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EFFECTS OF KOLB'S EXPERIENTIAL LEARNING MODEL AND GARDNER'S MULTIPLE INTELLIGENCE LEARNING MODEL ON STUDENTS' CRITICAL THINKING IN ELECTRICAL INSTALLATION AND MAINTENANCE WORK

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Abstract

This study investigated the effects of Kolb's experiential and Gardner's multiple intelligence learning model on students' critical thinking in electrical installation and maintenance work. Two research questions guided the study while three hypotheses formulated were tested at 0.05 level of significance. The study adopted a quasi-experimental treatment group design and it was carried out in North West Nigeria. The population for the study was 903 National Technical Certificate II (NTC II) students offering electrical installation and maintenance work in technical colleges in North-West, Nigeria. The simple random sampling technique was used to select 127 students consisting of 109 male and 18 female students assigned to two treatment groups using intact class. The instrument used for data collection was Electrical Installation and Maintenance work Critical Thinking Test (EICTT).The instrument was developed by the researcher and to ensure content validity, the instrument was subjected to face validation by five experts. The internal consistency of the instrument was determined by using Pearson moment correlation and coefficient of reliability of 0.84 was obtained. The data collected was analyzed using Mean to answer the two research questions while ANCOVA was used to test the three null hypotheses. The study found out, among others, that Gardner's multiple intelligence learning model was more effective than Kolb's experiential learning model in improving student's critical thinking of students in Electrical Installation and Maintenance Work. There was an influence of gender on students' critical thinking favoring males. However, gender had significant influence on students' critical thinking. The study found a significant interaction effect of methods and gender on students 'critical thinking. The study recommended among others that NBTE should incorporate Gardner's multiple intelligence learning model in the teaching/learning of Electrical Installation and Maintenance Work in Technical Colleges. In addition, workshops, seminars and conferences should be organized by Federal Ministry of Education and States Science and Technical Schools Management Board for teachers to enable them update their knowledge and skills on the use of Gardner's multiple intelligence learning model for improving students' critical thinking in Electrical Installation and Maintenance Work.

Introduction

Technology education is critical to sustainable development of the nation. It has been transforming human life in one way or another for many years. It is glaring that the pace of technological transformation has been very rapid in recent times precipitating numerous challenges on daily basis. Inherently, issues challenging the sustainable existence of humankind and general wellbeing such as automation, globalization, workplace change and policies increasing personal responsibility are growing (Jerald, 2009). These have necessitated a need to equip current and future citizens in general and Electrical Installation and Maintenance Work students in particular, with skills to address the rapidly evolving technology needs and challenges of the 21st century (Abdullahi, 2010). These skills go beyond the science process skills, but the broader skills such as critical thinking and creativity skills (Silva, 2008; Nwosu, 2015). Electrical Installation and Maintenance Work has the technology potentials to provide the needed solutions to the challenges of the millennium (Salihu, 2014).

The potentials of Electrical Installation and Maintenance work in providing the desired national sustainability is mirrored in the intents of its inclusion in the curriculum of Technical Colleges. The learning experience is aimed at the acquisition of appropriate level of literacy, numeracy, manipulation and life skills such as critical thinking for useful living within the society (Federal Ministry of Education, 2004). However, these skill objectives are yet to be achieved in technical colleges as a result, poor academic achievement of students in Electrical Installation and Maintenance work have been recorded in recent times. Technical and Vocational educators have identified some factors militating against the attainment of the objectives to include teachers' methodology and strategies. To acquire the relevant learning experiences and skills in electrical installation and maintenance work for example, requires the use of relevant instructional methods and techniques

Instructional methods and techniques are ways by which teachers present their course materials to learners and engage them in the task of learning the curriculum contents. Instructional methods and techniques are the tools used by the teacher for actualizing the set aims and objectives (Bello and Aliyu 2013). If the tools are faulty or inappropriate, the aims and objectives of the teaching and learning will not be achieved. It is clear from the foregoing that the possibility of Electrical Installation and Maintenance work to provide the needed solutions to the challenges of the millennium depends on the ability of Electrical Installation and Maintenance work teachers to select and maximally utilize appropriate instructional techniques and methods for their lesson delivery. The teaching methods are expected to reflect a modern society mandating the need for functioning, thinking-oriented, decision-making students. There is an overall lack of political and public confidence in Technical College training systems and a profound mismatch between the radically new key competencies demanded from students in the knowledge society and the teaching skills that teachers are equipped with, in teacher training institutions (Abdullahi, 2010). Nevertheless, the need for exposing the prospective students of Electrical Installation and Maintenance work to quality knowledge and skills, both practical and cognitive, remains a necessity. Technical educators maintain that the task can only be accomplished with a radical change from the use of teacher-centered approach in Technical college programmes to the use of student-centered approaches such as the Kolb's experiential learning model (Nwosu, 2015).

Kolb's experiential learning model is one of the widely used models. University of phoenix (2017) popularized experiential learning model as the most efficient method for mastering new concepts. This model takes its root from kolb's learning cycle. Kolb's Learning Cycle is a well-known theory which argues human beings learn from their experiences of life, even on an everyday basis. This also treats reflection as an integral part of such learning. University of Leicester (2017) reported that experiential learning theory provides a holistic model of the learning process and is a multi-linear model of adult development, both of which are consistent with what people know about how they naturally learn, grow, and develop. According to Kolb (1984), the process of learning follows a pattern or cycle consisting of four stages, one of which involves what Kolb refers to as 'reflective observation'. According to Kolb in the report of University of Phoenix (2017) knowledge results from the combination of grasping experience and transforming it. In Kolb's experiential learning model, there are four distinct segments to learning: description of concrete experience, reflections, generalizations/principles/theories and testing and application. Kolb's experiential learning model according to Kolb and Kolb (2005), sets out four distinct learning styles (or preferences), which are based on a four-stage learning cycle (Which might also be interpreted as a 'training cycle') in which 'immediate or concrete experiences' provide a basis for 'observations and reflections'. The observations and reflections' are assimilated and distilled into 'abstract concepts' producing new implications for action which can be 'actively tested' in turn creating new experiences. Kolb and Kolb (2005), further explained that ideally (and by inference not always) this process represents a learning cycle or spiral where the learner 'touches all the bases, i.e. a cycle of experiencing, reflecting, thinking, and acting. Immediate or concrete experiences lead to observations and reflections. These reflections are then assimilated (absorbed and translated) into abstract concepts with implications for action, which the person can actively test and experiment with, which in turn enable the creation of new experiences. Kolb (1984) model therefore works on two levels - a four-stage cycle: Concrete Experience - (CE), Reflective Observation - (RO), Abstract Conceptualization - (AC) and Active Experimentation - (AE), and a four-type definition of learning styles, (each representing the combination of two preferred styles, rather than a two by-two matrix of the four-stage cycle styles), for which Kolb used the terms: Diverging (CE/RO), Assimilating (AC/RO), Converging (AC/AE) and Accommodating (CE/AE).

The experiential learning model is acknowledged by academics, teachers, managers and trainers as fundamental concepts towards understanding and explaining human learning behaviour, and towards helping others to learn (Zagorac, Ivanis, Nuhbegovic, & Steiner, 2008). According to Greenway (2004), experiential learning model finds its application in a wide range of disciplines, especially in education and computer science to improve students' learning abilities. Kolb's experiential learning model, just like Gardner's multiple intelligence model, aimed at improving learning. Experiential styles refer to the preferred way individual processes information. The style is usually described as a personality dimension which influences attitudes, values, and social interaction.

Gardner's Multiple Intelligence Learning Model is a modern model that takes its root from the theory of multiple intelligences who suggests that the traditional notion of intelligence, based on intelligent quotient (IQ) testing, is far too limited. Gardner's Multiple Intelligence Learning Model according to Armstrong (2009) has eight different intelligences to account for a broader range of human potential in children and adults. Gardner also emphasizes the cultural context of multiple intelligences. Each culture tends to emphasize particular intelligence, suggests that there are a number of distinct forms of intelligence that each individual possesses in varying degrees. According to Gardner, the implication of the model is that learning/teaching should focus on the particular intelligence's of each person. For example, if an individual has strong spatial or musical intelligence's, they should be encouraged to develop these abilities. Gardner points out that the different intelligence's represent not only different content domains but also learning modalities.

In explaining multiple intelligences model, Gardner claims that all humans have eight intelligences, to a lesser or greater extent, and that each human have a different intelligence profile. This profile is based on genetics and experiences, and makes it unique from others. The intelligences are as follows: Linguistic intelligence is the ability to use spoken and written language effectively to express oneself; Logical-mathematical intelligence is the ability to analyze problems logically, work effectively with mathematical operations, and investigate issues using the scientific method. Finding patterns and deductive reasoning are other capabilities associated with this intelligence; Musical intelligence is the ability to perform, compose, and appreciate musical patterns, including changes in pitch, tone, and rhythm; Bodily-kinesthetic intelligence is the ability to use the body for expression. People high in this intelligence use their physical coordination to master problems; Spatial intelligence is the ability to recognize, use, and interpret images and patterns and to reproduce objects in three dimensions; Interpersonal intelligence is the ability to understand people's intentions, motivations, and desires. The intelligence allows individuals to work well with others; Intrapersonal intelligence is the ability to understand one, and to interpret and appreciate ones' own feelings and motivations; Naturalist intelligence is the ability to recognize and appreciate relationship with the natural world. According to Gardner (2000), Kolb's experiential learning model and Gardner's Multiple Intelligence Learning Model have been found to be an effective technique for increasing academic achievement of students in concepts in computer science among others in non-technical institutions unlike technical colleges.

Technical college is a type of secondary school established either by government or individual to offer technical and vocational trades leading to acquisition of knowledge and skills required for further studies or employment. Bakare (2009) defined technical college as a post primary institution equivalent to secondary school charged with the production of craftsmen and technicians. Technical colleges offer various technical and vocational trades and some of the trades include motor vehicle and mechanic work, radio and television, refrigeration and air conditioning, furniture and cabinet making, welding and fabrication, block laying and concrete work and electrical installation and maintenance work. Federal Government of Nigeria (2008), stated that the length of trades in a technical college, like other senior secondary schools shall be three years for the craft level and four years for the advanced craft level and National Business and Technical Examinations Board (NABTEB) shall award National Technical Certificate (NTC), National Business Certificate (NBC), Advanced National Technical Certificate (ANTC), and Advanced National Business Certificate (ANBC) to the successful graduates of technical colleges. Electrical installation and maintenance work offer in technical colleges is geared towards the graduation of technicians, and craftsmen who have skills and knowledge to meet the demand of electrical/electronic industries.

Electrical installation and maintenance work (EIMW) is one of the trades offered in Technical Colleges in Nigeria. Bakare (2010) described EIMW as electrical engineering trade offered in Nigerian technical colleges which has Battery Charging and maintenance, Domestic Installation, Industrial Installation, Cable Jointing, Winding of Electrical Machines and Solid State Devices as its components. According to national board for technical education (2007), EIMW was incorporated into the curriculum of technical colleges to facilitate the attainment of the objective on maintenance, service, and installation of electrical equipment and machines. In EIMW according to Bakare (2010), students learn basic practical skills needed to install, operate, maintain, and repair electrical and electronic equipment.

Critical thinking is a rational thinking in the pursuit of relevant and reliable knowledge about the material world. It is a purposeful, self-regulatory judgment which result in interpretation, analysis, evaluation and inference as well as explanation of the evidential, conceptual, methodological or contextual considerations upon which judgment was based (James, 2007). Critical thinking in this study is a reflective thinking which enables Electrical Installation and maintenance work students to draw conclusions, make tacit assumptions, deduce, interpret and evaluate arguments. The goal of critical thinking, which concurs with the goals of electrical installation and maintenance work teaching, according to Angeli and Valanides (2008)is that critical-thinking skills are necessary for active citizenship in any pluralistic and democratic society, where citizens are daily confronted with tremendous amounts of information and ill-defined problems with real uncertainty as to how they can be best solved. Heong, Yunos and Hassan (2011) discovered that achievement relates positively to Critical thinking skill acquisition at different education levels. These researches were based on foreign countries however the need for developing critical thinking more than ever before, less have been reported on the Nigerian environment with KELM and GMIM.

Gender according to Santrock (2001) involves the biological dimension of being a female or male. This has been a crucial matter to the educationists. Issues that are multidimensional in outlook as they relate to the teaching and learning of technical education in this regard have been very contentious. Providing quality education ensures sustainable development, Adapting an approach that takes into account the relationship and interaction between males and females. However, literature abound with statistics that gender parity could be established in science and technology classes that emphasize hands-on/activity based instructional strategies. In view of the fact that model methods such as the inductive and deductive inquiry have been used as well as other activity based strategies such as cooperative learning on gender issues in electrical installation and maintenance work, the result is still inconclusive. Hence, there is the need to try the Kolb's Experiential Learning Model (KELM) and Gardner's Multiple Intelligence Learning Model (GMIM) and ascertains its impact on critical thinking of both male and female electrical installation and maintenance work students.

Method

The study used quasi experimental treatment group design aimed at investigated the effects of Kolb's experiential and Gardner's multiple intelligence learning models on students' critical thinking in Electrical Installation and Maintenance work in. Two research questions guided the study while three hypotheses formulated were tested at 0.05 level of significance. The population for the study was 903 National Technical Certificate II (NTC II) students offering Electrical Installation and Maintenance work in technical colleges in North-West, Nigeria. The simple random sampling technique was used to select 127 students consisting of 109 male and 18 female students assigned to two treatment groups using intact class. The instrument used for data collection is Electrical Installation and Maintenance work Critical Thinking Test (EICTT). The instrument was developed by the researcher. To ensure content validity of the instrument, the instrument was validation by five experts. One in Measurement and Evaluation, one in Education Psychology, drawn from both Departments of Science and Adult Education and two in Electrical Technology Department of Industrial Technical Education all from University of Nigeria, Nsukka, and one in Electrical Installation and Maintenance Work from Government Technical College Malali, Kaduna. To establish the reliability of the instrument, the instrument was carried out on 30 sampled NTCII students at Government Technical College Soba, Kaduna State in North-west geo-political zone of Nigeria. The Pearson moment correlation coefficient was used to determine the internal consistency of the instrument. The reliability coefficient of the instrument was found to be 0.84. The data collected were analyzed using Mean to answer the two research questions while ANCOVA was used to test the three null hypotheses.

Results

Table1

***Mean and Standard Deviation of Pretest and Posttest Scores of Kolb's Experiential Learning Model and Gardner's Multiple Intelligences Learning Model Groups on the* Critical Thinking Test**

Group	N	Pre test		Posttest scores		Mean Gain
		$\overline{X}$	SD	$\overline{X}$	SD	$\overline{X}$
KELM	82	22.63	7.95	56.94	7.02	34.31
GMIM	45	15.18	5.41	54.22	7.71	39.04

The results presented in Table 1 showed that Kolb's experiential learning model group had a Mean score of 22.63 and Standard Deviation of 7.95 in the pre-test and a Mean score of 56.94 and Standard Deviation of 7.02 in the post-test making with a Mean gain of 34.31. Gardner's multiple intelligence learning model group had a Mean score of 15.18 and Standard Deviation of 5.41 in the pre-test and a post-test Mean of 54.22 and Standard Deviation of 7.71, with a Mean gain of 39.04. With these results, Gardner's multiple intelligence learning model in improving students' Critical Thinking in Electrical Installation and Maintenance Work was higher than Kolb's experiential learning model.

Table 2
Mean and Standard Deviation of Pretest and Posttest on the Influence of Gender on Critical Thinking Scores of Students Taught using Kolb's Experiential Learning Model(KELM) and Gardner's Multiple Intelligences Learning Model (GMIM)

Group	Gender	N	Pretest scores		Posttest scores		Mean Gain
KELM			$\overline{X}$	**SD**	$\overline{X}$	**SD**	$\overline{X}$
	M	74	21.69	7.36	56.97	7.11	35.28
	F	8	31.37	8.42	56.62	6.48	25.25
GMIM	M	35	14.91	5.83	54.63	7.64	39.72
	F	10	16.10	3.66	52.80	8.24	36.70

The data presented in Table 2 showed the influence of gender on Electrical Installation and Maintenance Work student's Critical Thinking when exposed to Kolb's experiential learning model. Result showed that the male students taught with Kolb's experiential learning model had a pretest mean of 21.69 with a standard deviation of 7.36 and a posttest mean of 56.97 with a standard deviation of 7.11. The difference between the pretest and posttest mean for the male students was 35.28. The female students taught using Kolb's experiential learning model had a pretest mean of 31.37 with a standard deviation of 8.42 and a posttest mean of 56.62 with a standard deviation of 6.48. The difference between the pretest and posttest mean for the female students was 25.25. Hence, the males taught with Kolb's experiential learning model achieved higher (35.28 > 25.25) than their female counterparts. Also the data presented in Table 11 shows the influence of gender on student's Critical Thinking when exposed to Gardner's Multiple Intelligence Learning Model. Result showed that the male students taught with Gardner's Multiple Intelligence Learning Model had a pretest mean of 14.91 with a standard deviation of 5.83 and a posttest mean of 54.63 with a standard deviation of 7.64. The difference between the pretest and posttest mean for the male students was 39.72. The female students taught using Gardner's Multiple Intelligence Learning Model had a pretest mean of 16.10 with a standard deviation of 3.66 and a posttest mean of 52.80 with a standard deviation of 8.24. The difference between the pretest and posttest mean for the female students was 36.70 Hence, the males taught with Gardner's Multiple Intelligence Learning Model achieved higher (39.72 > 36.70) than their female counterparts. Therefore, there is gender influence on students' Critical Thinking in Electrical Installation and Maintenance Work.

Hypothesis 1, 2 and 3

There is no significant difference in the effect of Kolb's Experiential Learning Model and Gardner's Multiple Intelligences Learning Model on methods, gender and interaction effect of methods and gender of students' Critical Thinking in Electrical Installation and Maintenance Work.

Table 3
Analysis of Covariance (ANCOVA) of the Difference in the Mean Scores of Methods, gender and interaction effects of Methods and gender on Critical Thinking of Electrical Installation and Maintenance Work Students Taught with KELM and those Taught with GMIM

Source	**Type III Sum of Square**	**Df**	**Mean Square**	**F**	**Sig.**
Corrected Model	329.655[a]	4	82.414	1.548	0.192
Intercept	29564.299	1	29564.299	555.474	0.000
Critical think pretest	88.318	1	88.318	1.659	0.200
Method	33.487	1	33.487	0.629	0.429

Gender	43.210	1	43.210	0.812	0.369
method * gender	0.648	1	0.648	0.012	0.912
Error	6493.274	122	53.224		
Total	404759.000	127			
Corrected Total	6822.929	126			

. a. R Squared = .048 (Adjusted R Squared = .017)

***Significant at sig of F<0.05**

The results in Table 3 showed that an F-ratio of 0.629 with associated probability value of 0.429 was obtained with regard to the difference in the mean scores of students taught with Kolb's experiential learning model and those taught with Gardner's multiple intelligence learning model. Since the associated probability (0.429)is greater than 0.05, the null hypothesis was accepted. Thus, this implies that the use of Kolb's experiential learning model and Gardner's multiple intelligence learning model did not significantly improved critical thinking of students in Electrical Installation and Maintenance Work.

The results in Table 3 showed that an F-ratio of 0.812 with associated probability value of 0.369 was obtained with regard to the difference in the influence of gender on the mean critical thinking scores of students taught with Kolb's experiential learning model and those taught with Gardner's multiple intelligence learning model. Since the associated probability (0.369) is greater than 0.05, the null hypothesis of no significant mean difference between the influence of gender (male and female) on students' critical thinking in Electrical Installation and Maintenance Work was accepted. Hence, this implies that the use of Kolb's Experiential and Gardner's Multiple Intelligence Learning Models result in no difference in the mean critical thinking scores of male and female students.

The results in Table 3 also showed that the interaction effect of methods and gender has an F-ratio of 0.012 with associated probability value of0.912 was obtained with regard to the difference in the mean interaction effect of Learning Models and Gender on critical thinking scores of students taught with Kolb's experiential learning model and those taught with Gardner's multiple intelligence learning model. Since the associated probability (0.912) isgreater than 0.05, the null hypothesis of no significant Interaction effect of Learning Models and Gender on Student's critical thinking was accepted. Hence, this implies that the use of Kolb's Experiential Learning Model and Gardner's Multiple Intelligence Learning Model result in no difference in the mean interaction effect of methods and gender on students' critical thinking scores in Electrical Installation and Maintenance Work.

Discussion

The data presented in Table 1 provided answer to research question one. It was revealed that the effect of Gardner's multiple intelligence learning model in improving students' critical is higher than Kolb's experiential learning model. The result indicates that Gardner's multiple intelligence learning model is more effective in improving students' critical thinking. However, analysis of covariance was used to test the first hypothesis (Table 3) at an F-ratio of 0.625 with associated probability value of 0.429 was obtained with regards to the difference in the mean scores of students taught with Kolb's experiential learning model and those taught with Gardner's multiple intelligence learning model. Since the associated probability (0.429) was greater than 0.05, the null hypothesis (HO_1) was accepted. The result means that there was no significant mean difference between the effect of Kolb's experiential and Gardner's multiple intelligence learning models on students' critical thinking in electrical installation and maintenance work.

The above findings are consistent with the findings of Heong, Yunos and Hassan (2011), Ramos, Dolipas and Villamor (2013) and Yang (2014) who, in their separate studies in other subjects found that the Multiple Intelligence based instructions had significant effect upon the students' critical thinking than other instructional formats. The findings of this study also support some literature evidence such as Shakirova (2007) explained that critical thinking skills are crucial in this millennium because they enable students to deal effectively with social, scientific, and practical problems. Practical activities in Gardner's multiple intelligence learning model group, aimed at addressing and developing students' verbal linguistic and logical mathematical intelligence. This allowed students to participate actively in the lesson by expressing their views freely, offering suggestions and opinions and asking questions. Encourage active interaction among students and between students and the teacher. Peter, (2012) and Weissberg, (2013) concluded that in a nutshell, students who are able to think critically are able to solve problems effectively. Merely having knowledge or information is not enough to be effective in the workplace (and in their personal lives), students must be able to solve problems to make effective decisions and they must be able to think critically.

The data presented in Table 2 provided answer to research question two. Findings revealed that gender has influence on students' critical thinking in Electrical Installation and Maintenance Work in favour of male students. However, analysis of covariance was used to test the second hypothesis (Table 3),at an F-ratio of 0.812 with associated probability value of (0.369) was obtained and confidence interval of 0.05.Since the associated probability 0.369 was greater than 0.05, the null hypothesis (HO_2) was accepted. The results showed that male students did not perform significantly better than their female counterparts in the acquisition of critical thinking skills when taught using Kolb's experiential and Gardner's multiple intelligence learning models. The finding of this study is similar to that of Heong, Yunos and Hassan (2011) and Myer and Dyer (2006)which showed that no higher order thinking skill and critical thinking skill differences respectively existed between male and female students in higher education. The nonexistence of significant gender influence on the acquisition of critical thinking skill unveiled by this study could be elucidated by the fact that both Kolb's experiential and Gardner's multiple intelligence learning models offered unique and equal opportunity devoid of the influences of socio-cognitive and stereotypical orientations for both males and females students to become stimulated/excited in the manipulative activities culminating into the development of these rationality traits. The outcome indicated that Electrical Installation and Maintenance Work students developed higher mental abilities which could be transferred to totally different situations. This is substantiated by the almost similar male and female Electrical Installation and Maintenance Work students' posttest mean scores in the components of critical thinking skills.

Analysis of covariance was used to test the third hypothesis (Table 3),at an F-ratio of 0.012 with associated probability value of (0.912) was obtained and confidence interval of 0.05.Since the associated probability 0.912 was greater than 0.05, the null hypothesis (HO_3) was accepted. There was no significant interaction effect of methods and gender on students taught with Kolb's experiential and Gardner's multiple intelligence learning models and their gender with respect to their mean scores on Electrical Installation and Maintenance Work critical thinking test. The finding of this study agrees with Yang (2014) who found a significant interaction effect between computer programming instruction group (logo and non-logo) and gender on the higher-order thinking skills and mathematical achievement of first grade students. The females in the Logo group performed significantly better on the Computation subscale than the females in the non-Logo group. This implies that the male and female students did not benefit equally due to school locations and method respectively. The result, therefore, means that students' gender (male or female) will not be a barrier to the learning of Electrical Installation and Maintenance Work subject in technical colleges. Hence, Electrical Installation and Maintenance Work teachers are encouraged to accept the fact that gender issue (male or female) should not be seen as adversely influencing academic learning in

Electrical Installation and Maintenance Work classroom.

Conclusion

Based on the findings of the study the following conclusions were made:

Kolb's experiential learning model and Gardner's multiple intelligences learning model are effective in enhancing students' critical thinking in Electrical Installation and Maintenance Work. However, Gardner's multiple intelligences learning model is more effective than Kolb's experiential learning model. It was also concluded that there was significant difference in the performance of students taught with Gardner's multiple intelligence learning model when compared with those taught with Kolb's experiential learning model. Moreover, gender has influence on the students' critical thinking skills acquisition when taught with Gardner's multiple intelligences learning model. The study also concluded that there was no significant difference in critical thinking skills acquisition when taught Electrical Installation and Maintenance Work with Gardner's multiple intelligences and Kolb's experiential learning models in the Technical Colleges of North-Western States of Nigeria.

Recommendations

Based on the findings, the following recommendations are hereby made:

1. The National Board for Technical Education (NBTE) curricular content packages in the minimum standard should be restructured to aid Electrical Installation and Maintenance Work students' training through Gardner's multiple intelligences learning model.
2. Technical College Teachers should use Gardner's multiple intelligences learning model in teaching Electrical Installation and Maintenance Work.
3. The state and local government in conjunction with the Federal Ministry of Education should endeavor to organize in-service training in form of workshops, seminars, conferences and symposia regularly for Electrical Installation and Maintenance Work Teachers to enable them update their knowledge, attitudes and skills on the use of innovative teaching strategies such as Gardner's multiple intelligences learning model.

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DEVELOPMENT OF FABRICATION AND WELDING TRAINING CONTENTS FOR CRAFTSMEN

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Abstract

The study developed fabrication and welding training contents for craftsmen in south western Nigeria. Three research questions were answered while one null hypothesis formulated was tested at 0.05 level of significance. The population for the study was 986, which comprised of the 109 teachers of fabrication and welding, 826 craftsmen of fabrication and welding and 51 supervisors of fabrication and welding in industries in the six south west states of Nigeria. The sample size for this study was 275 which comprised of 109 teachers of fabrication and welding, 134 craftsmen of fabrication and welding and 32 supervisors of fabrication and welding in industries. Purposive, Multi-stage and proportionate stratified random sampling techniques were used to determine the sample size for the study. Fabrication and welding training content questionnaire (FWTCQ) was used for data collection for the study. The instrument was face validated by three experts. The internal consistency of FWTCQ items was determined using Cronbach Alpha reliability method. The overall internal consistency index was obtained to be 0.82. Two hundred and seventy five copies of FWTCQ were administered on the respondents but only 261 copies were properly completed and returned representing 94.90 percent return rate. Mean was used for answering the research questions while analysis of covariance (ANCOVA) was employed for testing the null hypothesis at 0.05 level of significance. The findings of the study revealed 24 contents, 41 facilities and 25 teaching strategies for training fabrication and welding craftsmen. The hypothesis tested revealed that there was a significant difference between the mean responses of teachers, craftsmen and supervisors on the 24 contents, 41 facilities and 26 teaching strategies for implementing the fabrication and welding training contents. It was recommended that the developed fabrication and welding training contents should be employed for re-training of craftsmen. It was also recommended that the training contents in fabrication and welding should be integrated into curriculum of technical colleges in Nigeria.

Keywords: fabrication, contents, training, supervisors, craftsmen

Introduction

Training for skills development and acquisition in fabrication and welding as well as other trade areas is the major objective of technical colleges in Nigeria. National Board for Technical Education (NBTE, 2003) described Technical College as an institution that provides students through training with the relevant and adequate knowledge, skills and attitudes for employment under the guidance of teachers or instructors in related occupations. Alade, Ayodele and Ayodele (2010) described technical college as an institution where students are trained to acquire relevant knowledge and skills in different occupations for employment in the world of work. Technical college, according to Collins (2011), is a college where one can study arts and technical courses often as part of the qualifications and training required for a particular job. The goals of Technical Colleges as stated in the National policy on education, Federal Republic of Nigeria (FRN, 2004) are to, provide trained manpower in the applied sciences, technology and business particularly at craft, advanced craft and technician levels; provide the technical knowledge and vocational skills necessary for agricultural, commercial and economic development; and give training and impart the requisite skills to individual who shall be self-reliant economically. Technical Colleges are geared towards production of skilled graduates in various trades or occupations such as building, auto mechanics, woodwork, fabrication and welding, among others.

Fabrication and welding is one of the trades offered in Technical Colleges. Various skills, knowledge and attitudes are expected to be learnt by individuals in fabrication and welding for employment. Johnson (2012) described fabrication and metal welding as the building of metal structures by cutting, bending, and assembling processes. According to Yisa (2016), cutting is done by sawing, shearing, or chiseling (all with manual and powered variants), torching with hand-held torches (such as oxy-fuel torches or plasma torches); and via numerical control cutters (using a laser, mill bits, torch, or water jet).Bending is carried out by hammering (manual or powered) or via press brakes and similar tools (Kelvin, 2013). Assembling (joining of the pieces) is done by welding, binding with adhesives, riveting, threaded fasteners, or even yet more bending in the form of a crimped seam. Structural steel and sheet metal are the usual starting materials for fabrication, along with the welding wire, flux, and fasteners that will join the cut pieces. As with other manufacturing processes, both human labour and automation are commonly used. Fabrication and welding, according to Federal Government of Nigeria (2007), is designed to produce skilled craftsmen with good knowledge of the application of the equipment, materials, techniques and safety practices in fabrication and welding of metal projects. The report of National Board for Technical Education (2008) stated that on completion of the fabrication and welding programme, the students should be able to: carry out gas welding and cutting jobs on all types of metals, produce simple finished structural steel work projects with safety, using relevant equipment and techniques, apply protective wetting against corrosion on finished metal projects and market finished metal projects. Skills in fabrication and welding are taught by fabrication and welding teachers because they had undergone teachers' training programme and possess teaching qualifications that qualify them to teach. Fabrication and welding at technical college level is expected to equip individuals/students with skills for self reliance and this can be achieved when effective training in fabrication and welding is rendered.

Training is a learning process that involves the acquisition of knowledge, skills, concepts, rules, or changing of attitudes and behaviours over time to enhance the performance of the individual trained. Training is activity leading to skilled behaviour. Farunde (1995) stated that training involves acquiring information and abilities or attitudes, which will result in greater competence in the performance of a work. Training according to Olatunji, Kajibola and Coker (2011), is the systematic development of the attitude, knowledge and skill behaviour pattern required by an individual in order to perform adequately a given task or job. It is an activity, which is concerned with making individuals more articulate and efficient in the performance of their current tasks or in preparation for a new type of job to meet the dynamic needs of the organization (Ademola, 2009)**.** Training therefore is about using well developed contents for updating the knowledge, skills, and abilities of individual fabrication and welding craftsmen.

Content is simply what is to be learnt by the individual students either from text book or oral instruction or from the experiences in the environment. It is the knowledge, skills, concepts, principles, attitudes and values to be learned (Balitu, 2012). Content according, to Kapoma and Namusokwe (2011), is a list of subjects, topics, skills, themes, concepts or works to be covered. Similarly, Onah (2013) stated that curriculum content is the subject matter, ideas, skills or substance of what is to be taught. Furthermore, Olaitan and Ali (1997) depicted curriculum content as the knowledge, skills, attitudes and values to be learnt in a course, subject or lesson. Content of the training in fabrication and welding therefore is the subject matter which encompasses knowledge, skills, concepts, attitudes, principles and values to be taught to and learnt by the craftsmen under the guidance of a trainer. Contents are always taught to learners using relevant teaching methods.

Teaching is the art of transferring planned instructions to learners and this depends on the types of methods employed by teachers. Teaching methods are ways in which teachers use to deliver planned instruction/lessons to students. Bannon (2008) described teaching methods as ways that information is presented to students. These methods are more efficacious than others (Ukoha and Eneogwe, 1996). Some methods are more suitable for learning certain contents, that is, skill, knowledge, values, and attitudes. Still others yield better results for large group or individualized instructions. Teaching methods in technical and vocational education include demonstration, discussion, lecture, questioning, explanatory, practical and project. Further, some methods yield better performance for students with other traits. Barnstein (2006) stated that using appropriate teaching methods with relevant facilities to teach, results to better performance of learners.

Facilities, according to Agbo (2000) are materials designed or created to provide a service or fulfill a need. Facilities are those things used for teaching and learning fabrication and welding. These include numerous machines, tools, consumable materials and workshops. Onipede (2013) stated that facilities are material resource inputs necessary for effective teaching and learning to take place. Amount of skills acquired by individual trainees surely depends on the quality of trainers and the facilities used for training. Facilities in fabrication and welding are used by teachers/trainers and students/trainees to make teaching and learning more practical and real. These facilities include metal sheet, hacksaw, steel measuring tape, tapered shank drill bits, open end wrenches, screw drivers and wire brush among others. Robert (2012) explained that facilities help trainers to translate abstract ideas to concentrate ideas. Taiwo (2010) explained the contributions of using facilities during teaching and learning to include the following: aid in attracting the attention of students and as a result improve their interest level, stimulate students' interest to participate in the teaching and learning activities, help students to picture reality in what has been taught and create an interactive learning environment thereby facilitating effective teaching and learning. Training learners with relevant facilities help in acquiring skills to carry out given tasks. The skills acquired by learners are usually assessed using evaluation techniques.

Well developed contents could be used to train individual craftsmen in fabrication and welding. Akpan (2003) observed that despite the theoretical justification for the establishment of the National Board for Technical Education (NBTE) and attempts to produce skilled craftsmen from technical colleges who would be enterprising and self reliant, the objectives have not been achieved. According to Oyebade (2003), no one can accurately quantify the loss incurred by individuals, parents, communities and the nation when the educated, the willing and the able youths rot away to joblessness. Oyebade attributed the reason for this unemployment among technical college graduates to unemployable skills acquired by the graduates, while at school. Skills to weld and fabricate modern technologies such as metal doors and windows, railing of staircases and balconies with stainless steel, aluminum with glasses and security door for homes and financial houses are found deficient in the existing modules of fabrication and welding. The craftsmen or graduates are trained on obsolete technologies and therefore find themselves unemployable in the modern society. There is therefore need to develop fabrication and welding training contents for craftsmen. This is highly imperative because it will equip them with modern and relevant skills required to perform most modern operations in fabrication and welding. It will enable the craftsmen to establish their own workshops or industries instead of besieging ministries and government offices in search of white collar jobs that are either extremely few in supply or even non-existent, or riding motor cycle popularly known as Okada. Training fabrication and welding craftsmen with well developed contents will make them more proficient and relevant to the society to which they belong or found themselves. The general purpose of this study was to develop fabrication and welding training contents for craftsmen in south western, Nigeria. Specifically the study sought to determine:

1. Contents of training modules for graduates of Technical Colleges in fabrication and welding
2. Facilities for implementing skill training modules for graduates of Technical Colleges in fabrication and welding
3. Teaching strategies for implementing skill training modules for graduates of Technical Colleges in fabrication and welding.

Research Questions

The following research questions guided the study:

1. What are the fabrication and welding training contents for retraining craftsmen?
2. What are the facilities for implementing fabrication and welding training contents?
3. What are the teaching strategies required for implementing fabrication and welding training contents?

Hypothesis

A null hypothesis was tested at 0.05 level of significance:

$H0_1$: There is no significant difference in the mean scores of craftsmen trained with fabrication and welding training contents and those trained without a training content

Method

Design of the Study

The study adopted Research and Development design (R and D). Gall, Gall and Borg (2007) explained that Research and Development is an industry based development approach involving the use of research findings to design and develop new programmes and materials which assist in improving knowledge and skills. To some researchers, this design is called functions of industry design. Olaitan (2003) described functions of industry design as a procedure for identifying skills from an industry using scientific or research principles. R and D design was suitable for this study because the study aimed at developing a new product which is fabrication and welding training content for updating craftsmens' knowledge, skills and attitudes in south western, Nigeria.

Area of the Study

The study was carried out in South West States of Nigeria. It comprises of six states which includes: Ekiti, Ondo, Osun, Oyo, Ogun and Lagos States. South west states of Nigeria have twenty-eight Technical Colleges out of which twelve offer fabrication and welding and forty-five registered fabrication and welding industries. South west of Nigeria was chosen for the study because it was observed that graduates of Technical Colleges who also known as craftsmen lack enough skills in fabrication and welding which are useful for fabrication and welding industries.

Population for the Study

The population for the study was 986 which comprised of the 109 teachers of technical colleges of fabrication and welding that offers fabrication and welding, 826 craftsmen in fabrication and welding industries and 51 supervisors of fabrication and welding industries all in the six south west states of Nigeria. The choice of technical college teachers of fabrication and welding was made because they are the group responsible for the training of technical college graduates in Nigeria. Graduates of technical colleges of fabrication and welding in industries and their supervisors were chosen for this study because they are the employers of these technical college graduates.

Sample and Sampling Techniques

The sample size for this study was 275. This comprised of 109 teachers in technical colleges teaching fabrication and welding, 134 craftsmen in fabrication and welding industries and 32 supervisors of fabrication and welding in industries all from the six states that made up south west of Nigeria. Multi-stage sampling techniques were used for this study. Firstly, purposive sampling was used to sample 109 teachers in technical colleges teaching fabrication and welding across the six states (i.e. Eleven from Ekiti, Fourteen from Ondo, Sixteen from Osun, Twenty-three from Oyo, Twenty-Five from Ogun and Twenty from Lagos). Secondly, proportionate stratified random sampling was used to select 134 craftsmen working in fabrication and welding industries (i.e. 13 from Ekiti, 15 from Ondo, 17 from Osun, 27 from Oyo, 29 from Ogun and 33 from Lagos). Also, 32 supervisors of fabrication and welding in industries were sampled using proportionate stratified random sampling across the six states of south west of Nigeria (i.e.2 from Ekiti, 4 from Ondo, 5 from Osun, 6 from Oyo, 7 from Ogun and 8 from Lagos.

Instrument for Data Collection

Structured questionnaire titled: Fabrication and welding Training Content Questionnaire (FWTCQ) was used as the instrument for data collection. To develop the questionnaire, the researcher visited the industries and listed modern technical skills in fabrication and welding and complemented it with additional information from literature. The questionnaire was divided into parts 1 and 2. Part 1 was used to obtain information on personal characteristics of the respondents while part 2 was divided into sections A, B & C. Section A consists of the contents for updating or training craftsmen in fabrication and welding, Section B deals with the facilities for implementing the fabrication and welding contents while Section C centred on teaching strategies for implementing the fabrication and welding training contents. Each item in part B of the instrument was assigned a five point response scale and the response options are: Highly required/Strongly Agreed (SA)- 5, Required/Agreed (A) – 4, Undecided (UD) -

3, Not Required/Disagreed (D) -2, Completely Required/Strongly Disagreed (SD) - 1. The respondents were asked to rank the response options to an item based on the level at which each item is required for development of fabrication and welding training contents for craftsmen in South Western, Nigeria.

Validation of the Instrument

The instrument for data collection was validated by three experts. One expert in the Department of Vocational Technical Education, University of Nigeria, Nsukka, one expert from Tai Solarin College of Education Omu-Ijebu and one expert of fabrication and welding industry in Lagos State. Each expert was served with a copy of the instrument and requested to identify ambiguities and ensure that items are clearly stated and appropriate for the research questions and null hypothesis formulated. They were asked to give suggestions for improving the instrument towards meeting the objectives of the study. The experts vetted the items of the questionnaire one by one and included relevant ones.

Reliability of the Instrument

Cronbach alpha method was used to determine internal consistency of the instrument items. To determine this, 20 respondents comprising 10 supervisors in fabrication and welding industries, five teachers and five craftsmen in fabrication and welding industries in Kogi State, North Central Nigeria. These respondents were chosen in Kogi state which is a state outside the study area in order to get reliable coefficient for the instrument for data collection. Statistical Packages for Social Sciences (SPSS) 16 versions was employed to analyse the data collected from the respondents and 0.80 reliability coefficient value was obtained for the entire items in the questionnaire.

Method of Data Collection

Two hundred and seventy five copies of the questionnaire were administered on both teachers of fabrication and welding, craftsmen and supervisors in fabrication and welding industries in the study area with the help of six research assistants. The research assistants were instructed by the researcher on how to administer instrument so as to ensure safe handling and return of the instrument. Each of the research assistants was deployed to administer copies of questionnaire to respondents in their various locations while the researcher closely supervised the research assistant. Two weeks was given to the respondents in order to complete the copies of the instrument for data collection. After two weeks the researcher and the six assistants went round to collect the administered copies of the instrument for analysis and they were able to retrieve back 261 copies of the questionnaire which represent 94.90 percent return rate. The remaining 14 were not able to be retrieved because the respondents were not available at the time of collection.

Method of Data Analysis

Data collected was analyzed using mean and standard deviation to answer the research questions 1-3. Decision on the research questions was based on the cut-off point of 3.50, in other words, any item with a mean rating of 3.50 or above is regarded as Agree and was accepted while any item with a mean rating below 3.50 was taken as disagree and will not be accepted. Data collected for testing null hypothesis was analyzed using analysis of covariance. The decision on testing the hypothesis was based on comparing the significant values with 0.05 level of significance. The hypothesis of no significant difference was upheld for any item whose exact probability value was greater than 0.05 level of significance. Hypothesis of no significant difference was rejected for any item whose exact probability value was less than 0.05 level of significance.

Results

Results for answering research questions and testing hypothesis are presented in Table 1-4

Table 1

Mean Responses and Standard deviation of Teachers, Craftsmen and Supervisors on the fabrication and welding training Contents for craftsmen

S/N	Contents of the Training Module	$\overline{X}$	S.D	Remarks
1	Carrying out cutting processes	3.72	0.94	Agree
2	Carry out bending operations on aluminum windows and types	3.62	0.82	Agree
3	Identify types of drills suitable for fabrications and welding	3.78	0.73	Agree
4	Carry out drilling operations	3.55	0.83	Agree
5	Carry out simple servicing and maintenance of drilling machines	3.58	0.83	Agree
6	Carry out shaping operation using machines	3.42	0.81	Disagree
7	Determine when and where to apply shaping machines	3.83	0.82	Agree
8	Use arc and gas welding machines successfully	3.94	0.77	Agree
9	State types of arc and gas welding machines	3.54	0.85	Agree
10	Select consumables for carrying out arc welding	3.93	0.96	Agree
11	Use power hack saws for cutting operation	3.81	0.84	Agree
12	Carry out grinding operation	3.89	0.85	Agree
13	Carry out folding operation	3.56	0.93	Agree
14	Use water jet machines	3.99	0.83	Agree
15	Apply plasma cutting machines	3.68	0.84	Agree
16	Apply plasma and oxy-fuel machines	3.90	0.75	Agree
17	Weld metal doors and windows	3.65	0.84	Agree
18	Construct Rail of staircase and balconies with steel with aluminum and stainless steel	3.57	0.89	Agree
19	Constructing of stair case railings with aluminium with fibre glass	3.78	0.84	Agree
20	Fix security doors and windows correctly	3.83	0.75	Agree
21	Assemble various piece of metal together	3.63	0.85	Agree
22	Apply appropriate methods in fabrication and welding	4.19	0.96	Agree
23	Apply methods for carrying out good and neat cutting processes	4.23	0.81	Agree
24	Identify right steps for fabrication and welding processes	3.91	0.91	Agree
25	Observe safety practice skills in fabrication and welding processes	3.96	0.73	Agree

Data in Table 1 show the 24 fabrication and welding training contents. The Means for the contents ranged from 3.54 to 4.23. Each Mean is above the cutoff of 3.50 indicating that all the contents could be used to training craftsmen in fabrication and welding. The standard deviation values for the 25 contents ranged from 0.73 to 0.96 and this shows that the respondents were not far from one another in their responses and that their responses were not far from the mean.

Table 2

Mean Responses and Standard deviation of Teachers, Craftsmen and Supervisors on the Facilities for implementing fabrication and welding Training Contents for Craftsmen

S/N	Training facilities	$\overline{X}$	S.D	Remarks
1	Metal sheets for making different metal articles	3.62	0.85	Agree
2	Hack saw for cutting metals of different types	3.67	0.96	Agree
3	Arc welding machines for welding	3.61	0.82	Agree
4	Clamps such as F or G clamps for holding metallic objects	3.78	0.83	Agree
5	Wire brush for cleaning and removing waste	3.79	0.96	Agree
6	Steel measuring tapes for taking measurement	3.84	0.76	Agree
7	Tapered shank drill bits for drilling	3.91	0.91	Agree
8	Pillar drilling machines for making holes of different diameters	3.63	0.82	Agree
9	Open end wrenches	3.52	0.86	Agree
10	Cutting pliers	3.73	0.83	Agree
11	Repair manuals	3.90	0.91	Agree
12	Spanners	3.80	0.78	Agree
13	Hand gloves	4.08	0.92	Agree
14	Overall and jackets	3.78	0.87	Agree
15	Safety boots	3.51	0.83	Agree
16	Eye protectors	3.95	0.93	Agree
17	Fire extinguishers	3.75	0.70	Agree
18	Oil spill collectors	3.52	0.83	Agree
19	Rags	3.70	0.83	Agree
20	Pliers for holding small objects	3.73	0.93	Agree
21	Crescent wrenches	3.74	0.76	Agree
22	Breaker bar	3.77	0.88	Agree
23	Hammers for hammering	3.88	0.92	Agree
24	Relevant textbooks	3.80	0.86	Agree
25	Starboard for teaching the competencies	3.96	0.71	Agree
26	Makers for writing on the board	3.74	0.79	Agree
27	Dusters for clean up	3.64	0.90	Agree
28	White board for writing	3.71	0.90	Agree
29	Blackboard and chalk for writing during training	3.85	0.78	Agree
30	Computer systems as one of the aids for instructing	3.73	0.90	Agree
31	Projector for transmitting planned competencies	4.15	0.72	Agree
32	Internet facilities for downloading relevant materials	3.74	0.83	Agree
33	Screw drivers for screwing screws of different kinds	3.92	0.79	Agree
34	Retractable Tape for measurement	3.88	1.04	Agree
35	Tie and dies for making threads	3.52	0.84	Agree
36	Scribers for marking out	3.80	0.83	Agree
37	Pedestal grinder	3.95	0.75	Agree
38	Rip cut saws	3.90	0.83	Agree
39	Water jet machines	3.83	0.84	Agree
40	Plasma cutting machines	4.01	0.93	Agree
41	Plasma and oxy-fuel machines	3.73	0.83	Agree

Keys: *X = Mean of Respondents, SD = Standard Deviation, A = Agree*

The data in Table 2 reveal 41 training facilities for training craftsmen in fabrication and welding. The Means for the facilities ranged from 3.51 to 4.15. Each Mean is above the cutoff of 3.50 indicating that all were required for implementing fabrication and welding training contents. The 41 training facilities had their standard deviation ranging from 0.70 to 1.04; thus indicating that the respondents were close to one another in their opinions and that they were not from the mean.

Table 3

Mean Responses of Teachers, Craftsmen and Supervisors on the Teaching Strategies required for implementing fabrication and welding Training Contents

S/N	Teaching strategies	$\bar{X}$	S.D	Remarks
1	Use modern tools and equipment such as water jet machines, plasma cutting machines, plasma and oxy-fuel machines to demonstrate some competences or skills to students	4.10	0.84	Agree
2	Allow fabrication and welding practitioners from industries to complement teaching provided by metalwork teachers	4.10	0.96	Agree
3	Take students to fabrication and welding industries when there is need for practical	3.88	1.07	Agree
4	Allow students to demonstrate knowledge and skills acquired by students from industries to another in a class setting	3.85	0.96	Agree
5	Engage fabrication and welding technocrat in team teaching	3.51	0.82	Agree
6	Provide special instruction in fabrication and welding for slow ability students	4.37	0.81	Agree
7	Use reciprocal peer tutoring to teach some concepts in fabrication and welding	3.76	0.87	Agree
8	Allow students to improvise why teaching themselves on fabrication and welding	4.28	1.01	Agree
9	Develop fabrication and weldingprogramme instruction for teaching students skill contents	4.24	0.93	Agree
10	Teach fabrication and welding using water jet machines, plasma cutting machines, plasma and oxy-fuel machines where necessary	3.93	0.79	Agree
11	Involve students in learning process by asking fabrication and welding questions which provoke critical thinking	3.82	1.05	Agree
12	Prepare fabrication and welding instructions in power points for teaching students	4.27	1.07	Agree
13	Deliver the prepared fabrication and welding instruction using overhead projector and laptop in order to improve students' learning	3.55	0.89	Agree
14	Demonstrate problem solving solutions which allow students to develop creative activities in fabrication and welding	4.22	0.95	Agree
15	Teach the students with already developed web fabrication and welding	3.69	0.81	Agree
16	Employ team teaching techniques	3.73	0.98	Agree
17	Make connections logical, accurate and meaningful to learners while teaching fabrication and welding	3.77	0.99	Agree
18	Used individualized fabrication and welding project package for students during practical	3.84	0.82	Agree
19	Adopt fabrication and welding experiential approaches in a discussion with students	3.84	0.79	Agree
20	Direct individual trainee progress and his performance more consistently	3.77	0.85	Agree
21	Use improvised fabrication and welding materials for teaching the students	4.09	0.82	Agree
22	Invite successful fabrication and welding entrepreneurs to model trainees in schools	3.33	0.72	Agree
23	Use ICT to teach practical contents of fabrication and welding to students using virtue laboratory	3.51	0.80	Agree
24	Adopt e-teaching approach to deliver fabrication and welding instructions to students	4.02	0.86	Agree
25	Teach fabrication and welding students with interactive television	4.00	0.98	Agree
26	Use smart board to deliver instructions on modern operations in fabrication and welding	3.82	0.97	Agree

Keys: *X = Mean of Respondents, SD = Standard Deviation, A = Agree*

The data in Table 3 reveal that 25 out of 26 teaching strategies had their Mean values ranged from 3.51 to 4.37 and were above the cutoff point of 3.50. This indicated that all the 25 strategies were required for teaching the training contents in welding and fabrication.

The 26 teaching strategies also had their standard deviation ranged from 0.72 to 1.07 and this indicated that the respondents are not too far from the mean and are close to one another in their responses.

Table 4

Summary of Analysis of Covariance (ANCOVA) for Test of Significance in the Mean Scores of craftsmen trained with Fabrication and Welding Training Contents and those Trained without a Training Contents

Source	Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	122.965[a]	2	61.4825	39.306	.000
Intercept	.425	1	.425	.270	.605
post – test	107.215	1	107.215	69.675	.000
Group	5.814	1	5.814	2.818	.029
Error	102.021	34	3.001		
Total	88279.021	37			
Corrected Total	221.986	36			

***Significant at Sig. of F< .05**

The data in Table 4 shows that the F-value for group stood at 2.818 with significant of F at .029, which is less than .05. Hence, the null-hypothesis was therefore rejected at .05 level of significance. This indicates that, there was a significant difference in the mean scores of craftsmen trained with fabrication and welding training contents and those trained without training contents

Discussion

Twenty five fabrication and welding training contents were found for training craftsmen. The prominent among the contents are: apply appropriate methods in fabrication and welding, carrying out cutting processes, apply methods for carrying out good and net cutting processes, carry out bending operations on aluminum windows and types. These findings are in agreement with the opinion of Olaitan and Ali (1997) who depicted curriculum content as the knowledge, skills, attitudes and values to be learnt in a course, subject or lesson. Also the findings agreed with the finding of Onah (2013) who developed a digital empowerment programme for students on e-learning in the universities in southeast of Nigeria and found that contents of a training programme can be best stated in knowledge and skills or tasks. Bakare (2014) explained that the contents of empirically developed modules are derived from the stated training objectives.

The finding reveals 41 facilities for implementing the training contents in fabrication and welding. These findings agreed with the findings of Anthony, Saidu, Mohammed and Junguru (2009) who carried out a study on development of entrepreneurial skills in youths through information and communication technology and found that facilities are the major requirements for the acquisition of entrepreneurial skills. In fabrication and welding, crescent wrenches, breaker bar, hammers among others are essential. Robert (2012) stated that facilities help trainers to translate abstract ideas to concentrate ideas. John (2012) stated that saw, fire extinguishers, oil spill collectors, rags and pliers for holding small objects are quite useful in carrying out fabrication and welding operations.

It was found that 25 strategies are required for teaching skill training contents in welding and fabrication and some of the strategies include use of modern tools and equipment such as water jet machines, plasma cutting machines and plasma and oxy-fuel machines to demonstrate some competences or skills to students. The findings agreed with the findings of Agbafor (2011) on the students' responses on the suitability of instructional methods for their learning which showed that the students agreed with the use of discussion method, explanation, demonstration, role playing, and brainstorming for instructional delivery in Ebonyi State. Teaching strategies are used to deliver planned instruction and Ukoha and Eneogwe (1996) stated that some strategies are more efficacious than others. Some methods are more suitable for learning certain contents, that is, skill, knowledge, values, and attitudes, still others yield better results for large group or individualized instructions.

Conclusion

Fabrication and welding was introduced into the programme of Technical Colleges in order to equip individuals with relevant skills, knowledge and attitudes for work after graduation. However, most of the graduates of fabrication and welding nowadays cannot display any skills in fabrication and welding when giving opportunity to serve. Some of the artisans who do not receive formal training on fabrication and welding perform better than the graduates of technical colleges. The existing modules of fabrication and welding lack skills and knowledge for operating modern machines and equipment such as water jet machines, plasma cutting machines, plasma and oxy-fuel machines, structure steel fabrication equipment, hydraulic iron workers, robotic and hand held welding supplies, to mention but a few, in order to carry out modern fabrication and welding activities that could attract employment to the graduates. The graduates could not perform most of the modern operations in fabrication and welding this is against the objective of including fabrication and welding into the programme of Technical Colleges. This situation therefore called for the development of training contents in fabrication and welding where appropriate contents, strategies, and relevant facilities were identified.

Recommendations

The study recommended the following for implementation:

1. The developed fabrication and welding training contents should be employed for retraining of technical college graduates
2. The fabrication and welding training contents should be integrated to curriculum of technical colleges in Nigeria
3. The capacity of teachers of fabrication and welding in technical colleges should be built for effective implementation of the integrated modules
4. Relevant facilities should be given to schools, skills acquisition centres, or any institutions ready to implementing the training contents in fabrication and welding.

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EFFECTS OF COMPUTER ASSISTED INSTRUCTIONAL (CAI) TECHNIQUE ON STUDENTS' ACHIEVEMENT IN ENTREPRENEURSHIP STUDIES IN BAYELSA STATE NIGERIA

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Abstract

The study investigated the effects of computer assisted instructional technique on students' achievement in entrepreneurship studies in Bayelsa State. Three research questions guided the study and three null hypotheses formulated were tested at 0.05 level of significance. The study adopted quasi-experimental design. The population for the study was 253 third year students of Business Education (120) and Business Administration (133) in Niger Delta University, Wilberforce Island, Bayelsa State. Due to the manageable size of the population, the entire 253 third year students offering entrepreneurship studies were involved in the study. Through balloting, Business Administration Department with 133 third year students was assigned to computer assisted instruction (experimental group) while Business Education with 120 third year students of was assigned to lecture method (control group). The instrument for data collection was 50-item multiple choice Entrepreneurship Studies Achievement Test (ESAT). The instrument was validated by three experts and the reliability was tested using Kuder Richardson 21 (K-R21) reliability method in which a coefficient of 0.81 was obtained. Data collected were analysed using mean and standard deviation for answering the research questions while Analysis of Covariance (ANCOVA) was used for teasing the hypothesis at 0.05 level of significance. Based on the data analyzed, the study found that students taught entrepreneurship with computer assisted instruction had significantly higher mean achievement score than the control group that taught with conventional lecture method. The study also found that gender of the students had no significant ($p<0.05$) interaction effects with the treatments given. Based on these findings, the study among others recommended that teachers at all levels of education should adopt the use of computer assisted instruction (CAI) for instructional delivery and that seminars, workshops and symposium should be periodically organized for lecturers and teachers on the development and effective usage of computer assisted instructional package to enhance learning among students.

Keywords: computer assisted instruction (CAI), conventional teaching, achievement, entrepreneurship studies, gender

Introduction

Tertiary institutions established to provide knowledge, skills and training to students who have successfully passed through secondary education and desirous of pursuing a chosen discipline for career. They are higher level schools for advanced education following the completion of secondary education. The duration of the study may be from four to seven years or more, depending upon the nature and complexity of the programmes pursued (Brickman, 2009). Education at this level is provided in colleges of education, universities or a type of professional school such as mono or polytechnics where learners are equipped with specialised knowledge and skills in a career and entrepreneurial pursuits on graduation. Entrepreneurship pursuit according to Diamanto (2005) involves staring up and successfully managing business ventures with acquired entrepreneurship skills for sustainable livelihood as entrepreneurs. This suggests the relevance of entrepreneurship studies as a programme in Nigerian tertiary institutions.

Entrepreneurship studies according to Solomon (2007) focus on equipping trainees with the willingness and ability to seek for investment opportunities, to establish and to run an enterprise successfully. Entrepreneurship studies in the opinion of Baba (2013) deals with the teaching of starting a business, arranging the business deals and take risks in order to make profit through the education skills. Akhuemonkhan, Raimi and Sofoluwe (2013) stated that the need for entrepreneurship studies has continued to feature as a captivating theme in local summits and international conferences because of its potency as tool for mitigating unemployment and other social-economic challenges inhibiting sustainable development in all parts of the globe. Entrepreneurship education prepares people to be accountable and innovative persons who become entrepreneurs and contribute to development and sustainability of their communities. It provides opportunities for youths to be experienced, acquire entrepreneurial knowledge, skills, and attitudes including opportunity recognition, idea creation and marshalling resources in face of risk to chase opportunities, venture creation and operation, creativity and critical thinking (Okolie, et al, 2014).

The great socio-economic relevance of entrepreneurship skills resulted in the adoption of entrepreneurship education to accelerate economic growth and development in Nigeria (Akhuemonkhan, Raimi and Sofoluwe, 2013). Some of the aims and objectives of entrepreneurship studies is to equip youth to be self-employed and self-reliant, reduce rate of unemployment and poverty, and to serve as catalyst for economic growth and development. Unfortunately, the present high rate of unemployment among Nigerian youths, graduates inclusive and the current economic depression in the country are clear indications that the objectives of entrepreneurship studies in our tertiary institutions are not achieved. The percentage of Nigerian graduates of tertiary institutions who are ready to venture into new businesses to make a living is reducing due to lack of functional entrepreneurial skills. This discouraging trend could have been aggravated by the ineffective conventional teaching techniques of the teachers or lecturers teaching entrepreneurship studies in Nigerian schools, Bayelsa State inclusive.

The conventional teaching methods mostly used for instructional delivery among teachers and lecturers in Bayelsa State had been widely criticized by scholars. For instance, conventional instructional method cannot effectively achieve educational goals because conventional method of instruction is teacher centered (NTI, 2008). Similarly, Adeyemi (2012) noted that the conventional instructional method is characterized by emphasis on instructor’s behaviour rather than students’ behavior, minimal responses of students to the instructional materials and delayed feedback on students’ performance. Therefore, in order to facilitate the achievement of entrepreneurship studies in tertiary institutions in Bayelsa State, effort must be made to embrace modern and interactive teaching methods for quality instructional delivery for improved interest and achievement of students in entrepreneurship studies. Hence, this study is aimed at testing the efficacy of computer assisted instructional (CAI) technique as a modern teaching method on students’ achievement.

Computer Assisted Instruction is a new teaching and learning strategy in which the topics to be taught is carefully planned, written and programmed in a computer which could be run at the same time in several computer units and it allows each students to one computer terminal (Safo, Ezenwa and Wushishi, 2013). The instructions can be programmed in a computer disc (CD), this could be played in either audio or video system for the student to learn the programmed at his/her leisure time and at his/her own pace. The potential benefit of Computer Assisted Instruction (CAI) cannot be underestimated in the contemporary world. In the opinion of Hayes and Robins in Kareem (2015), the use of computer based instruction is effective on the achievement of learners as well as their attitude towards computer instruction. Busari, Ernest and Ugwuanyi (2016) described computer assisted instructional technique as holding the promise of carrying the learners along as well as making them active rather than passive participants, stimulating their interest through visual representations that catches their attention to explore especially in the field of sciences. Computer assisted instructional methods is a technology-based approach that promotes students interaction with the teachers and the computer machines to maximize their learning for higher academic achievement.

Academic achievement is the learning outcomes of the students which can be measured by any form of assessment technique to ascertain academic gain of the students. According to Akinbobola (2006), academic achievement of students is learning outcomes which include the knowledge, the skill and experiences acquired in both classroom and laboratory practices. Boyle and Dunleavy (2003) shared that students' achievement in learning are determined by factors such as teachers ability, motivation, interest, meaningfulness of subject matter, methods of instruction, memory capacity of the learners and gender of the students. Gender has been identified as one of the factors influencing students' achievement (Anagbogu and Ezeliora, 2007). Gender refers to all the characteristics of male and female which describes behaviours or attributes expected of individuals on the basis of being either a male or female in a given society. With reference to teaching and learning, Wasagu and Mohammad (2007) reported that different results and views of researchers in studies of different subjects showed that male and female students perform differently as a result of cultural and traditional reasons. While the result from the study of Busari, Ernest and Ugwuanyi (2016) showed no significant different in the performance of male and female students, Olom (2010) revealed significant difference in gender achievement in favour of the females. Hence, this study was carried out to establish the effects of computer assisted instructional (CAI) technique on students' achievement in entrepreneurship studies in tertiary institutions in Bayelsa State, Nigeria.

Purpose of the Study

The main purpose of this study was to determine the effects of computer assisted instructional (CAI) technique on students' achievement in entrepreneurship studies in tertiary institutions in Bayelsa State, Nigeria. Specifically, the study investigated:

1. the effects of computer assisted instructional (CAI) technique on students' achievement in entrepreneurship studies.
2. the effects of gender on students' achievement in entrepreneurship studies.
3. the interaction effect of treatments (computer assisted instructional technique and conventional lecture method) and gender on students' achievement with respect to their achievement in entrepreneurship studies achievement test.

Research Questions

In line with the specific purposes of the study, the following research questions were answered by the study:

1. What are the mean achievement scores of students taught entrepreneurship studies with computer assisted instructional technique and those taught with conventional lecture method?
2. What is the effect of gender on students' achievement scores in entrepreneurship studies achievement test (ESAT)?
3. What is the interaction effect of treatments (computer assisted instructional (CAI) technique and lecture method) and gender on students' achievement with respect to their mean scores in entrepreneurship studies achievement test (ESAT)?

Hypotheses

The following hypotheses were tested at $p<0.05$ levels of significance:

$H0_1$: There is no significant difference in the mean achievement scores of students taught entrepreneurship studies with computer assisted instructional technique and those taught with conventional (lecture) method.

$H0_2$: There is no significant difference in the mean achievement scores of male and female students taught entrepreneurship studies with computer assisted instructional (CAI) technique and those taught with conventional (lecture) method in the entrepreneurship studies achievement test (ESAT).

$H0_3$: There is no significant interaction effect of treatments (computer assisted instructional (CAI) technique and lecture method) and gender on students' achievement with respect to their mean score in entrepreneurship studies achievement test (ESAT).

METHOD

The study was carried out in Bayelsa State, South-south Nigeria. Three research questions and three null hypotheses were developed to guide the study. The study adopted quasi-experimental design. Quasi-experimental design according to Ali (2006) is the most appropriate design when making use of two intact classes, one control and one experimental group so as not to disorganize the school time table. Hence, Gall, Gall and Borg (2007) equally affirmed that the use of quasi-experimental design permits the use of intact classes. The quasi experimental design is appropriate where the use of two or more already existing or intact groups is randomly assigned for the study. Specifically, this study adopted the pre-test, post-test non-equivalent group design. The pre-test was used to establish the level of achievement at which the students function in entrepreneurship studies before the treatments. At the end of the treatments, the post-test was conducted. This study therefore assigned treatments to students in intact classes to the two different instructional strategies (computer assisted instruction and lecture methods) in order to determine the efficacy of the modern instructional method (computer assisted instruction) on students' achievement.

The population for the study was 253 third year students of Business education (120) and Business administration (133) in Niger Delta University, Wilberforce Island Bayelsa State, Nigeria. Since the study investigated the effects of two teaching methods (computer assisted instruction (CAI) and lecture methods), third year students of the two intact classes constituted the sample for the study. Through balloting, Business Administration Department with 133 third year students was assigned to computer assisted instruction (CAI) (experimental group) while Business Education with 120 third year students of was assigned to lecture method (control group). The assignment of the two groups through balloting was to ensure that each of the two Departments/Unit has equal probability of being assigned to either experimental or control group. The instrument for data collection was 50-item multiple choice Entrepreneurship Studies Achievement Test (ESAT). The instrument was validated by three experts of which two are from Business education unit of the Department of Vocational and Technology Education, Wilberforce Island Bayelsa State while one was from the Department of Business Administration of the same University. The reliability of the Entrepreneurship Studies Achievement Test (ESAT) instrument was ascertained using Kuder Richardson 21 (K-R21) which yielded a coefficient of 0.82.

Prior to the commencement of the treatment, all students both in experimental and control groups were subjected to a pre-test in order to obtain the pre-test achievement scores. The scores obtained by students from the two groups represented their pre-test scores. Thereafter, the actual treatment began in which third year students of Business Administration offering Entrepreneurship Studies were taught using computer assisted instruction (CAI) while third year students of Business Education offering Entrepreneurship Studies were taught using conventional lecture method.

The treatment lasted for a period of six weeks. After the sixth week of the treatment, the post-test was administered to the students in their respective groups to obtain the post-test achievement scores. The scripts of the students were collated and marked by the researcher and the students were scored over 100. This is because, any correct answer out of the 50 questions is 2 mark. The data collected in the two stages (pre-test and post-test) from the two groups (experimental and control) were compiled for analysis. The data collected were analyzed using mean and standard deviation to answer the research questions while the hypotheses were tested using Analysis of Covariance (ANCOVA) at 0.05 level of significance.

RESULTS

Research Question One

What are the mean achievement scores of students taught entrepreneurship studies with computer assisted instructional technique and those taught with conventional lecture method?

The data for answering research question one are presented in Table 1.

Table 1: Pre-test and Post-test Mean Achievement Scores of Students Exposed to Computer Assisted Instruction and Conventional Lecture Method in Entrepreneurship Studies Achievement Test (ESAT)

Groups	N	Pretest $\bar{X}$	Pretest SD	Posttest $\bar{X}$	Posttest SD	Pre/Posttest Gain Scores
Computer Assisted Instruction (CAI)	133	42.15	14.83	69.05	9.76	26.90
Control (Lecture)	120	41.21	10.04	51.32	7.82	10.11

The result presented in Table 1 shows that students taught entrepreneurship studies with computer assisted instructional method had pre-test achievement score of 42.15, post-test score of 69.05 and mean achievement gain score of 26.90. On the other hand, students taught with conventional lecture method had pre-test mean achievement score of 41.21, post-test mean achievement score of 51.32 and mean achievement gain of 10.11. This result indicates that teaching students entrepreneurship studies using computer assisted instructional method significantly increased academic achievement of the students than the use of conventional lecture method.

Research Question Two

What is the effect of gender on students' achievement scores in entrepreneurship studies achievement test (ESAT)?

Table 2: Pre-test and Post-test Mean Scores of Male and Female Students taught Entrepreneurship Using Computer Assisted Instruction (CAI) and those taught with Conventional Lecture Method.

SN	Teaching Methods	Gender	N	Pre-test $\bar{X}$	Pre-test SD	Post-test $\bar{X}$	Post-test SD	Gain Scores
1	**Computer Assisted Instruction (CAI)**	Males	62	41.59	9.55	68.73	7.61	27.14
		Females	71	42.72	9.64	69.37	7.74	26.65
2	**Lecture (Control)**	Males	54	40.88	8.38	51.44	6.60	10.56
		Females	66	41.53	9.43	51.19	5.47	9.66

The result presented in Table 2 showed the effect of gender on the achievement scores of students taught entrepreneurship studies using computer assisted instruction and conventional lecture method. The result showed that male students taught entrepreneurship with computer assisted instruction had pre-test mean achievement score of 41.59, post-test mean achievement score of 68.73 and mean achievement gain of 27.14. Female students taught entrepreneurship with computer assisted instruction had pre-test mean achievement score of 42.72, post-test mean achievement score of 69.37 and mean achievement gain of 26.65.

For the control group, male students taught entrepreneurship with conventional lecture method had mean achievement score of 40.88 in the pre-test and 51.44 in the post-test making their mean achievement gain to be 10.56. The female students taught with conventional lecture method had mean achievement score of 41.53 in the pre-test and 51.19 in the post-test making their mean achievement gain to be 9.66. This result indicated that teaching entrepreneurship using computer assisted instruction appreciably increased the achievement of both male and female students than those taught with conventional lecture method.

Research Question Three

What is the interaction effect of treatments (computer assisted instructional (CAI) technique and lecture method) and gender on students' achievement with respect to their mean scores in entrepreneurship studies achievement test (ESAT)?

The data for answering research question three are presented in Table 3 below.

Table 3: Mean Interaction Effect of Treatments (Computer Assisted Instruction and Lecture method) and Gender of the Students on their achievement in Entrepreneurship Studies Achievement Test (ESAT).

Gender	Group	Pre-test	Post-test	Gain Scores
Male	Mean	41.24	60.09	18.85
	Std. Deviation	8.59	6.86	
	N	116	166	
Female	Mean	41.13	60.28	19.15
	Std. Deviation	7.55	6.39	
	N	137	137	
Total	Mean	41.19	60.19	19.00
	Std. Deviation	7.50	7.62	
	N	253	253	

The result presented in Table 3 above revealed that the interaction effect of gender and treatments (computer assisted instruction and lecture methods) on students' academic achievement in entrepreneurship test. The result showed that male students had mean achievement score of 41.24 in the pre-test and 60.09 in the post-test making their overall mean achievement gain in entrepreneurship test to be 18.85 for the male students. The female students on the other hand had mean achievement score of 41.13 in the pre-test and 60.28 in the post-test making the overall mean achievement gain of female students in the entrepreneurship test to be 19.15. This result showed that, there is no difference in the mean achievement scores of male and female students in the entrepreneurship studies achievement test (ESAT) as a result of the treatments given.

Testing of Hypotheses

The data for testing the hypotheses are presented in Table 4 below.

$H0_1$: There is no significant difference in the mean achievement score of students taught entrepreneurship studies with computer assisted instructional technique and those taught with conventional (lecture) method.

$H0_2$: There is no significant difference in the mean achievement scores of male and female students taught entrepreneurship studies with computer assisted instructional (CAI) technique and those taught with conventional (lecture) method in the entrepreneurship studies achievement test (ESAT).

$H0_3$: There is no significant interaction effect of treatments (computer assisted instructional (CAI) technique and lecture method) and gender on students' achievement with respect to their mean score in entrepreneurship studies achievement test (ESAT)

The data for testing hypotheses 1, 2, 4 and 4 are presented in Table 9 below:

Table 4: Summary of Analysis of Covariance (ANCOVA) for test of Significant Difference in the Mean Achievement Scores of Students in Entrepreneurship Studies with Interaction Effects of Gender and Treatments (Groups)

Source	Type III Sum of Squares	DF	Mean Square	F-cal	Sig. (p-value)	Decision
Corrected Model	6543.661[a]	2	3271.830	45.357	0.000	
Intercept	8416.601	1	8416.601	134.310	0.000	
Pre-test	2623.446	1	2623.446	1.566	0.220	
Groups	3803.668	2	1901.834	53.907	0.000	**S***
Groups * Gender	36.978	2	36.978	0.461	0.499	**NS**
Error	5255.609	249	21.107			
Total	261546.000	253				
Corrected Total	9099.270	252				

R Squared = .719 (Adjusted R Squared = .705)

Note: **S*** = Significant; Level of Sig. = **0.05**

The result in Table 4 presents the summary of analysis of covariance (ANCOVA) for testing the significant ($p<0.05$) effect of treatments (groups) on the achievement of the students in entrepreneurship. For the groups, the F-calculated (F-cal) value was 53.907 and the p-value of 0.000 which is less than 0.05 level of significance shows that there was significant difference in the mean achievement scores of students taught entrepreneurship using computer assisted instruction and those taught with conventional lecture method. The mean achievement score of the students taught with computer assisted instruction was significantly higher than those taught with lecture method. Therefore, the null hypothesis of no significant differences in the mean achievement scores of students taught entrepreneurship using computer assisted instruction and those taught with conventional lecture method was rejected.

The result of interaction effect, that is Group*Gender had F-calculated (F-cal) value was 0.461 and p-value of 0.499 which is greater than 0.05 level of significance. This indicated that there was no significant ($p<0.05$) interaction effect between the treatments (computer assisted instruction and conventional lecture methods) given to students and their gender with respect to mean achievement scores in entrepreneurship studies.

Discussion

From the data analysed, the study found that students exposed to computer assisted instructional method had higher achievement and gain score in entrepreneurship studies achievement test (ESAT) than the group exposed to conventional lecture method. The findings of this study agreed with the findings of Kareem (2015) who found that students exposed to computer assisted instruction performed better than those exposed to conventional teaching method in Biology. The findings of this study also supported that of Safo, Ezenwa and Wushishi (2013) who investigated effects of computer assisted instructional package on junior secondary school students' achievement and retention in Geometry in Minna and found that students taught using computer assisted instructional package achieved significantly higher than those taught using lecture method.

The findings of this study on the effects of gender on students' achievement showed that the use of computer assisted instructional method significantly increased the academic achievement scores of both male and female students in entrepreneurship studies achievement test (ESAT) with gender having no interaction effects. The non-significant effect of gender on students' academic achievement in relation to the treatments indicated that the treatments (computer assisted instruction and lecture methods) are not gender sensitive. The finding of this study agreed with that of Yusuf and Afolabi (2010) on effects of computer assisted instruction (CAI) on secondary school students' performance in Biology where the authors found that there is no significant difference existed in the performance of male and female students exposed to CAI in either individual or cooperative settings. Similarly, the findings of this study corroborated that of Tabassum (2004) who in a study found that computer-assisted instruction (CAI) was equally effective for both male and female students. This study found no interaction effects of gender, teaching methods on the achievement of the study in garment making which agreed with the result of the study of Azih and Nwosu (2011) which equally showed that gender had no significant interaction with teaching approach on students mean achievement.

Conclusion

The lingering poor academic achievement of students and lack of interest in entrepreneurship pursuit on graduation from higher institutions is causing great deal of concern to the government, Nigerian society and parents due to the increasing threats of the effects of youth unemployment in the society. The conventional lecture method employed by most lecturers for instructional delivery seem ineffective for equipping students for better academic performance and interest. The situation is worse in south-south which recorded highest number of unemployed youth in the country, Bayelsa State inclusive. To prevent the ugly trend, effort was made to investigate the effects of computer assisted instructional on students' achievement in entrepreneurship in tertiary institution in Bayelsa State Nigeria.

Based on the data collected and analysed, the study found that computer assisted instructional method significantly increased students' academic achievement in entrepreneurship studies achievement test (ESAT) than conventional teaching method. The study also established that the use of computer assisted instructional method significantly increased the academic achievement of both male and female students in the entrepreneurship studies achievement test (ESAT). This indicated that computer assisted instructional method is not gender sensitive as it can equally increase the achievement of male and female students.

Recommendations

Based on the findings of this study, the following recommendations were made:

1. Lecturers and teachers at all levels of education should adopt the use of computer assisted instruction for instructional delivery.
2. Government should organized seminars, workshops and symposium for lecturers and teachers on the development and effective usage of computer assisted instructional package to enhance learning among students.
3. Teachers and lecturers in Nigerian schools should be provided with in-service training for professional skill update in the use of modern and student-centred instructional strategies such as computer assisted instruction to teaching and learning.
4. Government should increase funding for the entire educational sector in the state order to procure reasonable number of computers and its software like CAI.
5. There should be policy framework develop by the state government that will guarantee the judicious use of the computers and accessories to enhance teaching and learning with computer assisted instruction to aid achievement in entrepreneurs studies.

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STRATEGIES FOR PROMOTING EFFECTIVE UTILISATION OF MICROWAVE OVENS BY HOMEMAKERS IN ENUGU STATE

By

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Abstract
The study was carried out to determine strategies for promoting effective utilization of microwave ovens by homemakers in Enugu State. Four research questions guided the study while four null hypotheses formulated were tested at .05 level of significance. The study made use of descriptive survey design and was carried out in Enugu State. The participants for the study were 45 comprising of 23 lecturers, 17 technologists and 5 technicians. There was no sampling because of manageable size of the population. A 68-item questionnaire was used as instrument for data collection. The instrument was validated by three experts while Cronbach Alpha reliability method was used to determine the internal consistency of the questionnaire items and an overall reliability coefficient of 0.81 was obtained. Forty five copies of the questionnaire were administered on subjects by the researchers on one to one basis. Forty three copies of the questionnaire were retrieved which represents 95.55 percent return rate. The data collected were analyzed using mean to answer the four research questions while analysis of variance was employed to test the null hypotheses at .05 level of significance. Results revealed that 17 guidelines and 20 skills were required by homemakers for using and maintaining microwave ovens. Furthermore, the results of the study revealed that majority of the respondents agreed with the 31 precautionary measures to be taken when using microwave and range ovens. The findings on hypotheses revealed that there was no significant difference between the mean responses of the respondents on the guidelines, skills, precautionary measures for using microwave ovens. Hence, recommendations include that the findings of the study should be used for organizing workshop for homemakers in Enugu and other States of Nigeria
Keywords: Microwave -oven, Homemakers, Guidelines, Precautionary-measures, Magnetron, Maintenance.

Introduction

Food is a basis for human survival. It is any substance that can be metabolized by an animal to give energy and build tissues. Human being devises means or methods of processing their raw foods such as yam, beans, and rice. Some of these methods/processes therefore include cooking, boiling, frying, smoking, toasting, roasting and drying. In the olden days, raw foods are processed or cooked over a fire which was either built campfire-style in the open, or housed indoors in a fireplace, but later wood-burning stoves and coal stoves, electric stoves, ranges and gas cookers and were introduced, enabling cooks to place pots and pans directly on a flat, hot surface. As technology advances, microwave ovens were invented and generally accepted for use at homes and restaurants. Ovens according to ebay (2016) are all found in a variety of places, including private home kitchens, church kitchens, restaurant kitchens, cafeteria kitchens, bakery kitchens, and any number of other areas where cooking takes place.

Generally, ovens are kitchen appliances used for cooking. Microwave oven is an electricity dependent kitchen appliance used for cooking and warming of cooked foods. A microwave oven commonly known as a microwave is a kitchen appliance that heats and cooks food by exposing it to microwave radiation in the electromagnetic spectrum (Ebay, 2016). This induces polar molecules in the food to rotate and produce thermal energy in a process known as dielectric heating. Beaty (2006) stated that a microwave oven consists of: a high-voltage power source, commonly a simple transformer or an electronic power converter, which passes energy to the magnetron; a high-voltage capacitor connected to the magnetron, transformer and via a diode to the chassis; a cavity magnetron, which converts high-voltage electric energy to microwave radiation; a magnetron control circuit (usually with a microcontroller); a short waveguide to couple microwave power from the magnetron into the cooking chamber; a metal cooking chamber; a turntable or metal wave guide stirring fan and a digital / manual control panel. A microwave oven converts only part of its electrical input into microwave energy. An average consumer microwave oven consumes 1100 W of electricity in producing 700 W of microwave power, an efficiency of 64%. Bakare (2014) reported that microwave oven parts plus other electronics are prone to various degrees of faults most especially when they are misused or handled carelessly.

US Foods and Drug Administration (2016) reported that microwave ovens heat foods quickly and efficiently because excitation is fairly uniform in the outer 25–38 mm (1–1.5 inches) of a homogeneous, high water content food item; food is more evenly heated throughout (except in heterogeneous, dense objects) than generally occurs in other cooking techniques. Microwave ovens according to Schmitt (2012) are popular for reheating previously cooked foods and cooking a variety of foods. They are also useful for rapid heating of otherwise slowly prepared cooking items, such as hot butter, fats, and chocolate. Unlike conventional ovens, microwave ovens usually do not directly brown or caramelize food, since they rarely attain the necessary temperatures to produce Maillard reactions (United States Department of Agriculture, 2011). Chaplin (2012) stated that exceptions occur in rare cases where the oven is used to heat frying-oil and other very oily items (such as bacon), which attain far higher temperatures than that of boiling water.

A microwave oven decays and changes the molecular structure of the food by the process of radiation. It heats food by passing microwave radiation through it. Beaty (2009) stated that microwaves are a form of non-ionizing electromagnetic radiation with a frequency higher than ordinary radio waves but lower than infrared light. According to Frei, Berger, Dusch, Guel, Jauchem, Merritt, and Stedham, (2008), microwave ovens use frequencies in one of the industrial, scientific, medical (ISM) bands, which are reserved for this use, so they do not interfere with other vital radio services. Frost (2011) said that consumer ovens usually use 2.45 gigahertz (GHz)—a wavelength of 12.2 centimetres (4.80 in)—while large industrial/commercial ovens often use 915 megahertz (MHz)—32.8 centimetres (12.9 in). Water, fat, and other substances in the food absorb energy from the microwaves in a process called dielectric heating.

Microwaves are produced inside the oven by an electron tube called a magnetron. The microwaves are reflected within the metal interior of the oven where they are absorbed by food (Geddesm & Roeder, 2006). Microwaves cause water molecules in food to vibrate, producing heat that cooks the food. That is why foods that are high in water content, like fresh vegetables, can be cooked more quickly than other foods. Wortham (2011) explained that the microwave energy is changed to heat as it is absorbed by food, and does not make food radioactive or contaminated. Although heat is produced directly in the food, microwave ovens do not cook food from the inside out. Microwave cooking can be more energy efficient than conventional cooking because foods cook faster and the energy heats only the food, not the whole oven compartment (Frei, Jauchem, Dusch, Merritt, Berger, & Stedham, 1998). Microwave cooking does not reduce the nutritional value of foods any more than conventional cooking. Osinboyejo, Walker, Ogutu, and Verghese (2011) explained that foods cooked in a microwave oven may keep more of their vitamins and minerals, because microwave ovens can cook more quickly and without adding water.

Glass, paper, ceramic, or plastic containers are also used in microwave cooking because microwaves pass through these materials. Although such containers cannot be heated by microwaves, they can become hot from the heat of the food cooking inside (United States Department of Agriculture, 2011). Some plastic containers are not advisable to be used in a microwave oven because they can be melted by the heat of the food inside. Researches also show that plastic can melt and react with food and cause cancer for the people who eat such food. Generally, metal pans or aluminum foil are not used in a microwave oven, as the microwaves are reflected off these materials causing the food to cook unevenly and possibly damaging the oven. The instructions that come with each microwave oven indicate the kinds of containers to use. They also cover how to test containers to see whether or not they can be used in microwave ovens. Microwaves are a form of electromagnetic radiation; that is, they are waves of electrical and magnetic energy moving together through space. Electromagnetic radiation spans a broad spectrum from very long radio waves to very short gamma rays **(**U.S. Food and Drug Administration, 2016). Microwave is an interested electronic gadget but can be so dangerous and can cause a lot of calamities such as burning, accidents, fire outbreaks, electric shocks most especially when used carelessly. It is worthy to look for strategies for effective use of microwave ovens at home. Strategies are plans of action designed to achieve a long-term or overall aim (Egbita, 2006). It is a detailed plan for achieving success in situations such as microwave usage, or cooking. The homemakers or users of microwave ovens therefore require guidelines and precautionary measures when using them.

Precautionary measures are set of instructions one is expected to follow when using some appliances or instruments or when conducting experiment. Precautionary measures generally are taken to prevent accidents to individuals and damages to equipment. Precautionary measures according to Bakare (2014) warding off impending danger or damage or injury. They are taken in advance to protect against possible danger or failure. For example, microwave radiation can heat body tissue the same way it heats food. U.S. Food and Drug Administration (2016) reported that exposure to high levels of microwaves can cause a painful burn. Frei, Berger, Dusch, Guel, Jauchem, Merritt, and Stedham (2008) stated that two areas of the body, the eyes and the testes, are particularly vulnerable to RF heating because there is relatively little blood flow in them to carry away excess heat. Additionally, the lens of the eye is particularly sensitive to intense heat, and exposure to high levels of microwaves can cause cataracts (Wortham, 2011). But these types of injuries and diseases – burns, cataracts and cancer – can only be caused by exposure to large amounts of microwave radiation. Skill is also required for operating and maintaining microwave ovens. Ogbuanya and Bakare (2014) defined skill as the ability to do work to expectation and this can be acquired by training. Operating skills are required by homemakers for effective use of microwaves. Homemakers are the people making use of microwave ovens for private and public cooking. A guideline is a rule or principle that provides guidance to appropriate behavior. A guideline according to U.S. Dept. of Veterans Affairs (2017) is a statement by which to determine a course of action. A guideline aims to streamline particular processes according to a set routine or sound practice. Guidelines and skills for effective operation and maintenance of microwave ovens become essential for homemakers. Most of the homemakers in Enugu State in particular abandoned their spoilt microwave ovens for the purchase of new ones and this amount to continuous spending and electronic wastage that can cause health problems such as cancer to people most especially where they are disposed carelessly. About 85 percent of the homemakers in Enugu State who possessed microwave ovens do not know how to effectively utilize them for safe cooking. Most of the homemakers and maids use these wonderful kitchen appliances and spoil them while some use them to create calamities such as fire outbreaks, burns and health issues and diseases.

Purpose of the Study

The general purpose of the study was to determine strategies for promoting utilization of microwave oven by homemakers in Enugu State. Specifically, the study sought to determine:

1. guidelines required by homemakers for using microwave ovens
2. skills in operating and maintaining microwave ovens
3. precautionary measures required by homemakers when using microwave ovens

Research Questions

The following research questions guided the study:

1. What are the guidelines required for using microwave ovens by homemakers?
2. What are the skills in operating and maintaining microwave oven?
3. What are the precautionary measures required by homemakers when using microwave oven?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

1. There is no significant difference between the mean responses of the respondents on the guidelines required by homemakers for using microwave ovens
2. There is no significant difference between the mean responses of the respondents on the skills in operating and maintaining microwave ovens
3. There is no significant difference between the mean responses of the respondents on the precautionary measures to be taken when using microwave ovens

Method

Design of the Study

The study adopted a descriptive survey design. Descriptive survey design, according to Olaitan, Ali, Eyo and Sowande (2002), is the plan, structure and strategy that the investigator wants to adopt in order to obtain solution to research problems using questionnaire in collecting, analyzing and interpreting the data. Descriptive survey design was found appropriate for this study because data were collected from respondents using structured questionnaire.

Area of the Study

This study was carried out in Enugu State of Nigeria. Enugu State is one of the five States in South Eastern Geopolitical Zone of Nigeria. This is blessed with state and federal institutions and a lot of educated men and women who believed in using recent technology such as microwave and range ovens to perform domestic work such boiling, frying, roasting or cooking various foods for sale and for their families.

Population for the Study

The participants for the study consisted of all the 45 made up of 23 lecturers of electrical/electronic technology, 17 electrical/electronic technologists and 5 technicians in University of Nigeria, Nsukka, Enugu State University of Science and Technology (ESUT) and Institute of Management and Technology all in Enugu State. The lecturers in the University of Nigeria, Nsukka, ESUT and IMT have the same educational qualifications. There was no sampling due to the manageable size of the population.

Instrument for Data Collection

The instrument for data collection was structured questionnaire titled strategies for utilisation of microwave oven structured questionnaire (SUMOSQ). The researchers carried out critical literature review and extracted useful information for the design and development of the questionnaire. The questionnaire items were developed and arranged in line with the three research questions and hypotheses formulated for the study. The SUMOSQ was further divided into two parts, 1 and 2. Part 1 was used to elicit information on personal characteristics of the respondents considered for the study while part 2 consists of item statements arranged into sections A, B, and C. Section A comprised 17 guidelines in using microwave ovens by homemakers for cooking, section B contained 20 skills in operating and maintaining microwave ovens, while section C contained 31 precautionary measures to be taken when using microwave ovens for cooking.

Each item in part B of the instrument was assigned a five point Likert Scale response of Strongly Agree (SA), Agree (A), Undecided (UD), Disagree (D), and Strongly Disagree (SD) with corresponding numerical values 5, 4, 3, 2 and 1. The respondents were therefore asked to rank the response options to an item based on the level at which each item is required.

Copies of the SUMOSQ were subjected to face validation by three Experts. The researchers gave the copies of the instrument to three Lecturers in the Department of Industrial Technical Education, University of Nigeria Nsukka. The title of the study, specific purposes, research questions and null hypotheses formulated were attached to each copy of the questionnaire given to the experts. Copies of questionnaire were given to each of the experts to read the items one by one and make meaningful corrections. They were asked to read the items under each research question and make useful corrections in order to improve the standard of the questionnaire. The experts were also asked to add any relevant item to the questionnaire. After one week, one of the researchers went round to collect the copies of the questionnaire given to the experts and effected the corrections accordingly. One hundred and forty items were retained out of 159 items presented to experts in form of questionnaire

In order to establish the reliability of the instrument, Cronbach's alpha test of internal consistency was conducted on each section in the questionnaire. Twenty copies of the structured questionnaire were administered on electrical/electronic lecturers and technologists in Nammdi Azikwe University, Awka and their responses were analysed with the help of Statistical package for Social Science (SPSS version 22). Reliability coefficient value of 0.74 was obtained for items in section A of the structured questionnaire, 0.76 was obtained for items in section B, 0.79 was obtained for items in section C of the strategies for utilisation of microwave oven structured questionnaire while 0.81 was obtained as the overall reliability coefficient value for the entire questionnaire items in the SUMOSQ

Method of Data Collection

Data collection was carried out with the help of three research assistants (one for each tertiary institutions) while the researchers coordinated the collation and analysis of data. Forty five copies of the questionnaire were administered on lecturers and technologists/technicians in polytechnic and universities in Enugu State. Orientation was given to all Research Assistants (RAs) on how the administration of the questionnaire should be done. Two weeks after the administration of the structured questionnaire, research assistants went round and collected the copies of the questionnaire from the respondents and handed them over to the researchers for further actions. Forty two copies of the questionnaire were collected representing 93.33 percent return rate

Method of Data Analysis

The data collected were analyzed using Mean to answer the three research questions, while the Analysis of variance (ANOVA) was employed for testing the null hypothesis at the probability of 0.05 levels of significance. Any item with a Mean value of 3.50 or above was regarded as agree, while any item with a Mean value of less than 3.50 was regarded as Disagree. On the hypotheses tested, the hypotheses of no significant difference was accepted where the P-value was greater than 0.05 levels and this indicated that there was no significant difference in the mean scores of the groups of respondents on that item. If the P-value was less than 0.05 levels, this indicated that the hypothesis of no significant difference in the mean scores of the groups of respondents was rejected for that item.

Results

Table 1

Mean and Standard Deviation of the Responses of Lecturers, Technologists and Technicians on the Guidelines required by Homemakers for using Microwave Ovens

S/N	Item Statements	Mean	S.D	P-values	Remarks
1	Move at least 10 metre away from where a microwave oven is used	3.62	0.72	0.12	**Required, NS**
2	Cook with moderate heat when using microwave oven	3.56	0.81	0.09	***Required, NS***
3	Place microwave oven on a stable or flat platform	3.67	0.75	0.82	***Required, NS***
4	Cover exposed parts of the body when using microwave oven	3.51	0.69	0.50	***Required, NS***
5	Always put on cotton instead of nylon materials while using	3.61	0.77	0.65	***Required, NS***

	microwave oven				
6	Put cooking utensils on range oven before powering it	3.72	0.66	0.08	***Required, NS***
7	Place only dried pot on powered or energized microwave oven	3.55	0.75	0.07	***Required, NS***
8	Regulate radiation of microwave r oven according to food stuff	3.59	0.69	0.09	***Required, NS***
9	Stay around the vicinity of cooking when using microwave oven	3.38	0.70	0.11	***Required, NS***
10	Select low heat on thermostat of the microwave oven when using it to fry food such as eggs, yams among others	3.75	0.67	0.13	***Required, NS***
11	Do not heat water or liquids in the microwave oven longer than recommended in the manufacturer's instructions	3.79	0.74	0.23	***Required, NS***
12	Load an oven with foods or recommended substance before operating it	3..58	0.73	0.12	***Required, NS***
13	Never stand directly against an oven for long periods of time while it is operating	3.57	0.73	0.21	***Required, NS***
14	Follow the manufacturer's instruction manual for recommended operating procedures for oven model	3.74	0.64	0.31	***Required, NS***
15	Only operate microwave or range oven on full power supply	3.88	0.76	0.20	***Required, NS***
16	Only clean microwave oven when it is not in use	3.92	0.74	0.21	***Required, NS***
17	Never exceed the recommended heating times when determining the best time settings to heat water to the desired temperature	3.60	0.69	0.49	***Required, NS***

Keys: S.D – *Standard deviation; Ho- Null hypotheses; NS- Not significant; Rem.- Remark*

First, the study sought to determine the guidelines required by homemakers for using range oven. The data in Table 1 reveal that all the items have their mean value ranged from 3.51 to 3.92 and this shows that the mean value of each item was above cutoff point of 3.50, indicating that the items are the guidelines required by homemakers for using microwave and range ovens. Similarly, the standard deviation of these items ranged from .64 to .81 indicating that the respondents were close to one another in their opinion. The Table 1 also indicated that all the items had their P-values greater than 0.05. This indicated that there was no significant difference in the mean responses of the respondents on the guidelines required by homemakers for using microwave and range ovens. Therefore, the null hypothesis of no significant difference was upheld for all the 17 guidelines required by homemakers for using microwave and range ovens

Table 2
Mean and Standard Deviation of the Responses of Lecturers, Technologists and Technicians on the Skills in Maintaining Microwave Ovens

S/N	Item Statements	Mean	SD	P-values	Remarks
A	**Skills in Servicing and Microwave Ovens**				
1	Use recommended materials to clean dust and other debris off the microwave	3.83	0.77	0.15	***Required, NS***
2	Tape any exposed part of the cable of microwave ovens	3.62	0.65	0.08	***Required, NS***
3	Replace the blown fuse at the power unit of the microwave ovens	3.91	0.71	0.57	***Required, NS***
4	Replace any damage part of the microwave oven with new one	3.72	0.79	0.19	***Required, NS***
5	Clean the pins of the power socket of microwave oven regularly to carbon deposits	3.84	0.76	0.21	***Required, NS***
6	Apply recommended material to cover microwave oven after use	3.53	0.79	0.33	***Required, NS***
7	Clean inner part of microwave oven using recommended material	3.58	0.74	0.23	***Required, NS***
8	Clean the outer part of the oven with soft wet cloth or other materials	3.63	0.80	0.12	***Required, NS***
9	Regularly clean the oven cavity, the outer edge of the cavity, and the door with water and a mild detergent	3.62	0.80	0.52	***Required, NS***
10	Remove pealed power cable of the microwave oven	3.59	0.84	0.19	***Required, NS***
11	Replace the bad power cable with new one	3.61	0.75	0.12	***Required, NS***
12	Replace other spoilt parts of the microwave oven	3.74	0.79	0.52	***Required, NS***

B	**Skills in Repairing Microwave Ovens**				
13	Check ovens for leakage and other radiation safety problems in microwave ovens	3.52	0.84	0.55	***Required, NS***
12	Check the turntable or metal wave guide stirring fan	3.62	0.84	0.24	***Required, NS***
13	Replace digital or manual control panel of the microwave ovens	3.62	0.63	0.17	***Required, NS***
14	Test and replace transformers and/ electronic power converter	3.59	0.84	0.54	***Required, NS***
15	Replace shorted or opened semiconductor diodes	3.93	0.72	0.54	***Required, NS***
16	Diagnose and replace bad high voltage capacitors	3.59	0.87	0.08	***Required, NS***
17	Replace opened or shorted power cables of the microwave ovens	3.67	0.79	0.22	***Required, NS***
18	Troubleshoot and clear faults on magnetron control circuit	3.55	0.78	0.12	***Required, NS***
19	Align cavity magnetron for functionality	3.56	0.69	0.09	***Required, NS***
20	Replace or clean metal cooking chambers	3.78	0.72	0.15	***Required, NS***

Keys: S.D – *Standard deviation; Ho- Null hypotheses; NS- Not significant; Rem.- Remark*

Second, the study sought to determine the skills in operating and maintaining microwave ovens. The data presented in Table 2 reveal that all the items have their mean value ranged from 3.53 to 3.93. This shows that the mean value of each item was above cutoff point of 3.50, indicating that the items are the skills in operating and maintaining microwave ovens. Similarly, the standard deviation of these items ranged from .65 to .87 indicating that the respondents were close to one another in their opinion. The Table 2 also indicated that all the items had their P-values greater than 0.05. This indicated that there was no significant difference in the mean responses of the respondents on the skills in operating and maintaining microwave ovens. Therefore, the null hypothesis of no significant difference was upheld for all the 20 skills in operating and maintaining microwave ovens.

Table 3

Mean and Standard Deviation of the Responses of Lecturers, Technologists and Technicians on the Precautionary Measures to be taken when using Microwave Ovens

S/N	Item Statements	Mean	SD	P-values	Remarks
1	Avoid social exhibition of microwave ovens	3.84	0.82	0.15	***Required, NS***
2	Keep microwave and range ovens safely in the kitchen	3.74	0.79	0.18	***Required, NS***
3	Switch off range oven when there is power outage	3.61	0.74	0.07	***Required, NS***
4	Clean range oven regularly to avoid electric shock and dust	3.71	0.84	0.25	***Required, NS***
5	Check the stability of the microwave ovens before use	3.83	0.78	0.08	***Required, NS***
6	Make use of microwave oven on steady and stable power supply	3.90	0.60	0.57	***Required, NS***
7	Avoid wearing nylon materials near energized microwave ovens	3.83	0.81	0.69	***Required, NS***
8	Remove microwave ovens power cable from socket out after use	3.82	0.86	0.21	***Required, NS***
9	Use microwave oven on 15 amp socket outlet	3.69	0.75	0.33	***Required, NS***
10	Clean the surface of microwave ovens recommended materials	3.85	0.83	0.73	***Required, NS***
11	Switch off microwave ovens and remove from socket outlet before cleaning or servicing	3.62	0.83	0.12	***Required, NS***
12	Keep microwave ovens away from reach of children	3.81	0.74	0.23	***Required, NS***
13	Keep all inflammable materials away from used microwave ovens	3.57	0.82	0.65	***Required, NS***
14	Stay around microwave ovens while cooking	3.84	0.79	0.18	***Required, NS***
15	Check the food on microwave oven regularly to avoid burning and smoke	3.64	0.76	0.57	***Required, NS***
16	Cover microwave ovens with appropriate materials to avoid unnecessary moisture	3.71	0.84	0.25	***Required, NS***
17	Gently coil the power cable of the microwave ovens	3.83	0.72	0.08	***Required, NS***
18	Hang the coil power cable on appropriate point with microwave oven unit	3.62	0.80	0.57	***Required, NS***
19	Use microwave safe cookware specially manufactured for use in the microwave ovens	3.83	0.81	0.29	***Required, NS***
20	Follow the manufacturer's instruction manual for safety precautions for your oven model	3.78	0.86	0.21	***Required, NS***
21	Follow the manufacturer's instruction manual for recommended operating procedures and safety precautions for your oven model	3.69	0.75	0.33	***Required, NS***
22	Avoid not to use scouring pads, steel wool, or other abrasives as cleaners	3.85	0.83	0.18	***Required, NS***

23	Never operate empty ovens to avoid explosion and fire outbreaks	3.69	0.88	0.12	***Required, NS***
24	Stop using a microwave oven if it continues to operate with the door open	3.63	0.81	0.52	***Required, NS***
25	Do not heat water or liquids in the microwave oven longer than recommended in the manufacturer's instructions	3.84	0.78	0.65	***Required, NS***
26	Never operate a microwave oven if the door does not close firmly or is bent, warped, or otherwise damaged	3.77	0.79	0.28	***Required, NS***
27	Never stand directly against an oven for long periods of time while it is operating	3.61	0.74	0.57	***Required, NS***
28	Stay away at least 10 metre from the oven	3.73	0.84	0.65	***Required, NS***
29	Apply special microwave oven cleaner to clean the necessary parts of the oven	3.50	0.72	0.08	***Required, NS***
30	Never clean oven while in use	3.90	0.80	0.57	***Required, NS***
31	Closely follow the precautions and recommendations provided in the microwave oven instruction manuals, specifically regarding heating times	3.63	0.81	0.19	***Required, NS***

Keys: S.D – *Standard deviation; Ho- Null hypotheses; NS- Not significant; Rem.- Remark*

Data in Table 3 reveal that all the items have their mean value ranged from 3.50 to 3.90. This shows that the mean value of each item was above cutoff point of 3.50, indicating that the items are the precautionary measures to be taken when using microwave and range ovens. Similarly, the standard deviation of these items ranged from .60 to .88 indicating that the respondents were close to one another in their opinions. The Table also indicated that all the items had their P-values greater than 0.05. This indicated that there was no significant difference in the mean responses of the respondents on the precautionary measures to be taken when using microwave ovens. Therefore, the null hypothesis of no significant difference was upheld for all the 31 precautionary measures to be taken when using microwave ovens

Discussion

The results of this study revealed that 17 guidelines were required by homemakers for using microwave ovens; 20 skills were required in operating and maintaining microwave ovens; 31 precautionary measures were required when using microwave ovens were also identified. The implication of this finding is that microwave ovens are essential home appliances that can cause accidents and all kinds of negative effects most especially when used carelessly by homemakers. These findings were in agreement with the findings of Nwachukwu, Bakare and Jika (2011) who carried out a study to identify effective laboratory safety practice skills required by electrical and electronics students for effective functioning in the laboratory of technical colleges in Ekiti State. The authors found that 10 safety practice skills were required to use electrical hand tools, 25 safety practice skills in operating electrical and electronic power tools and machines and 10 safety practice skills for working in electrical/electronic workshop.

Specifically, the results presented in Table 2 indicate that majority of the respondents agreed with the 20 skills in operating and maintaining microwave ovens. Furthermore, the results presented in table 3 reveal that majority of the respondents concurred with 31 precautionary measures to be taken when using microwave ovens. These findings corroborate the findings of Bakare (2016) who found that 32 operational skills, 19 maintenance skills and 14 precautionary measures were required by farmers in making cell phones effective in boosting agricultural production in Ekiti State. This finding was also in agreement with the study of Akinduro (2006) who carried out a study on electrical installation and maintenance work skills needed by technical college's graduates to enhance their employability in Ondo State. The author found out that the graduates of technical colleges need domestic installation skills, industrial installation skills, cable jointing skills, battery charging skills and winding skills in electrical machine for employment in Ondo State. The findings of the study also agreed with the results of Olaitan, Asogwa and Abu (2011) that technology secondary school graduates required competencies in maintenance, servicing and repairing of electronic machines for agribusiness occupations to minimize wastage.

The findings of the above researchers in their various research activities helped to support the justification of the results of this study on the essential knowledge and skills needed for enhancing business transaction in Ekiti State. Furthermore, the results of hypotheses one to four showed that there were no significant differences in the mean responses of respondents in different locations on the guidelines, skills in operating and maintaining microwave ovens, and precautionary measures for using microwave ovens. This also means that the respondents in different locations had similar perceptions on each item.

Conclusion

The purpose of this study was to determine guidelines and maintenance skills required by homemakers for using microwave ovens. A total of four research questions were examined: one was to determine the guidelines required by homemakers for using microwave ovens; the second was to identify the skills in operating and maintaining microwave ovens; the third was to identify the precautionary measures to be taken when using microwave ovens and the last one was to possible effects of misusing microwave and range ovens to homemakers. In order to answer these research questions, an 78-item questionnaire was developed and used as the research instrument and was administered to 45 participating individuals in different tertiary institutions in Enugu State, Nigeria.

In conclusion, the participating experts agreed that homemakers required guidelines for effective use of microwave ovens. Precautionary measures for using microwave ovens and various essential skills in operating and maintaining them were also determined

Recommendations

Based on the findings of this study, the following recommendations can be considered:

1. There is urgent needs for government and other interested enabling bodies to organize training inform of capacity building for homemakers in Enugu and other States
2. All the guidelines, precautionary measures and essential skills determined in this study should be packaged and employed for training homemakers on how to make use of microwave ovens

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INFLUENCE OF ADVERTISEMENT AND BRANDING VARIABLES ON THE DEMAND FOR PLASTIC BUILDING PRODUCTS BY REAL ESTATE DEVELOPERS IN BAYELSA STATE

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Abstract
This study investigated the influence of advertisement and branding variables on the demand for plastic building Products by real estate developers in Bayelsa State. Two research questions were answered by the study while two null hypotheses formulated were tested at p≤0.05 level of significance. The study adopted descriptive survey design. The population for the study consisted of 2,039 respondents. Random sampling technique was utilized to sample 247 respondents which represented the sample frame of the study. The instrument for data collection was a structured 27-item questionnaire titled: Advertisement and Branding Variables Questionnaire. The instrument was validated by three experts. For the purpose of obtaining the internal consistency of the instrument, Cronbach Alpha reliability method was used in which a Cronbach alpha coefficient of 0.77 was obtained. Data were collected by the researcher with the help of four research assistants. Out of the 247 copies of the questionnaire administered, 238 copies were retrieved indicating 96.3% rate of return. Data collected were analysed using mean for answering the research questions while the two null hypotheses were tested using analysis of variance (ANOVA) at 0.05 level of significance. Based on the data analyzed, the study found out that 13 items of advertisement and 14 items of branding variables greatly influenced the demand for plastic building products by real estate developers in Bayelsa State. There were no significant (p<0.05) differences in the mean ratings of the responses of plastic building product distributors, real estate Architects, Engineers and Surveyors on the extent to which 22 out of the 27 items advertisement and branding influence the demand for plastic building products by real estate developers whereas, there were significant differences in the mean ratings of the remaining 5 items of advertisement and branding variables. Based on these findings, the study recommended that major actors in the building construction and manufacturing sub-sector of the Nigerian economy should adopt and utilize advertisement and branding variables for increased demand for their products and competitive advantage against counterfeit and sub-standard products in the market.
Keywords: advertisement, branding, demand, plastic building product and real estate developers.

Introduction

Construction of building for human shelters and other economic purposes is an ancient human activity that began primarily to protect human from environmental and harsh weather condition. Construction of building is the process of adding structure to real property through which residential and non-residential (commercial/institutional) structures are raised (Wood, 2012). Building construction ranges from renovations, creating additional room, bathroom or other parts of building. According to Halpin and Senior (2010), building construction requires collaboration of experts in the specification and assemblage of products to raise a building. Some of the most important building products are made of plastics.

Plastic building products are made out of chemical substances that can be formed into shapes when heated or made into thin threads and used to make various artificial fabrics (White, 2009). Plastic building product is the general term for a wide range of synthetic or semi synthetic organic amorphous solid materials used in building construction. They are fabricated with polycarbonates and possess certain basic features as durability and beautification. Plastic building products are easily fabricated, with less stress and are ideal for making porches, car pot and extensions. The products according to Waldron (1998) are diverse in nature and used for several purposes in buildings with distinct characteristics. The common plastic products used in building construction include: fascia boards, ceilings, water pipes, electrical pipes, tiles and transparent plastic roofing sheets among others which are made from Golden Polyvinylchloride (PVC), Amola PVC, Blue PVC, Easymeg PVC, Ansteve PVC and Viaeny PVC (White, 2009). These plastic building products are usually light in weight, resistant to warp and rot which make them suitable and preferable for use for building construction by real estate developers who makes demand for the products from the producers.

Demand refers to how much in quantity of a product or service a buyer is willing to buy at a given price and period of time. Reddy, Ram, Sastry and Devi (2009) described demand as a schedule that shows the amounts of products or services the consumers are willing and able to purchase at a possible price during a specified time in a specified market. Adam (2015) noted that the quantity demanded of any product is the amount of the product buyers are willing to buy at a certain price; the relationship between price and quantity demanded is known as the demand relationship. Apart from price, two of other important variables that influence the demand for products and services include advertisement and branding. Product advertisement is very important in business organization considering the fact that it serves as a source of information about goods and services and also persuades consumers to patronize the advertised goods and services. In affirmation, Awofadeju, *et al* (2015) stated that advertisement is very important for a business to succeed because, the heart of any business success lies in its advertisement. In the opinion of Kotler and Keller (2006) advertisement is any form of non-personal presentation of ideas, goods, or services by an identified sponsor which can be undertaken by the use of any of the following media: magazine, newspaper, radio, television, billboards and internet. Similarly, Noah (2008) viewed advertisement as technique and practice of bringing products, services and opinions to public notice for the purpose of persuading the public to respond to product or brand.

Brand according to Ikporah (2012) is one of the most important components of marketing as it describes the name, composition and design of a product. A brand represents everything that a product or service means to consumers. In the opinion of Kotler and Keller (2006), branding is the process of ascribing names, term that are intended to identify the products and services of one seller or group of sellers and differentiate them from those of competitors. Kotler and Keller (2006) stated further that the best brand names suggest something about the products benefits, qualities and are easy to pronounce, recognize and remember; are distinctive, and do not carry negative meanings or connotations in other countries and languages. Ikporah (2012) shared that when brand is emphasized, it is an inducement to get the buyer to develop loyalty and carry out repeat purchases. In the case of this study, unless plastic building products are branded by the producers, a potential real estate developer has no way of identifying the product a particular seller or marketer of the products is offering in the market.

The markets of plastic building products in Bayelsa State like other states on the nation is operated by the producers of the products, the marketers and real estate developers who constitute the buyers. Real estate refers to land and the improvements made by human efforts such as buildings, machinery, and the acquisition of various property rights, and the like. The real estate business is however, made up of highly qualified and experienced graduates from different fields of study which cuts across Architecture, Engineering, and Surveying (Obiegbu, 2003). Although, the engineers and the distributors of plastic building products have more dealing with procurement and supply of the plastic building products. For instance, the Architects design and draw building plans; while the Electrical Engineers are responsible for electrical installations like lighting and fittings. In addition, the real estate developers include Land Surveyors, who survey the land and determine its boundaries and dimensions. According to Inyanga (1998), many real estate developers flood the real estate market in search for quality plastic building products at affordable prizes. In the bid of manufacturers to market their plastic products, they adopt aggressive advertising activities in order to create awareness.

However, most of these activities produce negative impression on the choice of plastic building products by real estate developers. Manufacturers that market branded products normally make much use of advertising and branding variables to promote their products (Osuala, 1998). The case of marketing of plastic building products in Bayelsa State is not significantly different. This is because, Bayelsa State is a relatively young State located along the coastal line of south-south region of Nigeria with acidic soil formation and water-logging terrain. This makes building construction in the area more expensive and requires more quality plastic building products. These weather and porous soil conditions in the state destroy substandard and inferior building materials, which makes it imperative to popularize plastic building products that have reputation for lasting long using marketing variable of advertisement and branding. Hence, considering the promotional roles advertisement and branding play in the demand of any commodity, this study was carried out to investigate the influence of advertisement and branding variables on the demand for plastic building products by real estate developers in Bayelsa State.

Purpose of Study

The general purpose of the study was to investigate the influence of advertisement and branding variables on the demand for plastic building products by real estate developers in Bayelsa State. Specifically, this study sought to investigate the:

1. extent to which advertisement influence the demand for plastic building products by real estate developers in Bayelsa State.
2. extent to which branding influence the demand for plastic building products by real estate developers in Bayelsa State.

Research Questions

In line with the specific purposes of this study, the following research questions were answered by the study:

1. To what extent does advertisement influence the demand for plastic building products by real estate developers in Bayelsa State?
2. To what extent does branding influence the demand for plastic building products by real estate developers in Bayelsa State?

Hypotheses

Based on the specific purposes of the study, the following hypotheses were formulated and tested at $p<0.05$ level of significance:

$H0_1$: There is no significant difference in the mean responses of plastic building product distributors, real estate Architects, Engineers and Surveyors on the extent to which advertisement influence the demand for plastic building products by real estate developers in Bayelsa State.

$H0_2$: There is no significant difference in the mean responses of plastic building product distributors, real estate Architects, Engineers and Surveyors on the extent to which branding influence the demand for plastic building products by real estate developers in Bayelsa State.

METHOD

Descriptive survey design was adopted for the study. Descriptive survey research design as pointed out by Osuala (2005), focuses on people, their vital facts, beliefs, opinions, attitudes, motivation and behaviour as well as situations currently obtained and no variables will be manipulated as done within experimental design. Therefore, descriptive survey design was found suitable for this study because questionnaire was used to collect data from the representative group of respondents. The population for the study was the 2,039 respondents. These include 52 major plastic building product distributors, 637 real estate Architects, 660 Engineers and 648 Surveyors. The sample frame for the study was 247 respondents. These include the entire 52 major plastic building product distributors, 10% randomly sampled 64 real estate Architects, 66 Engineers and 65 Surveyors. The instrument for data collection for the study was a structured 27-item questionnaire titled: "Advertisement and Branding Variables Questionnaire (ABVQ). The questionnaire was structured into 5-point rating scale of Very Great Extent (VGE), Great Extent (GE), Moderate Extent (ME), Little

Extent (LE) and No Extent (NE) with corresponding values of 5, 4, 3, 2, and 1 respectively. The instrument was validated by three experts; one from the Department of Vocational Teacher Education, University of Nigeria, Nsukka; one from Department of Vocational/Industrial Education, Niger Delta University Wilberforce Island, Bayelsa State and one by a major distributor of plastic building products in Yenagoa, Bayelsa State.

For the purpose of obtaining the internal consistency of the instrument, Cronbach Alpha reliability method was used in which a Cronbach alpha coefficient of 0.75 was obtained indicating high reliability of the instrument. Four research assistants were hired and trained by the researcher for data collection across the state. Out of the 247 copies of the questionnaire administered, 238 copies were retrieved indicating 96.3% rate of return. The researcher collated the retrieved copies of the questionnaire from the assistants after two weeks of administration for data analysis. Data collected were analysed using mean for answering the research questions while the two null hypotheses were tested using analysis of variance (ANOVA) at 0.05 level of significance. In taking decision on the research questions, real limit was utilized as follows: any item with mean value within the real limit of 4.50 – 5.00 (Very Great Extent); 3.50 - 4.49 (Great Extent); 2.50 - 3.49 (Moderate Extent); 1.50 - 2.49 (Little Extent) and 1.00 - 1.49 (No Extent). The null hypothesis of no significant difference in the mean ratings of the respondents was accepted for items whose p-values are greater than 0.05 level of significance while the null hypothesis of no significant difference was rejected for items whose p-values were less than 0.05 level of significance.

RESULTS

The results for this study were obtained based on the research questions answered and hypotheses tested. Both the research questions and the hypotheses are presented in Tables 1 and 2 as follows:

Research Question One

To what extent does advertisement influence the demand for plastic building products by real estate developers in Bayelsa State?

$H0_1$: There is no significant difference in the mean responses of plastic building product distributors, real estate Architects, Engineers and Surveyors on the extent to which advertisement influence the demand for plastic building products by real estate developers in Bayelsa State.

The data for answering research question one and testing hypothesis one are presented in Table 1 below:

Table 1: Mean Ratings of the Responses of the Respondents on the Extent to Which Advertisement Influence the Demand for Plastic Building Products by Real Estate Developers in Bayelsa State.
(N= 238)

SN	Item Statements	Total Sum of Square	Mean Square	F-cal	P-value	$\bar{X}$	SD	Remarks RQ	Remarks H0
1	Advertising helps to create awareness of plastic building products	150.860	0.289	0.997	0.370	**4.53**	0.76	**VGE**	**NS**
2	Advertising of plastic building products influences the consumers' brand recall and desire to buy.	130.612	0.250	0.704	0.495	**4.52**	0.79	**VGE**	**NS**
3	Advertising of plastic building products captures consumers' attention and urge them to buy more.	105.243	0.201	1.533	0.217	**4.16**	0.80	**GE**	**NS**
4	Advertising of plastic building products gives adequate information about the products' features and attributes.	116.979	0.224	0.889	0.412	**4.54**	0.86	**VGE**	**NS**
5	Advertising of plastic building products brings fulfilment to the advertising agency.	136.291	0.262	0.532	0.588	**3.88**	0.98	**GE**	**NS**
6	Advertising of plastic building products helps to increase the sales volume of producers.	161.614	0.309	3.261	0.016	**4.63**	0.85	**VGE**	**S***
7	Advertising persuades consumers to purchase plastic building products frequently.	124.138	0.238	0.313	0.731	**4.67**	0.83	**VGE**	**NS**
8	Advertising is prominent in the development of plastic building products.	127.281	0.244	0.630	0.533	**4.30**	0.91	**GE**	**NS**
9	Advertising creates efficient reminder in the purchase of plastic building products by consumers.	119.266	0.229	0.182	0.834	**4.32**	0.82	**GE**	**NS**
10	Advertising is used to introduce old and new plastic building products to the public for consumption.	123.518	0.236	1.530	0.218	**4.50**	0.68	**VGE**	**NS**
11	Advertising of plastic building products accounts for their uniqueness.	165.052	0.317	0.325	0.723	**3.00**	1.18	**ME**	**NS**
12	Advertising makes consumers to purchase plastic building products as and when due.	115.434	0.220	3.625	0.003	**4.09**	1.23	**GE**	**S***
13	Advertising of plastic building products increases brand loyalty.	134.359	0.258	0.174	0.840	**3.94**	1.13	**GE**	**NS**

Note: $\bar{X}$ = Mean; **SD** = Standard Deviation; **VGE** = Very Great Extent; **GE** = Great Extent; **ME** = Moderate Extent; ***NS*** *=Not Significant;* ***S**** *= Significant; Level of Sig.* ***0.05***

The data presented in Table 1 revealed that the grand mean ratings of the responses of the respondents on items 1, 2, 4, 6, 7 and 10 were 4.53, 4.52, 4.54, 4.63, 4.67 and 4.50 respectively which all fell within the boundary limit of number 4.50 – 5.00 on a 5-point rating scale. This indicated that the respondents agreed that the six items of advertisement in the table are to a "Very Great Extent" influencing the demand for plastic building products by real estate developers in Bayelsa State. The grand mean ratings on items 3, 5, 8, 9, 12 and 13 were 4.16, 3.88, 4.30, 4.32, 4.09 and 3.94 respectively which all fell within the boundary limit of number 3.50 – 4.49 on a 5-point rating scale. This indicated that the respondents agreed that the six items of advertisement in the table are to a "Great Extent" influencing the demand for plastic building products by real estate developers in Bayelsa State. The mean value of item 11 in the table was 3.00 which fell between the boundary limit of number 2.50 – 3.49 on a 5-point rating scale. This indicated that the respondents agreed that item 11 in the table is to a "Moderate Extent" influencing the demand for plastic building products by real estate developers in Bayelsa State. The grand standard deviation values of the 13 items in the table ranged between 0.68 to 1.23 which indicated that the responses of the respondents are close to one another and to the mean.

The data presented in table 1 on hypothesis one revealed that that the p-values of 11 out of the 13 items ranged from 0.217 to 0.840 which are greater than 0.05 level of significance. This indicated that there were no significant differences in the mean ratings of the responses of plastic building product distributors, real estate Architects, Engineers and Surveyors on the 11 identified items of advertisement. Hence, the hypothesis of no significant difference in the mean responses of plastic building product distributors, real estate Architects, Engineers and Surveyors is accepted on the 11 indentified items in the table. The p-values on the remaining two items, specifically items 6 and 12 were 0.016 and 0.003 respectively which are less than 0.05 level of significance. This implied that there were significant differences in the mean ratings of the responses of plastic building product distributors, real estate Architects, Engineers and Surveyors on the two items. Therefore, the hypothesis of no significant difference in the mean responses of plastic building product distributors, real estate Architects, Engineers and Surveyors is rejected on items 6 and 12 in the table.

Research Question Two

To what extent does branding influence the demand for plastic building products by real estate developers in Bayelsa State?

$H0_2$: There is no significant difference in the mean responses of plastic building product distributors, real estate Architects, Engineers and Surveyors on the extent to which branding influence the demand for plastic building products by real estate developers in Bayelsa State.

The data for answering research question two and testing hypothesis two are presented in Table 2 below:

Table 2: Mean Ratings of the Responses of the Respondents on the Extent to Which Branding Influence the Demand for Plastic Building Products by Real Estate Developers in Bayelsa State.

(N= 238)

SN	Item Statements	Total Sum of Square	Mean Square	F-cal	P-value	$\overline{X}$	SD	Remarks RQ	H0
1	Branding helps to create the image of plastic building products to consumers.	117.820	0.225	1.245	0.289	**4.61**	0.82	**VGE**	**NS**
2	Branding distinguishes quality plastic building products from counterfeits in the market.	115.312	0.221	0.301	0.740	**3.08**	1.11	**ME**	**NS**
3	Branded plastic building products help to identify the marketer and the product.	194.746	0.374	0.610	0.544	**4.77**	0.85	**VGE**	**NS**
4	The purchase of branded plastic building products gives satisfaction to users.	156.164	0.300	0.655	0.520	**4.11**	0.93	**GE**	**NS**
5	Branded plastic building products increase sales volume of the producers.	128.340	0.246	3.115	0.043	**4.54**	0.95	**VGE**	**S***
6	Consumers prefer branded plastic building products to their generic unbranded products.	130.164	0.250	0.446	0.641	**3.94**	1.10	**GE**	**NS**
7	Branded plastic building products enhance the promises of value the product makes.	130.692	0.251	0.618	0.539	**4.41**	0.82	**GE**	**NS**
8	Branded plastic building products influence buying decisions and shapes ownership experience.	124.038	0.238	0.173	0.841	**4.57**	0.77	**VGE**	**NS**
9	Branded plastic building products simplify product handling.	143.981	0.274	3.931	0.024	**3.46**	1.06	**ME**	**S***
10	Branded plastic building products create emotional attachments to products and companies.	214.291	0.411	0.539	0.584	**3.71**	0.98	**GE**	**NS**
11	Branded plastic building products make purchasing decisions easier and quicker for the consumer.	140.428	0.270	0.284	0.753	**4.50**	1.14	**VGE**	**NS**
12	Branded plastic building products impress the firm’s identity upon potential customers.	138.061	0.265	4.011	0.009	**4.00**	0.78	**GE**	**N***
13	Branded plastic building products help to maximize profit.	154.746	0.298	0.040	0.961	**4.10**	0.75	**GE**	**NS**
14	Branded plastic building products suggest good quality.	138.096	0.265	0.102	0.903	**3.31**	1.14	**ME**	**NS**

Note: $\overline{X}$ = Mean; **SD** = Standard Deviation; **VGE** = Very Great Extent; **GE** = Great Extent; **ME** = Moderate Extent; ***NS*** *=Not Significant;* ***S**** *= Significant; Level of Sig.* ***0.05***

From the data presented in Table 2 above, it was revealed that the grand mean ratings of the responses of the respondents on items 1, 3, 5, 8 and 11 were 4.61, 4.77, 4.54, 4.57 and 4.50 respectively which all fell within the boundary limit of number 4.50 – 5.00 on a 5-point rating scale. This indicated that the respondents agreed that the five items of products branding in the table are to a "Very Great Extent" influencing the demand for plastic building products by real estate developers in Bayelsa State. The grand mean ratings on items 4, 6, 7, 10, 12 and 13 were 4.11, 3.94, 4.41, 3.71, 4.00 and 4.10 respectively which all fell within the boundary limit of number 3.50 – 4.49 on a 5-point rating scale. This indicated that the respondents agreed that the six items of products branding in the table are to a "Great Extent" influencing the demand for plastic building products by real estate developers in Bayelsa State. The mean value of the remaining three items in the table, specifically items 2, 9 and 14 were 3.08, 3.46 and 3.31 respectively which are between the boundary limit of number 2.50 – 3.49 on a 5-point rating scale. This indicated that the respondents agreed that the three items of products branding in the table are to a "Moderate Extent" influencing the demand for plastic building products by real estate developers in Bayelsa State. The grand standard deviation values of the 14 items in the table ranged between 0.77 to 1.14 which indicated that the responses of the respondents are close to one another and to the mean.

The data presented in table 2 on hypothesis two revealed that that the p-values of 11 out of the 14 items ranged from 0.289 to 0.961 which are greater than 0.05 level of significance. This indicated that there were no significant differences in the mean ratings of the responses of plastic building product distributors, real estate Architects, Engineers and Surveyors on the 11 identified items of product branding. Therefore, the hypothesis of no significant difference in the mean responses of plastic building product distributors, real estate Architects, Engineers and Surveyors is accepted on the 11 indentified items in the table. The p-values on the remaining three items, specifically items 5, 9 and 12 were 0.043, 0.024 and 0.009 respectively which are less than 0.05 level of significance. This indicated that there were significant differences in the mean ratings of the responses of plastic building product distributors, real estate Architects, Engineers and Surveyors on the three items. Therefore, the hypothesis of no significant difference in the mean responses of plastic building product distributors, real estate Architects, Engineers and Surveyors is rejected on items 5, 9 and 12 in the table.

Discussion

The study found that advertisement greatly influences the demand for plastic building products in number of ways which include: advertisement helps to create awareness of plastic building products, influences the consumers' brand recall and desire to buy, giving adequate information about the products' features and attributes, helping to increase the sales volume of producers, persuading consumers to purchase plastic building products frequently, advertising is prominent in the development of plastic building products, advertising creates efficient reminder in the purchase of plastic building products by consumers, accounts for their uniqueness of plastic products, making consumers to purchase plastic building products as and when due and that advertising of plastic building products increases brand loyalty among others.

The findings of this study on the extent to which advertisement influence the demand for plastic building products agreed with the findings of Okafor (1995) who conducted a study on the influence of advertising on soap and detergent products' marketing in Enugu metropolis; and found out that advertising of products largely influenced the way and manner consumers decide on the consumption of the product. Also, the result of this study conformed with that of Awuzie (2003) who investigated the marketing strategies of commercial banks in Lagos State and found that the banks use a combination of advertising, personal selling, publicity, public relations, direct marketing and sales promotion in introducing new products. In addition, the findings of this study corroborated the results of Brown (2014) who carried out a study on sales response of promotions and advertising found out that advertising is capable of deeping brand loyalty, helps manufacturing companies yield favourable sales responses.

The study found that branding greatly influences the demand for plastic building products in number of ways which include: branding helps to create the image of plastic building products to consumers, distinguishes quality plastic building products from counterfeits in the market, identifies the marketer and the product, gives satisfaction to users, increase sales volume of the producers, consumers prefer branded plastic building products to their generic unbranded products, enhance the promises of value the product makes, influences buying decisions and shapes ownership experience, creates emotional attachments to products and companies, makes purchasing decisions easier and quicker for the consumer and impress the firm’s identity upon potential customers among others.

The finding of this study on the extent to which branding influence the demand for plastic building products is in consonance with the findings of Ezeamasiobi (2001) who conducted a study on the impact of advertising on consumer brand preference for cosmetics in Abuja metropolis and found that advertising and product quality were influential in cosmetics brand preference, and that branding motivates and influences the consumers to choose a particular brand of cosmetics for use. The result of this study also supported the findings of Chukwu (2001) who investigated the effects of consumer behaviour on products brand preference and loyalty. Furthermore, the findings of the present study on influence of branding is consistent with the findings of the study of Gaur and Vaheed (2002) who assessed the buying behaviour of consumers for branded fine rice in India and found out that brand preference of the consumers depends on quality, retailer influence, reasonable price and brand image.

Conclusion

The manufacturers of plastic building materials in a bid to market their products adopt some aggressive advertising activities and branding of their products in order to create awareness and increase demand. Hence, this study put to test the extent to which variables of advertisement and branding of products influence the demand for plastic building products by real estate developers using Bayelsa State as case study. In carrying out the study, survey research design was adopted in carrying using the opinion of 238 respondents who supplied data that were used for the study. From the findings that emanated from the study, it was concluded that advertisement and branding variables greatly influenced the demand for plastic building products by real estate developers in Bayelsa State. Based on this conclusion, it was recommended that major actors in the building construction and manufacturing sub-sector of the Nigerian economy should adopt and utilize advertisement and branding variables for increased demand for their products and competitive advantage against counterfeit and sub-standard products in the market.

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EFFECTIVE WORKSHOP MANAGEMENT TECHNIQUES NEEDED FOR IMPROVING THE TEACHING OF ELECTRICAL TECHNOLOGY IN TECHNICAL COLLEGES IN BENUE STATE

By

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Abstract
The paper determined the workshop management techniques needed for improving the teaching of electrical technology in technical colleges in Benue State. Three research questions were answered while hypotheses formulated were tested at 0.05 level of significance. The study adopted descriptive survey design. The population for the study was 50 electrical technology teachers. The entire population was involved, hence there was no sampling. The instrument for data collection was structured questionnaire and three experts validated the instrument while Cronbach alpha reliability method was used to determine the internal consistency of the items and an overall coefficient of 0.84 was obtained. Mean was used to answer three research questions while t-test was used to test the null hypotheses at 0.05 level of significance. The study found out 38 items; 17 planning techniques, 10 organizing techniques and 11 coordinating techniques were needed by teachers for improving the teaching of electrical technology trades in technical colleges. There was no significant difference between the mean responses of electrical technology teachers with below five years and above five years of teaching experience on the workshop management techniques needed by teachers of electrical technology for improving their teaching in the electrical workshops in the technical colleges. Based on these findings, recommended include that all the all the techniques identified in the study should be packaged to retrain teachers of electrical technology through workshop or seminars. It was also recommended that competent teachers of electrical technology should be employed by government to teach in technical colleges in the State
Keywords: *Management, workshop, electrical technology, technical education, electrical technology teacher*

Introduction

Technical colleges are institutions that provide secondary level education in technical education. Technical education according to Federal Republic of Nigeria (2004) is that aspect of education that leads to the acquisition of practical and applied skills as well as basic scientific knowledge. In the same vein, (UNESCO, 2007), defined technical and vocational education as a comprehensive term referring to those aspect of educational process involving, in addition to general education the acquisition of practical skills, attitudes and understanding of knowledge relating to educational life. The aim of technical colleges is to produce graduates with saleable skills, knowledge and attitude necessary for effective employment and who can actually function well in their place of employment. In technical colleges, technical teachers give training in various disciplines such as woodwork, metalwork, building and electrical/electronic technology to mention but a few (Adeyemi & Uko-Aviomoh, 2004). Each of the above disciplines (including electrical technology) is usually headed by the most senior teacher usually referred to as the head of department. Electrical technology according to Alegbemi (2010) is that aspect of technical education which deals primarily with electricity and principles of magnetism and devoted to the utilization of forces of nature and materials for the benefits of mankind. Some of the training received in Nigeria schools under technical education in electrical/electronic technology includes; electrical installation and maintenance, radio, television and electronic work instruments mechanism, domestic appliance repair, machine and power engineering, electronics and communication, instrumentation and control.

In teaching electrical technology as a vocational course, emphasis should be laid on the actual job situation. Electrical technology is a broad area consisting of a number of related occupations. We may train the interested students in a specific area such as electrical appliances, electrical installations, auto-electricity, refrigeration and air-conditioning, or in a relatively new rapid expanding area of electronics. After specific occupation has been selected, it is necessary to determine the employment opportunities in the particular field. Electrical technology teachers are NCE (technical) graduates of electrical/electronic technology and university graduates in electrical/electronic technology. They are responsible for teaching of electrical technology trades in technical colleges.

Electrical technology in particular is unique, because it is also skill oriented and requires the use of workshop for the provision of learning situation in which the learner could experiment, study, create, construct, design, and repair and so forth (Sulaiman, 2000). The school workshop refers to a room or building housing the facilities used for manual training of students in Technical subjects so that they could acquire the practical skills that would enhance their economic life. In order to carry out such skilled training, the school workshop must be well managed in order to be a replica of what is obtainable in industries and companies where the students will find employment upon graduation. In the same vein workshop refers to a room or building where tools and machines are used for making or repairing things (Baba, 1992). Similarly, workshop is a unique learning environment in which the learner may test, construct, repair, experiment, design, disassemble, create, imagine and study (Ezeji, 2005).

Management is the process of dealing with or controlling things or people. Mullins (2007) defined management as the act of getting people together to accomplish desire goals and objectives using available resources (human, material and financial) efficiently and effectively. Management encompasses planning, organizing, leading, directing and controlling an organization or efforts for the purpose of accomplishing a set goal. As used in this study, management means workshop management techniques, such as planning techniques for workshop instruction, organizing techniques for workshop instruction, coordinating techniques for workshop instruction, techniques for implementing workshop instruction and evaluating techniques for workshop instruction.

Workshop management techniques are various ways or methods adopted by electrical technology teachers in schools and companies on how students can acquire practical skills. In the same vein, (Danjuma, 2008), workshop management techniques are strong means to attain competence in a job or occupation by the concerned individuals. He added that techniques are important ways which when appropriately adopted results into effective teaching and learning of practical subjects. According to Agu (2006), techniques are ways or mode of doing things such as: planning techniques for workshop instruction. Nwachukwu (2003) noted that for any effective instruction in the workshop, appropriate instructional techniques must be arranged, utilized and kept in order so that an acceptable occupational work habit and operational procedure are successfully imparted. Good planning gives impetus to effective learning and for planning to be effective, planning techniques must be considered (Olaitan, 2003). In effective planning there must be selection of appropriate materials, tools and equipment, identification of practical lesson objectives, selection of practical projects within the ability of students, drawing up step by step the procedure of carrying out the task, ensuring that all safety devices to be used for the lesson are in place and more so, preparation of learning sequence, that is, starting from simple to complex steps.

Organizing techniques for workshop instruction: organization in the workshop entails the arrangement of tools and equipment in the order they should be utilized in the step to step delivery of instruction. Okoro (2000) noted that in making the choice of what to teach, when to teach and how to teach in workshop, principal and technical teachers should be guided by the identified organizing techniques to solve such crucial issues. These techniques include, equipment and tools be organized in sequence like uses, sizes and colours for easy reference and accountability, tools be arranged so that supervisors can inspect and immediately identify worn out, broken and lost ones, lost or damaged tools be replaced for continuity of the programme, delegating functions to those involved in the workshop lessons, inviting master craftsman as the need arises to demonstrate certain skills in the classroom

Coordinating technique for workshop instruction; according to Whawo (1999), coordinating is the bringing together of related activities in school workshop to ensure a frictionless flow of work. Wale (2004) looked at coordinating process in terms of workshop management process ensuring that workshop programme activities are being brought together, harmonized and unified for effectiveness of workshop instruction. Akpakwu (2008) in his contribution said that coordinating is the synchronization of safety of students and material resources to achieve effective workshop instruction.

Techniques for implementing workshop instruction: For effective implementation of workshop instruction techniques, the following procedures should be adopted; hazardous substances subjected under control, taking decision on suitable time for workshop lessons, sharing of specific roles to students with major school events, trying out the work before the actual execution, grouping of students based on workshop availability, waste must be minimized. Evaluation technique for workshop instruction: Nwachukwu (2001) looked at evaluation in an educational setting as the processes of determining how much learning the students have acquired. In general terms, it is the process of reaching decisions. Patizhiko (2003) definition of evaluation pertaining to workshop instruction considers it as the process of assessing the effectiveness of workshop lessons in relation to its objectives using appropriate measuring techniques and providing feedback.

Workshop management techniques keep the workshop materials, machines and tools in good working conditions if properly applied by the teachers. Workshop management is successful if the objective for managing the workshop is fully achieved. In line with the above statement, Ogwo and Oranu (2006) observed that good workshop management techniques do enable students to exercise self-control in obeying rules. It also influences the amount of time the students are engaged in meaningful learning. It as well enables the teacher, with the aid of workshop attendants and other personnel in the workshop to ensure that records are kept, materials are supplied/improvised and cared for, tools and equipment are well maintained and accident are prevented.

However, according to Ede and Attam (2010), the situation seems to differ in technical colleges in Benue State where there are frequent damage to tools and machines, waste of materials by students and teachers. Many workshops in the technical colleges are not organized and planned for daily routine activities. Accidents occur frequently in the workshop and the few facilities in these workshops are not well managed to achieve the objectives of electrical technology training programmes. In order to improve the teaching of electrical technology in technical colleges, it is therefore necessary that the teachers should be prepared adequately in the act of workshop management. To achieve this, teachers found implementing electrical/electronic trades need to be equipped with workshop management techniques. The study therefore, focused on workshop management techniques such as planning, organizing, coordinating, implementing and evaluating; needed for improving the teaching of electrical technology trades in technical colleges in Benue State.

Statement of the Problem

Over the past three decades or so, the achievements of Benue State Technical College Students in both National Business and Technical Examinations Board (NABTEB) and teacher-made examinations have shown considerable and progressive deterioration, especially in the area of electrical technology. This problem is considered serious enough that in 2010 and 2011 National Business and Technical Examination Board (NABTEB) conference dwelt on this issue. The NABTEB Chief examiner's report and experience of the majority of electrical technology teachers confirmed the observation. Consequent upon the observed deterioration in students' achievement in both internal and external examinations, the feeling is that the electrical technology teachers in technical colleges in Benue State lack workshop management techniques in teaching of electrical technology in the schools. Umar (2010) reported that more than 60% of Benue State electrical technology teachers do not employ workshop management techniques in their instruction when teaching. One wonders what the situation will look like if adequate attention is not given to improve on the situation. According to Elom (2009), workshop management techniques are necessary in every electrical or any workshop if effective teaching of the course is to be achieved. This is because it enables the teacher to effectively deliver his/her lesson to the students. It involves the planning, organization, coordination, controlling, implementation and evaluation of the workshop instruction. Ede and Attama (2010) stated that workshop as a place of practical work and study, the quality of instruction and learning is positively influenced by the manner the workshop is managed. Koontz and Weihrich (2001) stressed that better teaching of technical courses for success of any educational goals and objectives depends very much on the managerial techniques adopted and efficient utilization of the available resources. Unfortunately, the management of electrical technology workshop by the teachers in technical colleges in Benue State leaves a lot to be desired. The task of this study therefore is to identify workshop management techniques needed to improve the teaching of electrical technology in technical colleges in Benue State.

Purpose of the Study

The general purpose of this study was to determine workshop management techniques needed for improving the teaching of electrical technology in technical colleges in Benue State. Specifically, the study is designed to identify:

1. The workshop planning techniques needed by electrical technology teachers for improving their teaching in electrical workshops in technical colleges in Benue State.
2. The workshop organizing techniques needed by electrical technology teachers for improving their teaching in electrical workshops in technical colleges in Benue State.
3. The workshop coordinating techniques needed by electrical technology teachers for improving their teaching in electrical workshops in technical colleges in Benue State.

Research Questions

The study sought answers to the following research questions:

1. What are the workshop planning techniques needed by teachers of electrical technology for improving their teaching in electrical workshops in technical colleges in Benue State?
2. What are the workshop organizing techniques needed by teachers of electrical technology for improving their teaching in electrical workshops in technical colleges in Benue State?
3. What are the workshop coordinating techniques needed by electrical technology teachers for improving their teaching in electrical workshops in technical colleges in Benue State?

Hypotheses

The following hypotheses were formulated and tested at 0.05% level of significance:

$H0_1$: There is no significant difference between the mean responses of electrical technology teachers with below five years and above five years of teaching experience on the workshop planning techniques needed by teachers of electrical technology for improving their teaching in the electrical workshops in the technical colleges

$H0_2$: There is no significant difference between the mean responses of electrical technology teachers with below five years and above five years of teaching experience on the workshop organizing techniques needed by teacher of electrical technology for improving their teaching in electrical workshops in technical colleges

$H0_3$: There is no significant difference between the mean responses of electrical technology teachers with below five years and above five years of teaching experience on the workshop coordinating techniques needed by teachers of electrical technology for improving their teaching in electrical workshops in technical colleges

Method

Design of the Study

A descriptive survey design was employed for carrying out the study. A survey research according to Nworgu (2006) is one in which a group of people or items is studied by collecting and analyzing data from only a few people or items considered to be representative of the entire group. The survey plan or design specifies how such data will be collected and analyzed since the study entails the collection of data from the respondents through the use of questionnaire to identify workshop management techniques for improving teaching of electrical technology in technical colleges in Benue State, this research design is therefore most suitable for the study.

Area of the Study

This research was carried out in Benue State of Nigeria. The State is situated in the central part of Nigeria. It shares common boundaries with Enugu, Ebonyi and Cross River States in the south, Kogi State in the West, and Nassarawa State and Taraba States in the North. Makurdi town which is the capital of the state is located along the bank of river Benue from where the state derived its name. The major occupation of the people in the state is farming which engages about 80% of the people in the state. The state has three major tribes namely Tiv, Idoma and Igede. Varieties of crops such as yams, rice, groundnuts, maize, cassava, potatoes etc, are grown in large quantity in the state. Hence the state is tagged the Food Basket of the Nation. There are thirteen government approved technical colleges in the state. Poor management and very bad conditions of electrical technology workshops in the colleges have been observed to be on increase in the State. Benue State government has also embarked on massive electrification of rural communities. The students graduating in the technical colleges in electrical technology trades will be of great benefit to the communities in carrying out installation and repairs on electrical equipment.

Population for the Study

The population for the study consisted of 50 electrical technology teachers selected from thirteen technical colleges in Benue State. Data obtained from Benue State Science and Technical Education Board, Makurdi in (2011) and Federal Ministry of Education, Makurdi Zonal Office (2011) has shown that there are 50 electrical technology teachers working with the thirteen technical colleges in Benue State. The entire population was involved, hence there was no sampling.

Instrument for Data Collection

The instrument for data collection for this study was a structured questionnaire. It consisted of 56 items developed by the researcher from literature based on the research questions. The questionnaire was divided into part 1 and 2; and four sections (A, B, C & D). Section A elicited personal information from the respondents. Section B has seventeen (17) items on the planning workshop techniques required for improving the teaching of electrical technology and section C has ten (10) items and deals with the organization of workshop techniques required for improving the teaching of electrical technology and section D has eleven (11) items on the techniques for coordinating workshop required for improving the teaching of electrical technology. The response code for the Likert rating scale of strongly Agree (SA), Agree (A) Undecided (UD), Disagree (DA) and strongly Disagree (SD) with assigned numerical values 5, 4, 3, 2 and 1 respectively assigned. The real limit of the scale is 4.5-5.0, 3.5-4.5, 2.5-3.5, 1.5-2.5 and 0.5-1-5. The respondents were asked to indicate their best opinion on each item.

Validation of the Instrument

The draft instrument was subjected to face validation by three experts. Two in the Department of industrial technical Education, Faculty of Vocational and Technical Education, University of Nigeria, Nsukka and one expert in the Department of Vocational and Technical Education, Benue State University, Makurdi. They were requested to ensure clarity and appropriateness of the items with regard to addressing the problem of the study and research questions under investigation by making suggestions and corrections. Their suggestions were used to make necessary corrections to produce the final copy of the instrument. The items on the questionnaire were 66, after validation of the instruments; the final copy has 56 items.

Reliability of the Instrument

Cronbach alpha reliability method was used to determine the internal consistency of the instrument for data collection. Twenty copies of the instrument were administered on twenty teachers of electrical technology in technical colleges in Benue State. The responses of the teachers were analyzed using Statistical Package for Social Science (SPSS) Version 16. The overall reliability coefficient of 0.84 was obtained.

Method of Data Collection

The researcher personally went to the thirteen (13) technical colleges in Benue State and administered copies of the questionnaire to the respondents. He gave the respondents three weeks to answer them. The completed copies of the questionnaire were collected after three weeks by the researcher.

Method of Data Analysis

The descriptive statistics of Mean was used for the analysis of the data collected for the study in order to answer the research questions. Standard deviation was used to determine the closeness of the mean score. The mean of 3.50 was taken as a criterion for the determination of workshop management techniques needed for improving the teaching of electrical technology in technical colleges. Any mean score of 3.50 and above represented positive response, while any mean score below the criterion mean of 3.50 regarded as negative response. T-test was used for testing the null hypotheses formulated for the study at 0.05 level of significance. The null hypotheses were accepted when the p-value was greater than 0.05. The null hypotheses were rejected when the p-values were less than 0.05.

Results

The results for the study were obtained from the research questions answered and hypotheses tested through data collected and analyzed. The data for answering research question one and testing hypothesis one were presented in Table 1

Table 1
Mean Responses of the Respondents on the Workshop Planning Techniques Needed by Teachers of Electrical Technology for Improving their Teaching in Electrical Workshops in Technical Colleges in Benue State
N = 50

S/N	Item Statements	Mean	S.D.	P-values	Remarks
1	Provision of adequate funds for the purchase of consumable materials such as cables and maintenance of existing facilities	3.80	0.72	0.34	Needed
2	Providing adequate number of electrical technology tools and equipment in the workshop	3.86	0.83	0.11	Needed
3	Equipment and materials should be planned based on electrical technology curriculum	3.70	0.81	0.09	Needed
4	Workshop stores should be provide for safety of consumables	4.02	0.75	0.13	Needed
5	Locating machines, switches and socket outlets for convenience and safety in electrical workshop	3.72	0.81	0.23	Needed
6	Tools, equipments and materials used in teaching electrical technology should be planned for yearly	3.90	0.91	0.12	Needed
7	Selection of practical projects with the ability of electrical technology students	3.68	0.98	0.33	Needed
8	Planning the workshop to take care of students practical work in areas of construction of electrical appliances	4.14	0.88	0.14	Needed
10	Provision for adequate ventilation, illumination and	3.64	0.85	0.37	Needed

	artificial lighting				
11	Maintenance schedule for regular maintenance of tools, equipments and machines in electrical workshop	3.62	0.85	0.18	Needed
12	Provide electrical technology workshop facilities base on current students' enrollment	3.76	0.76	0.26	Needed
13	Grouping of the learners based on work stations available in electrical workshop	3.80	0.99	0.10	Needed
14	Listing clearly the roles expected to be performed by the electrical technology teachers	3.56	0.73	0.13	Needed
15	Stating clearly the roles to be performed by the students in the lesson in electrical workshop	3.56	0.76	0.45	Needed
16	Examining tools and materials necessary for the activities to be done in electrical workshop	3.78	0.81	0.09	Needed
17	Utilize technical manual for replacement of parts for electrical technology equipments	3.90	0.94	0.15	Needed

Data in Table 1 revealed that all the 17 items have their mean values ranged from 3.56 to 4.14. This showed that the mean value of each item was above the cut-off point of 3.50, indicating that all the workshop planning techniques are needed by teachers of electrical technology for improving teaching in electrical workshops in technical colleges in Benue State. The Table also showed that the standard deviations of the items are within the range of 0.72 to 0.99 and are positive. This indicated that the respondents were not very far from the Mean or from one another in their responses. Table 1 also indicated that all the items had their P-values greater than 0.05. This indicated that there was no significant difference between the mean responses of electrical technology teachers with below five years and above five years of teaching experience on the workshop planning techniques needed by teachers of electrical technology for improving their teaching in the electrical workshops in the technical colleges of Benue State. Therefore, the null hypothesis of no significant difference was upheld for all the 17 techniques

Table 2

Mean Responses of the Respondents on the Workshop Organizing Techniques Needed by Teachers of Electrical Technology for Improving Teaching in Electrical Workshops in Technical Colleges in Benue State

N = 50

S/N	Item Statements	Mean	S.D	P-values	Remarks
1	Arranging the equipment to facilitate teaching and learning of electrical technology	3.81	0.79	0.09	Needed
2	Equipment and tools should be organized based on uses and size for easy reference and accountability in electrical workshop	3.90	0.84	0.12	Needed
3	Arrangement of tools and materials before and after use in electrical workshop	3.64	0.91	0.24	Needed
4	Proper keeping of records of all the workshop equipment and tools	3.70	0.84	0.21	Needed
5	Tools and equipment in electrical workshop should be organized arranged so that supervisor can inspect and identify immediately worn out, broken and lost ones	3.82	0.70	0.11	Needed
6	Hazardous substances or materials must not only be stored securely but should be under control in electrical workshop	3.50	0.83	0.23	Needed
7	Constant checking of tools and materials to avoid loss due to pilfering or vandalism	4.04	0.75	0.08	Needed
8	Tools and equipment in electrical workshop should be	3.94	0.81	0.12	Needed

	used for activities they are designed for				
9	Work areas in electrical workshop should be designated and equipped for each skill area such as installation, maintenance, repairs, design and construction	3.32	0.95	0.23	Not needed
10	Preventive maintenance should be carried on electrical technology facilities to avoid break down	3.92	0.70	0.25	Needed

Table 2 revealed that nine out of 10 items have their mean values ranged from 3.50 to 4.04. This showed that the mean value of each item was above the cut-off point of 3.50, indicating that only nine workshop organizing techniques are needed by teachers of electrical technology for improving teaching in electrical workshops in technical colleges in Benue State. The Table also showed that the standard deviations of the items are within the range of 0.70 to 0.95 and are positive. This indicated that the respondents were not very far from the Mean or from one another in their responses. Table 2 also indicated that all the items had their P-values greater than 0.05. This indicated that there was no significant difference between the mean responses of electrical technology teachers with below five years and above five years of teaching experience on the workshop organizing techniques needed by teachers of electrical technology for improving their teaching in the electrical workshops in the technical colleges of Benue State. Therefore, the null hypothesis of no significant difference was upheld for all the 10 techniques

Table 3
Mean Responses of the Respondents on the Workshop Coordinating Techniques Needed by Teachers of Electrical Technology for Improving Teaching in Electrical Workshops in Technical Colleges in Benue State
N = 50

S/N	Item Statements	Mean	S.D	p-values	Remarks
1	Grouping students to execute specific working projects in electrical technology workshop	3.72	0.78	0.08	Needed
2	Arranging of workshop facilities available for different uses in electrical workshop	4.04	0.90	0.11	Needed
3	Inventory and inspection of tools and equipment in electrical workshop should be carried out periodically	3.72	0.82	0.23	Needed
4	In electrical workshop materials and tools should be allocated to groups or individuals for different uses	3.65	0.89	0.12	Needed
5	Make sure that effort of individual students are unified in electrical workshop	3.66	0.80	0.34	Needed
6	Interpreting and analyzing different types of projects to the students individually and in groups in electrical workshop	3.64	0.75	0.23	Needed
7	Make sure that different tools and equipment are harmoniously used in workshop operations	3.82	0.82	0.41	Needed
8	Improving the security arrangement in the electrical workshop by checking pilfering of tools by both staff and students	3.84	0.78	0.09	Needed
9	Improving the safety arrangement in the electrical workshop by providing different safety devices	3.56	0.73	0.12	Needed
10	Ensuring maintenance of different machines and equipment in the electrical workshop	3.76	0.94	0.18	Needed
11	Ensuring cordial relationship between electrical technology teachers and other members of staff in the school to work together for the realization of workshop objectives	3.84	0.88	0.21	Needed

Table 3 revealed that all the eleven items have their mean values ranged from 3.56 to 4.04. This showed that the mean value of each item was above the cut-off point of 3.50, indicating that all the workshop coordinating techniques are needed by teachers of electrical technology for improving teaching in electrical workshops in technical colleges in Benue State. The Table also showed that the standard deviations of the items are within the range of 0.73 to 0.94 and are positive. This indicated that the respondents were not very far from the Mean or from one another in their responses. Table 3 also indicated that all the items had their P-values greater than 0.05. This indicated that there was no significant difference between the mean responses of electrical technology teachers with below five years and above five years of teaching experience on the workshop coordinating techniques needed by teachers of electrical technology for improving their teaching in the electrical workshops in the technical colleges of Benue State. Therefore, the null hypothesis of no significant difference was upheld for all the 11 techniques.

Discussion of findings

The findings of this study revealed that seventeen workshop planning techniques, nine organizing techniques and 11 coordinating techniques were needed by teachers of electrical technology in technical colleges in Benue State. These findings were in agreement with the finding of Elom (2009) that proper planning for equipment based on electrical technology curriculum is one of the workshop planning techniques for effective teaching to take place in the workshop. The author also found out that planning techniques such as provision of adequate funds for the purchase of consumable materials such as cables and maintenance of existing facilities, provision of adequate number of electrical technology tools and equipment in the workshop and providing workshop stores for safety of consumables are needed by teachers for effective performance. Maiyaki (2002) also stated that adhering strictly to the programme of school workshop activity in electrical technology workshop improves technical teaching. Odinaka (2010) explained that one of the workshop management techniques required by teachers is that they should note the steps in the procedure to complete the project that needed modification. The author added that planning for equipment based on electrical technology curriculum is a prominent workshop planning technique. Organizing equipment and tools based on uses and size for easy reference and accountability in electrical workshop, arrange tools and materials before and after use in electrical workshop result to effective skills acquisition.

These findings were in consonance with the opinion of Akpakwu (2008) that carrying out inventory and inspection of tools and equipment in electrical workshop periodically promotes effective teaching in the workshop. Sulaiman (2000) stated that workshop management techniques are required by teachers teaching electrical technology trades because they are unique, skill oriented and requires the use of workshop for the provision of learning situation in which the learners could experiment, study, create, construct, design, and repair and so forth. The school workshop refers to a room or building housing the facilities used for manual training of students in Technical subjects so that they could acquire the practical skills that would enhance their economic life. In order to carry out such skilled training according to Baba (1992), the school workshop must be well managed in order to be a replica of what is obtainable in industries and companies where the students will find employment upon graduation

Some of the coordinating techniques required by teachers in the workshop as found in the study include grouping students to execute specific working projects in electrical technology workshop and arranging workshop facilities available for different uses in electrical workshop. These findings were in line with the opinion of Ahmad (2010) that arranging the equipment to facilitate teaching and learning of electrical technology is an organizing technique. Koontz and Weihrich (2001) stressed that better teaching of technical courses for success of any educational goals and objectives depends very much on the management techniques adopted by teachers and efficient utilization of the available resources. The finding on hypotheses tested revealed that there was no significant difference between the mean responses of electrical technology teachers with below five years and above five years of teaching experience on the workshop management techniques needed by teachers of electrical technology for improving their teaching in the electrical workshops in the technical colleges of Benue State. The implication of this finding was that the two categories of teachers have the same opinion on the workshop management techniques needed by teachers. The findings of the above researchers in their various research activities helped to support the justification of the results of this study on the workshop management techniques needed for improving the teaching of electrical technology in technical colleges in Benue State.

Conclusion

Observation reveals that sixty percent of Benue State electrical technology teachers do not employ workshop management techniques in their instructions when teaching. This occurred as a result of lack of workshop management techniques by the teachers. A study was now conducted to identify workshop management techniques. Workshop planning techniques, organizing techniques, coordinating, techniques, implementing techniques and evaluating techniques were then identified and found needed by electrical technology teachers for improving their teaching or instruction.

Recommendations

Based on the findings of the study and the conclusions made, the following recommendations were made:

1. All the techniques identified in the study should be packaged to retrain teachers of electrical technology through workshop or seminars
2. Competent teachers of electrical technology should be employed by government to teach in technical colleges in the State
3. Electrical workshop of technical colleges in the state should be equipped with relevant modern machines and tools for the training of electrical technology students.

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EFFECTS OF INSTRUCTIONAL SCAFFOLDING ON STUDENTS' PERFORMANCE IN TECHNICAL DRAWING IN TECHNICAL COLLEGES

By

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Abstract
This study investigated the effect of instructional scaffolding strategy on students' academic performance in technical drawing in technical colleges in Edo and Delta States, Nigeria. Two research questions were developed while three null hypotheses formulated were tested at 0.05 level of significance. A pretest, posttest, non equivalent control group, quasi-experimental research design was adopted. Sixty one students made up the experimental group and 59 students in the control group for the study; giving a total of 120 year III technical students in 2015/2016 academic session drawn from four technical colleges made up the population for this study. Technical Drawing Achievement Test (TDAT) was the instrument used for data collection. Instructional scaffolding and conventional lesson plans were prepared by the researcher. The instrument was face and content validated by five experts in Technical Education and Test and measurement. The reliability coefficient of TDAT was found to be 0.80 using Kuder-Richardson's estimate. Research questions were answered using Mean while the hypotheses were tested using ANCOVA. The findings revealed among others that students taught technical drawing using instructional scaffolding strategy had higher mean achievement scores than those taught with the conventional teaching method. It was recommended among others that technical teachers should be encouraged to use instructional scaffolding in teaching technical drawing.
Keywords: instructional scaffolding, technical drawing, strategies, performance, achievement

Introduction
Technical Drawing (TD) is a skill oriented subject or course that encompasses work done by architects, engineers, interior designers and electricians, technical drafters, craftsmen, technical teachers, educators and students (Oviawe & Adeola, 2017). It is the language of technology and the most popular technical subject in any technical education programme in Nigerian Universities, Polytechnics, Mono-technics, Colleges of Education, technical colleges or conventional secondary schools. Technical drawing, according to Okorie (2001), is essentially the universal language which technicians, engineers, designers, craftsmen, manufacturers and industrialists communicate with. Oviawe and Adeola (2017) asserted that the usability of technical drawing transcends cultures and languages and for any nation to progress technologically, such nation must develop the training of her citizens in the language of technology which is technical drawing.

Technical drawing is the prime mover of all other technical related subjects that forms a picture of concept of what should be drawn before actually drawing it (Oviawe and Adeola, 2017). They added that greater form is done where the teacher finds it difficult to assist students create the image of the picture required. These difficulties according to Okoye (1998), are of a mechanic tradition. The author added that Nigeria as a developing nation is just starting to experience the technology age, with the result that most of her young people, unlike youths elsewhere have had no acquaintance with machines, mechanical knowledge, attitude, habits and thinking that are normal part of growing up in a technology culture. This clearly implies that something is lacking in Nigeria's quest for technological growth and development. The required background which forms the basis for the technological culture that ought to be the foundation for the study of engineering and technology which is technical drawing seems missing. Technical drawing needs a high level of imagination and vision; and students are required to acquire or possess the creative skills to enable them perform well in technical drawing towards becoming self-reliant and wealth creators and entrepreneur in the society.

The lack of adequate skills required for employment and wealth creation as observed on the part of the students has been blamed on various factors amongst which is the teaching method adopted by the teacher (Nwali, 2014). To Nwali (2014), the teachers adopt teacher-centred method of learning which encourages rote learning. He opined that the methods used by the teachers are predominantly lecture, explanation, and demonstration with no emphasis on group work, practical and project activities that could result in creative thinking, cooperation and discussion among the students. The application of information and communication (ICT) in schools would enhance students understanding and also increase skill acquisition in technical drawing. Ndem and Omiko (2015) posited that lack of equipped laboratories and workshops in schools contribute to low academic performance of students in science and vocational subjects.

The teaching of technical drawing involves innovations in order to meet the challenges of the society. When innovative approaches are produced in both teachers and students, students will be encouraged while improved academic performance becomes realistic and achievable. To achieve the above, teachers of technical drawing must be acquainted with appropriate teaching methods and develop the ability to creatively apply the different approaches among which is instructional scaffolding.

Scaffolds are temporary structures that physically support workers while they complete jobs that would otherwise be impossible. Scaffolds provide workers with both a place to work and the means to reach work areas that they could not access on their own (Nwali, 2014). An instructional scaffold is a teaching strategy that was clearly named for the practical resemblance it bears to the physical scaffold used by workers on construction sites. This instructional strategy emphasizes the teaching of new skills by engaging students collaboratively in tasks that would be too difficult for them to complete on their own. Omiko (2015) defined scaffolding as the assistance (parameters rules or suggestions) a teacher gives to the students in a learning situation. Margaret (2005) saw instructional scaffolding as a learning process designed to promote a deeper level of learning. It is the support given during the learning process which is tailored to the needs of the students with the intention of assisting the students to achieve their learning objectives.

Instructional scaffolding is the provision of support to promote learning when concepts and skills are being first introduced to the students. These supports may include resources, a compelling task, templates and guidance on the development of cognitive and social skills. Nwali (2014) asserted that the instructor initially provides extensive instructional support or scaffolding to continually assist the students in building their own understanding of new content and process. The students assume full responsibility for controlling the progress of a given task once they are able to internalize the content and process. Sawyer (2006) added that these supports are gradually removed as the students develop autonomous learning strategies, thus promoting their own cognitive, affective and psychomotive learning skills and knowledge.

Novak (2005) stressed on the students performance in science and technology through scaffolding as a heuristic tool for the curriculum. He added that the application of instructional scaffolding by teachers for teaching could change their view of curriculum contents with important implications for teaching and learning. Hartman asserted that the use of scaffolding in education ensure students become independent and self-regulating learners and problem solvers. In order to carry out scaffolding instructional strategy, the teacher must first identify and determine: (i) what students can accomplish independently; (ii) what students can accomplish with guidance (the students' zone of proximal development); and (iii) teacher then provides the instructions that are just enough to support the learner in task beyond reach without teacher's support.

Levels of scaffolding support may differ such that a great deal of support is given when the teacher models the targeted task, giving individual verbal explanations that identify the element of the content and strategy little support would be when the teacher only provides cues to some aspects of the task in response to what students have already mastered (Alake & Ogunseemi, 2013). The levels of support that lie between these two extremes according to Beed, Hawkins and Roller (1991) in Alake and Ogunseemi (2013) are: (i) assisting modeling: students are encouraged to participate in the completion of the task; (ii) element identification: the teacher identifies the elements of the intelligent behaviour as the students complete task; and (iii) strategy naming: the teacher refers to the name of the strategy and students employ it on their own.

Instructional scaffolding focuses on active learning and students' choice. To this end, Winnips (2001) asserted that the technique works well with technology based learning, in which students need to be more self-reliant. Instructional scaffolding allows students to work being self-reliant while receiving adequate support. Conventionally, learning support in the classroom has been provided by continuous interaction with the teacher, but as ICT becomes more prevalent, experts say, the incorporation of Instructional scaffolding in contents where knowledge is fixed, demand that the teacher provide the support before time. Whereas in content where knowledge is developmental. Such as technical drawing, there is the demand that the teacher provides more interaction and continuous guidance as the task is being executed by the student.

The effectiveness of scaffolding as a teaching method is known mainly in developed countries and its application in the teaching of technical drawing is yet to be explored. Considering the fact that technical drawing is a gender sensitive subject, it may be necessary to speculate that the application of scaffolding in the teaching process may have some fascinating implications in the performance and interest of male and female students in the subject. Hence, the problem of this study was to find out the effect of instructional scaffolding on students' performance and interest in technical drawing. In line with general purpose, two specific purposes were derived.

Research questions

The following research questions guided the study:

1. What is the effect of instructional scaffolding on students' performance in Technical Drawing?
2. What is the effect of instructional scaffolding on male and female students' performance in Technical Drawing?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

1. There is no significant difference in the performance of students' taught technical drawing with instructional scaffolding and the conventional teaching method at post-test.
2. There is no significant difference in the performance male and female of students' taught technical drawing with instructional scaffolding and the conventional teaching method at post-test
3. There is no significant interaction effect of gender and instructional approach on the Mean performance score of students' in technical drawing concepts.

Method

This study was conducted using quasi-experimental research design of pre-test, post-test control group. Quasi-experimental research design is a design that uses non-randomized group and this option occurs when the researcher cannot sample and assign subjects to treatment groups. The design was specific with non-randomized control group and non-equivalent groups since intact classes were used. The use of intact classes to determine the effect of instructional scaffolding strategy on students' performance in technical drawing in Edo and Delta States technical colleges was to avoid threat of selection bias among the students and to avoid re-arranging and re-grouping which could disrupt the normal lessons. The pre-test was used to partial out initial differences in the two groups and also to control selection bias which is a threat to internal validity.

The population for this study consisted of all Year III technical students offering technical drawing in the 10 technical colleges in Edo and Delta States. Purposive sampling technique was used in selecting two technical colleges each from both States giving a total of four technical colleges with a population size of 120 students and the population size is manageable. The four colleges were grouped into two. Two technical colleges were used as experimental group and the other two as control group. Intact classes were used in each school for experimental and control.

The instruments used for data collection were the researcher developed Technical Drawing Achievement test (TDAT). TDAT is a paper and pencil 50-item multiple choice objective test with four-options (A to D) test based on the NBTE (2003) curriculum. The test was used for both Pre-test (PRETDAT) and Post-test (POSTTDAT). There was a six weeks interval between pre-test and post-test. This was to create enough time to take care of the possibility of the students becoming "test wise". The Pre-test (PRETDAT) was used to establish the level of achievement at which the students functioned in Technical Drawing prior to treatment. At the end of the treatment, the Post-test (POSTTDAT) was conducted. It was used to establish the level of performance at which the students attained in Technical Drawing after treatment. The items in TDAT used for pretest were reshuffled for use as posttest.

TDAT and lesson plans were face and content validated by two technical drawing Lecturers, an expert in test and measurement from Ambrose Alli University, Ekpoma and University of Benin, Benin City, two technical drawing teachers from technical colleges. Based on their criticism and corrections, a final draft of the instruments which were used for data collection resulted. TDAT was administered on an equivalent technical college not included in the main study sample to determine the coefficient of stability of the instrument. This was done to prevent contamination of study samples and results obtained in the course of the study. The result obtained was used to calculate the difficulty index and discrimination index of the items. The reliability of the test items was determined using Kuder Richardson formula (K-R 20) and the reliability of 0.80 was obtained.

Data collected were analyzed using mean to answer the research questions while Analysis of Covariance (ANCOVA) was used in testing the hypotheses at 0.05 level of significance. The regular teachers were coached on the lesson plan prepared for the experimental classes which was used for the students by their teachers while the teachers in the control group were allowed to teach normally using the conventional teaching method. The regular teachers were allowed to teach both groups to take care of hawthorn effect which might result when the students are aware that they are engaged in an experiment while the researcher only supervised the teaching and testing processes. To ascertain the pre-existing differences in technical drawing performance between groups, the TDAT was administered as a pretest to the students and the results were used as covariate measures to the posttest scores. Both the test and the teachings for the subjects in the experimental and control groups were held during normal school timetable schedule. Then the researcher with the assistance of the teachers finally administered the posttest (TDAT) to the students under a uniform testing atmosphere. The results of both the pretest and posttest were collated and were used to answer the two research questions and to test the null hypotheses.

Findings

Table 1: Mean and Standard Deviation of Pretest Post-test mean Performance of Students' taught Technical Drawing using Instructional Scaffolding and Conventional Teaching Method

Group	N	Pre-test Mean	Pre-test SD	Post-test Mean	Post-test SD	Gains Mean
Experimental Group (Instructional Scaffolding)	61	30.05	8.85	68.17	16.50	8.72
Control (CTM) Group	59	30.98	10.17	59.45	16.85	

The result in Table 1 on research question 1 shows that the experimental group had a mean score of 30.05 in the pre-test and a mean score of 68.17 in the post-test making a pre-test, posttest mean gain of experimental group is 62.00. The control group had a mean score of 30.98 in the pre-test and a mean score of 59.45 in the post-test making a pretest, posttest mean gains of control group to be 28.47. With this result, the students in the experimental group performed better in the achievement test than the students in the control group. Hence, instructional scaffolding strategy improved students' academic performance in technical drawing.

Table 2: Mean and Standard Deviation of Pretest Post-test mean Performance of Male and Female Students' taught Technical Drawing using Instructional Scaffolding and Conventional Teaching Method

Group	Gender	N	Pre-test Mean	Pre-test SD	Post-test Mean	Post-test SD	Gains Mean
Experimental Group (Instructional Scaffolding)	Male	91	38.75	8.12	65.61	15.97	5.28
	Female	29	30.24	10.14	70.90	16.89	

Data in Table 2 on research question 2 shows that for the experimental group, male students had a mean score of 38.75 in the pre-test and a mean score of 65.61 in the post-test making a pre-test, posttest mean gain of male students in the experimental group is 26.86. The female students had a mean score of 30.24 in the pre-test and a mean score of 70.90 in the post-test making a pretest, post-test mean gains of female students to be 40.66. With this result, the female students in the experimental group performed better in the achievement test than their male counterpart.

Table 3: Analysis of Covariance (ANCOVA) for Difference in Performance of Technical Drawing Students based on Methods of Teaching and Gender

Source of Variation	Sum of Square	df	Mean Square	F	sig	Remarks
Corrected model	31912.736	85	375.444	4.012	0.000	
Intercept	11448.527	1	11448.527	122.334	0.000	
Pretest	210.645	1	210.645	2.251	0.142	NS
Gender	33.071	1	33.071	0.353	0.556	NS
Methods	714.981	1	714.981	7.640	0.009	S
Gender*Methods	17.872	1	17.872	0.191	0.665	NS
Error	3181.855	34	93.584			
Total	523675.0	120				
Corrected Total	35094.592	119				

S= significant at 0.05 probability level
NS= not significant at 0.05 probability level

The result in Table 3 for hypothesis 1 shows that an F-ratio of 7.640 with associated probability value of 0.009 was obtained with regards to the mean achievement score of the students taught technical drawing using concept mapping instructional technique and conventional teaching method. Since the associated probability (0.556) is greater than 0.05 set at level of significance, therefore, the null hypothesis which states that there is no significant difference in the academic performance of students' taught technical drawing using instructional scaffolding and conventional teaching method is rejected. This implies that there was significant difference in the academic performance scores of students' taught technical drawing using instructional scaffolding and those taught with the conventional method.

The result in Table 3 for hypothesis 2 shows that an F-ratio of 0.353 with associated probability value of 0.556 was obtained with regards to the mean achievement score of the students in the experimental group for gender. Since the associated probability (0.556) is greater than 0.05 set at level of significance, therefore, the null hypothesis which states that there is no significant difference in the performance of male and female students' taught technical drawing using instructional scaffolding and conventional teaching method is retained. This implies that gender is not a significant factor in the performance scores of students' taught technical drawing using instructional scaffolding.

The result in Table 3 for hypothesis 3 shows that an F-ratio of 0.191 for the two way interactions (methods*gender) with associated probability value of 0.665 which is greater than 0.05 set at level of significance, therefore, the null hypothesis which states that there is no significant difference in the performance of technical students' taught technical drawing using instructional scaffolding and conventional teaching method is retained. Consequently, there is no significant interaction effect of gender and instructional approach on the mean performance score of students' in technical drawing concepts.

Discussion

The study revealed that there was significant difference in the performance of students due to instructional methods. The students taught with instructional scaffolding obtained a higher mean achievement score than the students taught with the conventional teaching method. The high mean score by the experimental group revealed that instructional scaffolding strategy enabled the students in the experimental group to perform better. The teachers in the experimental groups used instructional scaffolding to bring to bay the desired prerequisite information and skills to the knowledge of the students. This is line with Onyeshi (2014) who asserted that if teaching style employed closely matches the student preferred style of acquiring knowledge, learning will be easier, more natural, and achievement will improve. Similarly, the findings of this study appear to corroborate those of other studies in science and technical subjects (Oviawe & Adeola, 2017; Oviawe, Ezeji & Uwameiye, 2016; Akani, 2015; Ogbuanya & Onatunde, 2015; Alake & Ogunseemi, 2013; Azih & Nwosu, 2011) where experimental treatments improved students' academic achievement. This finding is in line with that of similar experimental studies by Akani (2015); Alake and Ogunseemi (2013); Azih and Nwosu (2011) respectively, where the experimental treatment (instructional scaffolding) was more effective than the control treatment (conventional teaching method). These authors reported that the effectiveness of instructional scaffolding has been demonstrated and established to be a powerful strategy in achievement. This could be as a result that learning becomes easy when students receive adequate support. The findings of this study confirmed the assertion of Lipscomb, Alake and Ogunseemi (2013) that scaffolding is a form of couching or modeling that supports students as they develop new skills or learn new concepts. When students achieve competence, the support is removed and the student continues to develop the skills or knowledge on his/her own. The assertion of Shilly (2006) in Akani (2015) that instructional scaffolding provides a sufficient support that promotes deeper learning also corroborates the findings of this study.

The findings of this study reveal that there was no significant difference in the performance male and female of students' taught technical drawing with instructional scaffolding and the conventional teaching method. This is line with findings of Azih and Nwosu (2013) who observed that there was no significant difference in the mean achievement scores of male and female students taught using instructional scaffolding. However, the finding of this study is at variance with those of Omiko (2015); Azih and Nwosu (2011) who reported that there was significant difference in the mean achievement of male and female students. The male students were favoured by instructional scaffolding more than the female students. Williams (1993) in Azih and Nwosu (2011) posited that female students in secondary schools perform better than their male counterparts to disagree with the findings of this study.

On the interaction effect of gender and instructional scaffolding strategy on students academic performance in technical drawing, the findings from this study shows no interaction between gender and instructional approach on students mean performance in technical drawing. The mean scores for instructional scaffolding are higher at all levels of gender. In the test for significance, the F-values are less than the critical values on the students mean performance in technical drawing. Both male and female students performed well having been exposed to treatment effect under the same condition. The implication is that male and female students benefited from instructional scaffolding strategy. Supporting this view, Azih and Nwosu (2011) posited that instructional scaffolding helps to achieve the goal of any educator, which is to help students develop skills that will make them self-directed and self-regulated learners. It also allows them to reach levels of mastery that might be impossible for them to achieve without it.

Conclusion and Recommendations

The result of this study revealed that instructional scaffolding strategy improves the learning and understanding of concepts in technical drawing irrespective of students' gender. It is hoped that instructional scaffolding strategy is employed in teaching technical drawing and other technical and vocational subjects in Nigeria technical colleges. Based on the findings of this study, the following recommendations were made:

1. technical drawing teachers should be encouraged to use instructional scaffolding strategy in technical colleges. Curriculum developers should
2. government should organize seminars, workshops and conferences for training and retraining of technical teachers on the importance of applying instructional scaffolding strategy in teaching technical drawing.
3. educational administrators should monitor schools regularly to ensure that effective methods of instruction like instructional scaffolding strategy are harnessed to enhance students' performance**.**

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RELATIVE EFFECTIVENESS OF REDA AND RUBULT'S PROBLEM SOLVING MODELS ON METAL WORK STUDENTS' ACADEMIC ACHIEVEMENT, INTEREST AND RETENTION IN TECHNICAL COLLEGES IN ENUGU STATE, NIGERIA

By

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Abstract
The study determined the relative effectiveness of Reda and Rusbult's problem solving models on technical college students' academic achievement in Metalwork. A quasi non-randomized control groups, pretest-posttest design was used. The population for the study comprised all 210 National Technical Certificate (NTC II) Metalwork students (175 males and 35 females) in six technical colleges that offer Metalwork in Enugu State. Metalwork Cognitive Achievement Test (MWCAT) was used for data collection. Two research questions were posed and two hypotheses were formulated to guide the study. Mean and standard deviation were used to analyze the data for answering research questions while analysis of covariance (ANCOVA) was used to test the hypotheses of no significance difference at 0.05 level of significance. The study revealed that Reda's model is more effective in improving students academic achievement in Metalwork than Rusbult's model. It was recommended that Ministry of Education, National Business and Technical Examinations Board (NABTEB) and the National Board for Technical Education (NBTE) should organize workshops and seminars for technical teachers on regular basis to enlighten and improve their knowledge and skills on the use of the Reda's and Rusbult's problem solving models.
Keywords: *reda, rubult, models, metalwork, interest, achievement, retention*

Introduction

Metalwork technology in the Technical Colleges is aimed at studying the technical competencies in trade- related areas which include welding and fabrication, foundry and forging and machine shop practice. Metalwork technology according to Vilaton (2010) refers to activities of using metals or metal based materials for the purpose of fabrication, construction and other associated project and design activities. The technical college Metalwork curriculum is designed to meet requirements necessary to prepare students for employment, self-reliance and / or entrepreneurial ventures. Metalwork technology according to the Federal Ministry of Education, (2013) is a vocational subject offered at the senior secondary schools and technical colleges level for the purpose of enabling students to acquire further knowledge and develop skills. It exposes students to career opportunity by exploring usable options in the world of work and enable youths to have an intelligent understanding of the increasing complexity of technology. The achievement of the above stated objectives would depend on the mode of instruction and motivation of students in the study of Metalwork by the teacher.

Recognizing the importance of technical education in general and Metalwork in particular, in National Development , Federal Ministry of Education, (2013) listed Metalwork as one of the subjects to be studied at all levels of educational institutions. Metalwork is also one of the subject for which specialist teachers should be provided at all educational levels. The inclusion of Metalwork at technical institutions prepares minds of youngsters to the opportunities for technological development. Students that completed technical college programmes according to FGN, (2013) shall have the opportunity to secure employment either at the end of the whole course or after completing one or more modules of employable skill. Also, the students could be able to set up their own business and become self employed and be able to employ others and in addition pursue further education in tertiary institutions like Monotechnics, Polytechnics or Colleges of Education (Technical). The goal of technical education at the technical colleges according to Salami in Nwaodo (2016) is to produce trained manpower in technology, craft, advance craft, and vocational skills necessary for individual to be self-reliant in contemporary Nigeria. These individuals are to be guided in the vocational skill training.

Training then needs to be conducted for Metalwork technology students in technical colleges so as to achieve these lofty objectives. The Federal Ministry of Education (FME), (2000) stated that technical college program comprises four components namely trade theory, general education, related subjects, workshop practice with industrial training and to ensure quality, all graduates of technical college will be asked to sit for examination conducted by National Business and Technical Examination Board (NABTEB) which is uniform all over the country. Imandojemu (2008) observed that, technical college students have been having poor results in their final year National Business and Technical Education Board (NABTEB) examination particularly in Metalwork. These results show that average failure rate in Metalwork technology trade in the year 2013, 2014, 2015 and 2016 were 56%, 67%, 48% and 73% respectively (NABTEB, 2016). Failure in Metalwork subject predates Nigerians independence (Taiwo, 2001). This situation, has not improved but rather has continued to deteriorate (Okebukola, 2006). Hence, it is a source of concern for researchers and stakeholders in education.

Some researchers have identified defective teaching methods as one of the reasons for the poor performance of students in Metalwork in NABTEB examinations. For example, it has been observed that the persistent poor academic achievement of students in Metalwork is as a result of the inappropriate teaching methods adopted by teachers (Ajerole & Adenoyin, 2006). Daluba, (2008) further attributed teaching methods adopted by technical teachers as a factor responsible for students' failure in NABTEB examination. The urge to improve Metalwork achievement through more effective instructional methods has increased the awareness of the importance of learner centeredness in teaching.

Teaching Metalwork at the technical colleges requires good teaching skills and mastery of the subject matter. For the technical college graduate to be well trained in Metalwork technology, their teachers must have possessed the needed competencies for teaching the subject at the technical colleges. Teaching is a complex exercise, which involves systematic interaction with human beings in order to enable them acquire lifelong skills, live good lives, improve upon existing standards and also solve social as well as economic problems when the need arises. Making use of a variety of methods to teach metalwork can help to improve students achievement in the subject. The implication of the use of different methods in teaching metalwork is that it will affect the attitudes and behaviour of students positively. A good teaching method that will facilitate understanding among the students should be used by the teacher.

Teachers using problem solving methods to teach metalwork can generally achieve the following results: students centered teaching; less lecturing, increased productivity in Metalwork technology and better outcome in technical education discipline. Okoro in Dawodu (2013) has shown concern over the need to develop student cognitive, affective and psychomotor skills in order to enhance their cognitive achievement in technical education of which Metalwork technology is one. Moreover, Olaitan, Nwachukwu, Onyemachi, Igbo and Ekpong (1999) have stressed the need to modify teaching methods to incorporate the techniques that would establish a firm foundation for acquisition of both knowledge and skills, which are necessary steps for technological capabilities and positive instructional development. According to Okebukola (2006), specific acts are adopted by teachers to inject varieties in their teaching, stimulate and maintain the learners' academic achievement in the lesson in a bid to improve education.

Improvement on the academic achievement of students of Metalwork in technical colleges needs to be taken seriously so that there would be better achievement in the NABTEB examinations. Epunam (1999) defined achievement as the learning outcomes which include knowledge, skills that are acquired and retained through course of study within and outside the classroom situation. There is no doubt that students academic achievement should be improved so as to generate desirable changes in the achievement of students of metalwork in technical colleges. To improve academic achievement of metalwork students, there is need to adopt problem solving method of teaching.

Problem solving method has been defined by many educationists in various ways with regard to its philosophical and psychological backgrounds. The Gestalt theorists according to Alio (1997) defined problem solving as an insightful or initiative process involving the perceptual processes of the solver. To them (the Gestalt theorists), problem solving is a type of discovery learning that depends on the structure of the task and independent of the learners' previous knowledge. In support, Idoko and Ibitoye (1998) described problem solving as a manipulation of the problem statement geared towards achieving the desired solution which is cognitive in nature or domain dependent.

Problem solving is a pathway of getting to a solution of problem which involves identification of the type of problem to be solved, the necessary pre-requisites, the strategies, the heuristics or hints and the element used in applying the strategies. Different models of problem solving have been proposed by many authors and researchers in attempts to understand the problem solving of individuals and in their attempts to describe the problem solving process. Some of these include: Dewey, 1910; Ausubel, 1970; Greeno, 1972; Rusbult, 1989; Glencoel Mc Graw-Hill, 2001 and Reda, 2008.

The present study intend to investigate the relative effectiveness of Reda's and Rusbults problem solving models on students' achievement in Metalwork technology in Enugu State. Reda (2008) stated that problem posing and problem formulation are logically and philosophically appealing notion to educators and teachers. Reda feels that teachers might use one or more methods to formulate new problems or encourage their students in classes to be good problem posers as they are good problem solvers. Reda went ahead to state that problem posing situations could be classified as free, semi-structured or structured situations. Free problem posing situation is situation from daily life (in or outside school). Semi-structure problem posing situations is when students are given an open situation and are invited to explore it using knowledge, skills, concepts and relationship from their previous experiences while structured problem posing situation is any problem that consists of known data (given) and unknown (required). The description of the 5-step plan of the Reda's (2008) problem-solving model is as follows:

- **Step 1:** Understanding- Here, he/she determine what information is given in the problem and what one needs to find.
- **Step 2:** Make a plan-After one has understood the problem, he/she select a strategy for solving it.
- **Step 3:** Carry out the plan- He/she now solve the problem by carrying out the required plan.
- **Step 4:** Evaluate solutions- He/she examine the answer carefully to see if it fits the facts given in the problem.
- **Step 5:** Posing related problems – He/she pose a related problem by simply changing the unknown(s) in the solved problem.

Rusbult believed that one get "oriented" by using all available information (words, pictures and free information) to form a clear, complete mental picture of the problem situation. By reading the problem statement carefully, one gets accurate comprehension, the meaning of words and sentence structure, so as to gather all the important facts. The description of the 4-step plan of the Rusbult's (1989) problem-solving model is as follows:

- **Step 1:** Orientation- He/she translate the problems word, pictures and free information into a clear idea of now (the situation that is defined by the problem statement) and Goal (what problem is asking you to do).
- **Step 2:** Planning- He/she figure out how to get from where you are now to the Goal.
- **Step 3:** Action- He/she start doing the plan, and continue until he/she have reached the goal.

- **Step 4:** Check- Ask yourself, "Have I answered the questions that were asked? Have I reached the Goal?

The choice of these models is that they are both cyclic adaptations of polya's 1957 model but differ at the level of checking and posing related problems. Rusbult stated that to check, one needs to ask himself, "Have I answered the questions that were asked? Have I reached the Goal? If yes, then one should move to the next higher learning experience but if no, you need to go through all the steps of the solved problem and correct or complete the solution. Reda on the other hand said that to check, examine your answer carefully to see if it fits the facts given in the problem. Then, pose a related problem by simply changing the unknown(s) in the solved problem.

Problem posing technique ensures further practice, understanding and evaluation of the concepts taught. It also raises a problem which leads into the future work when the days work is finished. It has therefore becomes necessary to use problem solving for teaching in Metalwork technology in technical colleges in order to determine its effect on students' academic achievement.

Students' achievement connotes performance in school subject as symbolized by a score or mark on an achievement test. Achievement is the measurement of the effects of specific programme of instruction or training (Kulbir, 2005). It can also be defined as something that somebody has succeeded in doing, especially after a lot of effort. It is an act of finishing something successfully. Relating this to academic achievement in this context means success in Metalwork when Reda's and Rusbult's problem solving models are used as media of instruction in classroom teaching and learning. The problem of poor achievement of students could be attributed to poor instructional methods used by teachers in teaching Metalwork. As a result, the students at the technical colleges find it difficult to cope with the required standard presented to them.

It has also been observed that the teacher centered method is the main teaching method employed by the technical teachers for implementing the curriculum. Obviously, the adoption of teacher centered methods of teaching by the teachers results into ineffective use of varieties of instructional method and instructional techniques and inability of teachers to effectively implement the curriculum to naturally increase students involvement and commitment in learning. The shortcoming in teacher-centered method of teaching could be responsible for poor academic achievement of Metalwork students in public examination. The general purpose of this study therefore, was to determine the effects of Reda's and Rusbult's problem solving models on technical college students' academic achievement in Metalwork in Enugu State. Specifically, the study sought to;

1. Determine the effect of Reda's and Rusbult's problem solving models on students' academic achievement in Metalwork.
2. Identify whether any significant difference exists in the mean achievement scores of male and female students exposed to Reda's and Rusbult's models.

Method

Two research questions were possed by the study and two null hypotheses were formulated and tested at 0.05 level of significance. This study adopted a quasi experimental research design. This design was used for this study because a true experimental research design which involved subjects randomization will disrupt academic activities of the technical colleges involved in the study area during the time of study. Such random selection in true experimental design according to Ezeudu and Eze (2008) is hardly permitted by the authorities of the school used for the research. A non randomized group (intact classes) was used for the study.

The study was conducted in Enugu State of Nigeria. The state has six National Board for Technical Education (NBTE) accredited technical colleges offering metalwork whose students were used as subject for the study. These technical colleges include: Technical College Obe; GTC Akpugoeze; GTC Enugu; GTC Nsukka; Technical College Ugbaike and Technical College Umuoka. The population for the study was the 210 NTC II students consisting of 175 males and 35 females of metalwork in the six technical colleges offering metalwork trade in Enugu State. The sample size was 68 Metalwork NTC II students; 39 students that consisted of 32 males and 7 females for Reda's model while 29 students that consisted of 24 males and 5 females for Rusbult's model. A purposive sampling technique was used for selection of two colleges from the six technical colleges for this study thereafter, a simple random technique was equally used to allocate one college each to Reda's and Rusbults models respectively. Intact classes in each college were used for the study.

Metalwork Cognitive Achievement Test (MWCAT), Reda's problem solving model lesson plan and Rusbult's problem solving model lesson plan were the instrument for the study. Reda's problem solving model lesson plan was used to teach one group while Rusbults problem solving model lesson plan was used to teach the other group. MWCAT has 40 multiple choice items based on technical college curriculum content for NTC II students. Three lecturers from Industrial Technical Education Department, University of Nigeria, Nsukka validated the instrument for the study. A test re-test method and Pearson Product Moment correlation were used to establish the reliability of the instrument and the coefficient of 0.81 was obtained.

Experimental Conditions

I. **Experimental Bias:** The following conditions were adopted to minimize experimental bias; (a) The same lesson topics were given to both Reda's model and Rusbults model; (b) the same achievement test was given to both groups at the same time in order to avoid experimental bias; (c) the students had no pre-knowledge of their involvement in the experiment; (d) the researcher was not directly involved in the teaching and test administration .

II. **Teacher Variability**: Both Reda's problem solving model lesson plan and Rusbults problem solving model lesson plan were prepared by the researcher in order to control teachers effect on lesson preparation.

III. **Training of Teachers:** A two week intensive briefing was organized for the participating teachers by the researcher on how to use Reda's and Rusbult's problem solving models lesson plans for effective teaching of Metalwork to students.

Experimental Procedure

The intact groups were used for the experiment. The trained teachers were supplied with materials and the scheme of work. Topics to be taught were selected from the scheme of work for Metalwork. Five topics were selected based on the class used for the experiment. One group was taught with five Reda's model lesson plans, while the other group was taught with five Rusbult's model lesson plans. Each lesson plan lasted for 90 minutes. The treatment lasted for five weeks. At the end of the treatment, MWCAT was administered on both groups. The data collected from the students were analyzed using mean scores and standard deviation for answering research questions and analysis of covariance (ANCOVA) to test the hypotheses of no significant difference.

Results

Research Question 1

What is the effect of Reda's and Rusbult's problem solving models on students' achievement in Metal work?

Table 1

Mean scores and Standard Deviation of Students Taught Metal Work Based on Method

Method		**Pretest**		**Posttest**		
	N	**Mean**	**SD**	**Mean**	**SD**	**Mean Gain/loss**
Reda's Model	39	34.85	8.74	64.92	22.57	+30.07
Rusbult's Model	29	27.62	11.31	36.76	6.85	+3.14

Table 1 shows that pretest mean scores and standard deviation for students taught Metalwork using Reda's model are 34.85 and 8.74, while those taught metalwork using Rusbult's model are 27.62 and 11.31. This shows that both groups were not in the same achievement standing prior to experimental treatment. However, posttest achievement mean score and standard deviation for Reda group are 64.92 and 22.57, whereas the posttest mean and standard deviation scores for Rusbult group are 30.76 and 6.85. This shows that the group taught using Reda model performed better than the group taught using Rusbult model, with mean gain score of 30.07, whereas Rusbult's model group had mean gain of 3.14.

Hypothesis 1

There is no significant difference between the mean achievement scores of students taught metalwork with Reda's model and those taught with Rusbult's model

Table 2:
Analysis of Covariance (ANCOVA) of Students Mean Achievement Scores in Metalwork Based on Method

Tests of Between-Subjects Effects

Dependent Variable: Posttest

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	23209.818[a]	2	11604.909	36.605	.000
Intercept	13582.970	1	13582.970	42.844	.000
Pretest	66.430	1	66.430	.210	.649
Method	22686.902	1	22686.902	71.560	.000
Error	20607.167	65	317.033		
Total	207183.000	68			
Corrected Total	43816.985	67			

a. R Squared = .530 (Adjusted R Squared = .515)

Table 2 indicates that F-ratio (71.56) with associate probability (sig (2-tailed)(p=0.000) under method is less than significant level (0.05) the postulated hypothesis. Hence, the researcher failed to uphold the null hypothesis, which means that the alternative hypothesis was upheld. Therefore, there is a significant difference between the mean achievement scores of students taught metalwork with Reda's model and those taught with Rusbult's model in favour of Reda's group with high mean gain score of 30.07.

Research Question 2

What is the difference between post test scores of male and female students exposed to Reda's and Rusbult's models?

Table 3
Mean scores and Standard Deviation of Students Taught Metalwork Based on Method and Gender

Method	Gender	Pretest Score			Posttest Score		Mean
		N	Mean	SD	Mean	SD	gain/loss
Reda's Model	Male	32	35.59	8.18	63.91	22.09	+28.32
	female	7	31.43	10.99	69.57	25.98	+38.14
Rusbult's Model	Male	24	27.92	11.82	31.79	6.59	+3.87
	female	5	25.80	7.39	26.20	8.67	+0.40

Table 3 reveals that pretest mean score and standard deviation for male students in Reda group are 35.59 and 8.18, while that of females in the same group are 31.43 and 10.99. Also posttest achievement mean and standard deviation scores for males in Reda group are 63.91 and 22.09 with mean gain score of 28.32, while that of females in the same group are 69.57 and 25.98 with mean gain score of 38.14.

Similarly, pretest mean achievement scores and standard deviation for males in Rusbult group are 27.92 and 11.82, while that of females in the same group are 25.80 and 7.39. Again, posttest mean scores and standard deviation for males in the Rusbult's group are

31.79 and 6.59 with mean gain score of 3.87, while that of females in the same group are 26.20 and 8.67 with mean gain score of 0.40.

Hypothesis 2

There is no significant difference between the mean achievement scores of male and female students taught metalwork with Reda's model and those taught with Rusbult's model.

Table 4

Analysis of Covariance (ANCOVA) of Students Mean Achievement Scores Based on Method and Gender

Tests of Between-Subjects Effects

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	23390.806[a]	4	5847.701	18.036	.000
Intercept	13600.604	1	13600.604	41.948	.000
Pretest	50.887	1	50.887	.157	.693
Method	14961.603	1	14961.603	46.146	.000
Gender	21.246	1	21.246	.066	.799
method * gender	136.811	1	136.811	.422	.518
Error	20426.179	63	324.225		
Total	207183.000	68			
Corrected Total	43816.985	67			

a. R Squared = .534 (Adjusted R Squared = .504)

Table 4 indicates that F-ratio (0.066) with associate probability (sig (2-tailed)(p=0.799) under gender being greater than significant level(0.05) postulated. Hence, the alternative hypothesis was upheld. Therefore, there is no significant difference between the mean achievement scores of students taught metalwork with Reda's model and those taught with Rusbult's model based on gender. This shows that both Reda's and Rusbult's Models are gender friendly.

Discussion

Findings revealed that Reda's model is more effective in improving students cognitive achievement in Metalwork than Rusbult's model. The implication of this findings is that Reda's model is more effective than Rusbult's model in enhancing students achievement in Metalwork. The findings is in line with Akor (2005) and Pekene (2002) who in their study revealed that students taught with Reda's model performed significantly better than those taught with Rusbult's model in Physics. The findings further revealed that Reda's model has positive effect on students' achievement which is similar to the findings of Nekang (2011) who in his study found out that the adoption of Reda's model in the teaching of trigonometry students improved the students achievement than the students taught with Rusbult's model. A possible explanation for the effectiveness of Reda's model is the students active involvement in learning process using cooperative and intensive way, clarifying, probing and questioning as the students manipulate the materials and tools given to them. The Analysis of covariance indicates that there is a significant difference between the mean achievement scores of students taught metalwork with Reda's model and those taught with Rusbults model in favour of Reda's group with high mean gain score of 30.07.

Findings reveals that male students taught Metalwork with Reda's model had a mean score of 35.59 in the pre-test and a mean score of 63.91 in the post-test while the females taught Metalwork with the same models had a mean score of 31.43 in the pre-test and a mean score of 69.57 in the post-test. In the Rusbult's model, the male students had a mean score of 27.92 in the pre-test and a mean score of 31.79 in the post-test while the female counterpart had a mean score of 25.80 in the pre-test and a mean score of 26.20 in the post-test. The statistics shows that both male and female students in the Reda's and Rusbult's groups have almost the same mean scores. This implies that both models are gender friendly. The Analysis of covariance shows that there is no significant difference between the mean achievement scores of students taught metalwork with Reda's model and those taught with Rusbult's model based on gender.

Conclusion

Based on the result of this study, Reda's model is more effective in improving students academic achievement in Metalwork. Both Reda's and Rusbults problem solving models are viable alternative to the teacher centered method of teaching Metalwork. Instructional methods such as Reda's and Rusbults problem solving models give technical teachers opportunity to engage students in real world of classroom exercises. It also gives the students opportunity to develop valuable thinking skill and acquire an understanding about technical world.

Recommendations

1. Reda's and Rusbult's problem solving models should be used for teaching Metalwork in technical colleges.
2. Seminars, workshops and in-service programs should be organized by all examination boards (NABTEB and NBTE) to enlighten technical teachers and improve their knowledge and skills on the use of the Reda's and Rusbult's problem solving models for improving students performance in Metalwork.

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REDUCING ERGONOMIC HAZARDS AND CHALLENGES IN THE WORKPLACES OF ELECTRICAL INSTALLATION CRAFTSMEN IN ENUGU STATE

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Abstract
The study aimed at reducing ergonomic hazards and challenges in the workplaces of electrical installation craftsmen in Enugu State. Four research questions were answered while four null hypotheses formulated were tested at 0.05 level of significance. The study adopted a descriptive research design. The population for the study was 69 persons which consisted 18 electrical industries in Enugu State. All the 69 persons in 18 electrical industries were used for the study. Non questionnaire was the instrument used for data collection. The questionnaire has a four point responses categories of Strongly Agree, Agree, Disagree and Strongly Disagree. The questionnaire consists of 30 items developed from the reviewed literature. The instrument was validated by three experts in the Faculty of Vocational and Technical Education, University of Nigeria, Nsukka. To determine the internal consistency of the instrument, the instrument was trial tested and Cronbach alpha co-efficient of 0.79 was obtained. Data was collected by the researcher with the help of three research assistants with 98% returned rate. Data collected were analyzed using mean to answer the research questions while t-test was used to test the null hypotheses of no significance difference in the mean responses of experienced and less experienced electrical installation craftsmen at 0.05 level of significance. The major findings shows that handling and using hand tools like; pliers, screw driver, chisel, and hammer, stepping on obstructions left on floors such as nails, pieces of irons or bare conductor, operating an unguarded electrical machine can cause hazard. Therefore the study recommends that: Trainings, workshops and seminars should be organized for both experienced and less experienced craftsmen in the electrical installation workplaces. This will help the craftsmen in carrying out their jobs in hazard free environment. Health education and awareness creation should be included in the industries curriculum. Electrical installation craftsmen should be encouraged to put on their Personal Protective Equipments (PPE) in other not to be impacted by hazards.
Keywords: Ergonomics, hazards, craftsmen, workplace, electrical installation,

Introduction

Electrification is one of the fields of human endeavor where workers manipulate tools and equipments for effective productivity in the environment. Electricity has many hazards, Ogbuanya, (2005) described electricity as a good servant but a bad master. Anybody can be exposed to these hazards at home, at school, at work or at the workshop. Therefore, Electrical installation can only be carried out by appropriate qualified or trained craftsmen who can recognize hazards or potentially unsafe condition. Ogbuanya, Abdullah and Ado (2012) maintained that despite the risk and hazards involve in electrification, teaching and learning has a major role to play in the provision of electricity for industries. It is expected that craftsmen should possess ergonomic skills that will enable them to perform in their different working places.

Ergonomics refers to human posture by which people interact with equipment, tools and machines in workplace for effective performance and productivity. It encompasses the human practice of designing equipment and work tasks to conform to the capability of the craftsmen. Ergonomics, according to Kogi (2000), is the study of people in relation to their working conditions, especially in the design of tools, equipment and furniture to help an individual work efficiently to protect live, property and improve productivity in the workplaces. Furthermore, ergonomics is a situation that removes barriers to quality, productivity and safe human performance by fitting products tasks and environments to people. It also provides a means of adjusting the work environment and work practices to prevent injuries before it occur. Mokdad (2005) viewed ergonomics as the systematic way of people at work with the objective of improving the work situation, the working condition and the tasks perform. Ergonomics are sciences that aim at looking closely about human abilities and limitations with the aim of applying the knowledge to improve people's interaction with products, system and environments (Thatcher, James and Todd, 2005).

Ergonomics are beneficial to people in several ways. According to Kadiri (2008), ergonomics improves safety and health of the craftsmen in the work place, improves productivity and quality of work, reduces absenteeism of the workers, accidents, errors, medical cost, worker compensation associated with cumulative trauma disorder, occupational injuries, illness and hazards. For this reason application of ergonomic principles are necessary in order to reduce electrical hazards in the Craftsmen workplaces. The main purpose is to ensure man-machine relationships with emphasis to improve productivity, efficiency, safety and acceptance of the system by the user. Ergonomics or human factor of engineering is the skill of designing equipment and tools in the most operable way with the special consideration for space, comfort and adaptation to the user. Electric hazards have claimed so many lives, damaged some reputations and environment.

Hazards are situations that pose a level of threat to life, health, property or environment. McCollum (2006) defined hazard as something that could be potentially harmful to a person's life, health or the environment. According to Milan (2013), most hazards are dormant or potential, with only a theoretical risk of harm; however, once a hazard becomes "active", it can create an emergency situation. Dormant means when situation has the potential to be hazardous, but no body, property or environment is currently affected by accident. The Author noted that hazards are generally of five types: physical hazards, chemical hazards, biological hazards, psychological hazards and radiation hazards.

Physical hazards are conditions or situations that can cause the body physical harm or intense stress such as injuries, fall from ladder and cut. Chemical hazards are substances that can cause harm or damage to the body, property or the environment. Chemical hazards can be either natural or human made like explosion and chemical reaction from the battery. Biological hazards include hazards from bio mass and related reptiles destroying cables and that could lead to short circuit. Psychological hazards are created during work related stress or a stressful environment (Milan, 2013). Radiation hazards causes harm to the human or damage body by affecting the cell directly. Therefore, physical hazards are situations that pose a level of threat to life, health, property or environment and cause challenges of injury, electrocuting and death to electrical installation craftsmen in their workplaces.

Ergonomic Hazards refer to workplace conditions that pose the risk of injury to the musculoskeletal system of the worker, they include; repetitive and forceful movements, awkward postures or positions that arise from improper work methods and improperly designed workstations, tools and equipment. Amadi (2012) defined ergonomic hazards as: poor workplace design, awkward body mechanics or postures, repetitive movements among others contribute to a staggering number of Cumulative Trauma Disorders (CTD). Therefore, inabilities of electrical installation craftsmen in their different workplaces expose them to the risk thereby reducing productivity and efficiency in the application and practices of electrical installation.

Electrical installation is one of the courses offered in technical college in Nigeria. It comprises the following; Basic Electricity, Battery Charging, Domestic Installation, Industrial Installation, Cable Jointing and Winding of Electrical Machines National Board for Technical Education, (NBTE, 2001). Electrical installation craftsmen are those trained in technical colleges to carry out electrical installations in both residential and industrial buildings (Federal Government of

Nigeria, (FGN, 2004). Electrical installation exposes craftsmen to physical hazards which could lead to death or damage in the electrical installation industries. Domestic installation craftsmen carry out installation operations in electrical components or equipment in a building. Such components include: home appliances fixed in position ready for use, in form of surface wiring, conduit wiring as well as maintenance of electrical fittings; such as illumination lamps used in homes mostly within the range of 0.5V-415V. Industrial installations involve a high voltage that is ranging from 415v and above for industrial consumption using high tension conductors and is transmitted through overhead conductor, underground and truncking (Gupta, 2005). This could be in alternating current AC or direct current DC for the use of machines and equipment and control gear for effective protection. These are inter- connected or joint with conductor known as cables. Cable jointing and terminations uses one or more conductors with or without insulating covering (Morley in Abdullah, 2012). These are armoured cable, over head conductors, boss bars and communication cable, are means of conveying, distribution and installation for effective use in homes and industries. All these have hazards associated with them in the electrical installation craftsmen workplaces.

Workplace is one of the places other than the home. It constitutes a central concept for several entities. Kadiri (2008) defined workplace as the physical location where both experienced and less experienced workers carry out their operations. Experienced craftsmen according to Ogbuanya & Abdullah (2014) requires that their number of years in trainings should be between six years and above, while below are considered to be less experienced craftsmen. The concept of experience generally refers to technical know-how rather than propositional knowledge, on-the-job training rather than learning Levitt (1999). Experienced craftsmen are those people with considerable experience in electrical installation; they gain a reputation as an expert because they were trained on the job. While less experienced craftsmen have not gotten much (duration in operation) experience because they are trained on the pseudo job (Turner, 2009). Therefore, Craftsmen are those graduates of electrical installation which is one of the courses in technical colleges, these installations could be in industries, at home, fixing appliances and fittings as well.

Physical hazards are those situations that threaten an individual’s physical body or tools and equipment. Some of these hazards can easily be perceived before damage is done. The impact can be felt such as; fire outbreak, explosion, vibration, chemical reactions, ultraviolet (Donald and David, 2008). Physical hazards that emanate from ergonomic occurs in the process of work type, body position and working conditions in carrying out operations in installation put strain on one’s body. Smith (2001) sated that physical hazard is an environmental factor which threatens an individual’s physical safety, leads to death or ill health of the craftsmen. Therefore, health education is necessary to prevent the physical hazard.

Health education is the process of educating people about environmental, physical, social, emotional health. It is the principle by which individuals and groups of people learn to behave in a manner conducive to their workplace (McKenzie, Neiger and Thackeray, 2009). It is the state or quality of being aware of something. Creating Awareness is the process and tactics to efficiently and intelligently achieve goals. Creating awareness of a concept or information in electrical installation is necessary to educate workers on the correct method of operation (Olajide, 2005). Osagbemi, (2010) stated that the level of awareness of various electrical installation hazards should be high, because of all kinds of health problems experienced in the craftsmen workshop. In other words, awareness creation in body temperament, posture and stress is simply letting (the right) people know about the information.

Ergonomic stress is a body or material fatigue which is not managed properly; it can seriously interfere with one’s job, family life, and health (Chiesa, 2010). Stress according to Melinda (2013) includes: being unhappy in one’s job, having a heavy workload or too much responsibility, working long hours, having poor management, unclear expectations of one’s work, working under dangerous conditions, fear of uncertainty and company isn't supportive. Stress level differs based on personality and response to situations. For this reason, it is administrator's responsibility to control different stresses in the workplaces to ensure proper management.

Administrative controls are procedures and methods, typically instituted by the employer, that significantly reduce daily exposure to Muscular Skeletal Disorder (MSD) hazards by altering the way in which work is performed via supervisors. According to Ariel (1999) it is the responsibility of supervisors to create situation that will prevent injuries and provide employees with appropriate working tools, equipment, and assistance. Administrators must be able to evaluate the work places, provide safe working situations. It is in light of this administrative concern that Yakubu (2000) opined that there's introduction of modern digital electrical gadget, procurement of safety wears and trainings in body posture to control most of the hazards in industries in order not to impact the craftsmen.

Therefore, application of ergonomic principle is necessary for greater efficiency in all the electrical installation craftsmen workplaces. Ismailia (2001) stated that the inefficiency of the electrical installation craftsmen to use appropriate protective equipment, right tools to the right jobs in the workplace to perform effectively has caused a great loss in human life, material and financial resources in electrical industries. All these constitute a serious obstacle from the lost of professional to craftsmen that the industrial development so much rely on, so if not addressed, will continue to occur in Enugu State. Enugu State is one of the oldest and fast developing industrial states, most electrical equipments and appliances such as NOCACO, JECON globe among others are produced in the state. Therefore, it becomes necessary to identify the ergonomic hazards and challenges in the electrical installation craftsmen work places in Enugu State.

Statement of the Problem

Electrical installation industries rely solely on constant power supply and one cannot achieve anything unless human and material resources are properly coordinated in hazard free practices. Trained personnel to handle electrical practice are craftsmen in industries, homes, schools and indeed any situation where electric power is needed. These craftsmen attend different technical colleges, thought by different teachers, and different environment though the same curriculum and level of examinations. But one cannot rule out that they possess different experiences and practical application in their places of work.

Unfortunately, craftsmen in the electrical installation industries have been subjected to some agonizing outcome of ; failure to keep within the cost estimate, failure to achieve required completion date, failure to achieve the required quality and operational requirement and worst of it all, increasing rate of accidents which leads to death of some craftsmen in the electrical installation workshops. These situations have caused human tragedies, de-motivated workers, disrupted workshop activities, delayed progress which has caused the reputation of industries. Some electrical installation craftsmen work in awkward or unnatural positions for so long without safety wears thereby experiencing injuries, pain and strain. Hence, it is necessary for electrical installation craftsmen to practice good body posture during electrical installation in other to reduce risk, danger or hazards in the electrical installation craftsmen workplaces.

The study aimed at reducing ergonomic hazards and challenges in the electrical installation craftsmen workplaces in Enugu State. Specific objectives of the study were to identify; physical hazards associated with electrical installation craftsmen workplaces, Ergonomic stress factors associated with electrical installation craftsmen workplaces, administrative control of hazards and challenges in the electrical installation craftsmen workplaces and way of reducing hazards and challenges in the electrical installation craftsmen workplaces. To achieve these objectives, four research questions were developed and four null hypotheses were formulated.

Method

The study adopted a descriptive research design. The population for the study was 69 persons which consist of 18 electrical industries in Enugu State. All the 69 persons in 18 electrical industries were used for the study. Questionnaire was the instrument used for data collection. The questionnaire has a four point responses categories of Strongly Agree, Agree, Disagree and Strongly Disagree. The questionnaire consists of 30 items developed from the reviewed literature. The instrument was validated by three experts in the Faculty of Vocational and Technical Education, University of Nigeria, Nsukka. To determine the internal consistency of the instrument, the instrument was trial tested and Cronbach alpha co-efficient of 0.79 was realized for the study. Data was collected by the researcher with the help of three research assistants with 98% returned rate. Data collected were analyzed using mean and standard deviation to answer the research questions, while t-test for independent sample was used to test the null hypotheses of no significance difference in the mean responses of experienced and less experienced electrical installation craftsmen at 0.05 level of significance.

Results

Table 1: Mean Responses of Craftsmen on the Physical Hazards associated with Electrical Installation Craftsmen Workplaces

S/N	Physical Hazards occur when:-	$\overline{X}$	S.D	Remakes
1	Handling and using hand tools like; pliers, screw driver, chisel, hammer etc.	3.73	0.45	Strongly Agreed
2	Stepping on obstructions left on floors such as nails, pieces of irons or bare conductor.	3.75	0.53	Strongly Agreed
3	Lifting heavy objects in the electrical workshop	3.50	0.64	Strongly Agreed
4	Using inflammable materials such as fuel and gas	3.53	0.73	Strongly Agreed
5	Inhaling vapour and gases in electrical installation craftsmen in the workshop	3.61	0.65	Strongly Agreed
6	Operating an unguarded electrical machines	3.75	0.53	Strongly Agreed
7	Spilling oil or water on the floor	3.68	0.56	Strongly Agreed
8	Ultrasound or extreme noise from faulty machines slip rings like generators, welding machines which can damage the ear drum	3.42	0.80	Agreed
9	Coming in contact with bare life conductor	3.61	0.58	Strongly Agreed
10	Falling from a ladder	3.49	0.68	Strongly Agreed
11	Fire incidence occur in electrical workshop	3.60	0.59	Strongly Agreed
12	Experiencing electrical burns and injury in the electrical installation workplaces.	3.48	0.64	Agreed
13	Using electrical installation portable power tools such as drilling machines wrongly.	3.60	0.65	Strongly Agreed
14	Coming in contact with moving objects in the electrical installation workshops.	3.54	0.68	Strongly Agreed
15	Storing chemicals, materials and other equipments in the same place carelessly	3.43	0.80	Agreed
16	Dealing with corrosive dust (corona) carelessly.	3.46	0.72	Agreed
17	Handling gases carelessly in the electrical installation craftsmen workshops.	3.49	0.70	Agreed
18	Cutting irons or wire wrongly in electrical installation craftsmen workshop	3.42	0.69	Agreed
19	Operating any electric machines or equipments without the manuals.	3.48	0.66	Agreed

Data presented in Table 1 revealed that all the items had their mean value ranged from 3.42 to 3.75 which falls within the response categories of Agreed and Strongly Agreed. In items 8, 12, 15,16,17,18 and 19 craftsmen agreed that physical hazards occur in electrical installation workplaces and their mean scores ranged from 3.42 to 3.49. while in items 1,2,3,4,5,6,7,9,10,11,13 and 14 craftsmen strongly agreed that physical hazards occur when installing electrical appliances with their mean value ranged from 3.49 to 3.75. The table also showed that standard deviations of the items are within the range of 0.45 to 0.80. This indicated that the opinions of the respondents were not far from one another in their responses.

Table 2: Mean responses of the craftsmen on the Ergonomic Stress Factors associated with Electrical Installation Craftsmen workplaces

S/N	Workshop Stress Causes;	$\overline{X}$	SD	Remarks
20	Psychological problems in electrical installation workplaces	3.39	0.74	Agreed
21	Broken family life	3.29	0.69	Agreed
22	ill health of the electrical installation craftsmen	3.40	0.63	Agreed
23	Unhappiness due to too much work load or responsibility and harassment at workplace.	3.54	0.61	Strongly Agreed
24	Fear of uncertainty in the life of a craftsman	3.24	0.66	Agreed
25	Anxiety concerning job security	3.37	0.74	Agreed
26	Negative attitudes in terms of procuring electrical materials for work	3.43	0.66	Agreed
27	Unnecessary movement and other behavior of workers in the workshops	3.37	0.71	Agreed
28	Inappropriate application of first aid to some electrical victims	3.21	0.86	Agreed
29	Tension to electrical installation craftsmen	3.47	0.75	Agreed
30	Exhaustion and mental or emotional strain to craftsmen	3.43	0.68	Agreed

Data presented in Table 2 revealed that all the items had their mean value ranged from 3.21 to 3.54 which falls within the response categories of Agreed and Strongly Agreed. In items 20,21,22, 24,25,26,27,28,29 and 30 craftsmen agreed that ergonomic stress factors causes workshop stress in electrical installation craftsmen workplaces and their mean scores ranged from 3.21 to 3.47. While in item 23 craftsmen strongly agreed that ergonomic stress factors causes' workshop stress in electrical installation craftsmen workplaces with the mean score of 3.54. The table also showed that the standard deviations (SD) of the items are within the range of 0.61 to 0.86, this indicated that the opinions of the respondents were not far from one another in their responses.

Table 3: Mean responses of the Craftsmen on the Administrative Controls of Ergonomic Challenges in the Electrical Installation Craftsmen workplaces

S/N	Effective Administration Controls in Electrical Installation Workplaces includes;	$\overline{X}$	SD	Remarks
31	Controlling all the events in the electrical installation workplaces	3.63	0.55	Agreed
32	Organizing trainings, seminars and workshops for craftsmen in the electrical installation workplaces	3.68	0.53	Agreed
33	keeping of records of accidents for management use in the workshop	3.62	0.55	Agreed
34	Planning for the Provision of materials and other equipments such as personal protective devices (PPE)	3.60	0.60	Agreed
35	Implementation of practices and strategies that improve a workstation layout and help reduce stress in the electrical installation workshops.	3.57	0.63	Agreed
36	Training of an employee in variety of jobs rather than one specific task repeatedly.	3.56	0.56	Agreed
37	Adjustment and redesigning work stations and methods for craftsmen in the electrical industry.	3.33	0.66	Agreed
38	Early intervention to prevent injury in electrical workshop	3.36	0.71	Agreed
39	Evaluation of work in electrical installation workplaces	3.55	0.53	Agreed
40	Provision of rest periods between jobs to reduce muscles strain	3.49	0.64	Agreed
41	Provision of information for craftsmen to mitigating ergonomic hazards	3.54	0.66	Agreed
42	Proper storage of tools and equipments after use.	3.95	0.65	Agreed
43	The enforcement of laws in the electrical installation workshop	3.44	0.63	Agreed

44	Organizing job rotation where employee's cross-train craftsmen in jobs that use different muscle groups.	3.54	0.66	Agreed
45	Division of tasks among units in electrical installation workshops	3.62	0.58	Agreed
46	Developing checklist of jobs needing to be done in the electrical installation workshops.	3.57	0.66	Agreed
47	Provisions of required information to enable the workers discharge their works.	3.56	0.61	Agreed
48	Proper location of resources to various units in electrical workshops	3.54	0.56	Agreed
49	Provision of services like: telephone, water, electricity at the workshop	3.60	0.52	Agreed
50	Provision of first aid unit in the workshop in case of electric shock, injuries, cut among others.	3.63	0.57	Agreed
51	Providing security post at the electrical installation workplaces	3.54	0.68	Agreed
52	Promoting and Motivating workers as at when due to be happy in their work	3.65	0.62	Agreed
53	Recruiting right people to the right job	3.62	0.55	Agreed
54	Acquisition of modern machinery and equipment for electrical installation craftsmen	3.66	0.48	Agreed
55	Provision of adequate and proper firefighting equipment	3.54	0.61	Agreed
56	Discarding worn-out damaged tools and getting new ones	3.49	0.68	Agreed
57	Keeping tools in boxes and racks when not in use	3.57	0.56	Agreed

Data in Table 3 revealed that all the items had their mean value ranged from 3.33 to 3.95 which falls within the response categories of Agreed and Strongly Agreed. In items 37,38,40,43 and 56 craftsmen agreed that effective administrative controls are necessary in electrical installation craftsmen workplaces with their mean scores ranged from 3.33 to 3.49. While in items 31,32,33,34,35,36,39,41,42,44,45,46,47,48,49,50,51,52,53,54,55 and 57 craftsmen strongly agreed that effective administrative controls reduces hazards and challenges in the electrical installation craftsmen workplaces with the mean score ranged from 3.54 to 3.95. The table also showed that the standard deviations (SD) of the items are within the range of 0.48 to 0.71. This indicated that the opinions of the respondents were not far from one another in their responses.

Table 4: Mean Responses of the Craftsmen on the Ways of reducing Ergonomic Hazards and Challenges in the Electrical Installation Craftsmen workplaces

S/N	**Ergonomic hazards and challenges can be reduced through;**	$\overline{X}$	**SD**	**Remarks**
58	Understanding workshop safety rules and regulation.	3.82	0.49	Agreed
59	Health education and awareness creation.	3.75	0.44	Agreed
60	Understanding and tolerating everything in order to fit in the electrical installation workplaces.	3.66	0.59	Agreed
61	Acquiring knowledge on appropriate use of tools and the importance of ensuring that electrical equipment guards are in place	3.60	0.52	Agreed
62	Complying with the general rules for safe practice in the work environment at all times	3.57	0.58	Agreed
63	Understanding the essential features and working principles of ergonomics in their operations such as joining, cutting, installing, soldering among others	3.38	0.65	Agreed
64	Understanding the basic working principles of power tools such as soldering iron and drilling machine.	3.54	0.61	Agreed
65	Selecting and accurately use of hand tools for carrying out various fittings and assembly tasks.	3.72	0.52	Agreed
66	Having appropriate knowledge of cable jointing.	3.54	0.59	Agreed
67	Understand cutting through the joints and investigate the Soldering, brazing, and fusion.	3.59	0.58	Agreed
68	Handling materials and making accident report to the appropriate			

	authority	3.68	0.50	Agreed
69	Making use of protective wears such as hand gloves, coverall, eye shields among others, when working at all times.	3.71	0.49	Agreed

Data presented in Table 4 shows that all the items had their mean value ranging from 3.38 to 3.82 which falls within the response categories of Agreed and Strongly Agreed. In item 63 craftsmen agreed on the ways of reducing ergonomic hazards and challenges in the electrical installation craftsmen workplaces with the mean score of 3.38. While in items 58,59,60,61,62,64,65,66,67,68 and 69 craftsmen strongly agreed on the ways of reducing ergonomic hazards and challenges in the electrical installation craftsmen workplaces with their mean score ranged from 3.54 to 3.82. The table also showed that the standard deviations (SD) of the items are within the range of 0.44 to 0.65. This indicated that the opinions of the respondents were not far from one another in their responses.

Hypotheses 1

There is no significant difference between the mean responses of experienced and less experienced craftsmen on the physical hazards associated with electrical installation craftsmen workplaces. Data analyzed for the test of this hypothesis is presented in Table 5.

Table 5: T-test analysis of responses of experienced and less experience craftsmen on the physical hazards associated with electrical installation craftsmen's workplaces N1= 33; N2= 34

S/N	Physical Hazards occur when:-	$\overline{X}$	S.D	t-cal	Sig	Decision
1	Handling and using hand tools like; pliers, screw driver, chisel, hammer etc.	3.73	0.45	-0.073	0.665	NS
2	Stepping on obstructions left on floors such as nails, pieces of irons or bare conductor.	3.75	0.53	1.446	0.062	NS
3	Lifting heavy objects in the electrical workshop	3.50	0.64	0.088	0.067	NS
4	Using inflammable materials such as fuel and gas	3.53	0.73	-0.565	0.001	S
5	Inhaling vapour and gases in electrical installation craftsmen in the workshop	3.61	0.65	-0.794	0.080	NS
6	Operating an unguarded electrical machines	3.75	0.53	-0.272	0.414	NS
7	Spilling oil or water on the floor	3.68	0.56	-0.481	0.165	NS
8	Ultrasound or extreme noise from faulty machines slip rings like generators, welding machines which can damage the ear drum	3.42	0.80	0.228	0.082	NS
9	Coming in contact with bare life conductor	3.61	0.58	0.316	0.773	NS
10	Falling from a ladder	3.49	0.68	-0.608	0.036	S
11	Fire incidence occur in electrical workshop	3.60	0.59	-0.686	0.543	NS
12	Experiencing electrical burns and injury in the electrical installation workplaces.	3.48	0.64	0.083	0.307	NS
13	Using electrical installation portable power tools such as drilling machines wrongly.	3.60	0.65	1.240	0.044	S
14	Coming in contact with moving objects in the electrical installation workshops.	3.54	0.68	0.432	0.616	NS
15	Storing chemicals, materials and other equipments in the same place carelessly	3.43	0.80	0.062	0.473	NS
16	Dealing with corrosive dust (corona) carelessly.	3.46	0.72	0.234	0.671	NS
17	Handling gases carelessly in the electrical installation craftsmen workshops.	3.49	0.70	-0.425	0.576	NS
18	Cutting irons or wire wrongly in electrical installation craftsmen workshop	3.42	0.69	-0.273	0.759	NS
19	Operating any electric machines or equipments without the manuals.	3.48	0.66	-1.365	0.111	NS

Key: NS = Not Significant, S= Significant, t-cal = Calculated value of t-test using SPSS version 20, S.D = Standard Deviation, $\overline{X}$ = Mean, N_1 = number of Less Experienced Craftsmen N_2= number of Experienced Craftsmen, Level of Significance = 0.05.

The result in Table 5 shows that there is a significant difference in the mean responses of experienced and less experienced craftsmen on items 4, 10 and 13. Since their significance level ranges from 0.001 to 0.036 which are less than 0.05. Therefore, the null hypothesis of no significance difference at 0.05 level of Significance was rejected for those items. The result also revealed that there was no significance difference in the mean responses of experienced and less experienced craftsmen on items1,2, 3,5,6,7,8,9,11,12,14,15,16,17,18 and 19. Since their significance level ranges from 0.036 to 0.773 which are more than 0.05 level of significance. Therefore, the hypothesis of no significance difference was accepted at 0.05 level of significance for those items.

Hypotheses 2

There is no significant difference between the mean responses of experienced and less experienced craftsmen on the workshop stress associated with electrical installation craftsmen's workplaces. Data analyzed for the test of this hypothesis is presented in Table 6.

Table 6: T-test analyses of responses of experience and less experience craftsmen on the workshop stress associated with electrical installation craftsmen's workplaces

S/N	Workshop Stress Causes;	$\overline{X}$	SD	t-cal	Sig	Decision
20	Psychological problems in electrical installation workplaces	3.39	0.74	0.705	0.471	NS
21	Broken family life	3.29	0.69	2.174	0.755	NS
22	Ill health of the electrical installation craftsmen	3.40	0.63	0.072	0.925	NS
23	Unhappiness due to too much work load or responsibility and harassment at workplace.	3.54	0.61	0.107	0.401	NS
24	Fear of uncertainty in the life of a craftsman	3.24	0.66	0.231	0.698	NS
25	Anxiety concerning job security	3.37	0.74	0.227	0.560	NS
26	Negative attitudes in terms of procuring electrical materials for work	3.43	0.66	-0.105	0.982	NS
27	Unnecessary movement and other behavior of workers in the workshops	3.37	0.71	0.574	0.616	NS
28	Inappropriate application of first aid to some electrical victims	3.21	0.86	-0.252	0.459	NS
29	Tension to electrical installation craftsmen	3.47	0.75	-1.067	0.027	S
30	Exhaustion and mental or emotional strain to craftsmen	3.43	0.68	-0.101	0.662	NS

Key: NS = Not Significant, S= Significant, t-cal = Calculated value of t-test using SPSS version 20, S.D = Standard Deviation, $\overline{X}$ = Mean, N_1 = number of Less Experienced Craftsmen N_2= number of Experienced Craftsmen, Level of Significance = 0.05.

The result in Table 6 shows that there is a significant difference in the mean responses of experienced and less experienced craftsmen on item 29. Since the significance level is 0.027. Therefore, the null hypothesis of no significance difference at 0.05 level of Significance was rejected for this item. The result also revealed that there was no significance difference in the mean responses of experienced and less experienced craftsmen on items 20, 21, 22,23,24,25,26,27,28 and 30. Since their significance level ranges from 0.401 to 0.982 which are more than 0.05 level of significance. Therefore, the hypothesis of no significance difference was accepted at 0.05 level of significance for those items.

Hypotheses 3

There is no significant difference between the mean responses of experienced and less experienced craftsmen in the effective administrative control in the electrical installation craftsmen's workplaces. Data analyzed for the test of this hypothesis is presented in Table 7.

Table 7: T-test analyses of responses of experience and less experience craftsmen on the effective administrative controls in the electrical installation craftsmen's workplaces

S/N	Effective Administration Controls in Electrical Installation Workplaces includes;	$\overline{X}$	SD	t-cal	Sig	Decision
31	Controlling all the events in the electrical installation workplaces	3.63	0.55	0.14	0.86	NS
32	Organizing trainings, seminars and workshops for					

	craftsmen in the electrical installation workplaces	3.68	0.53	0.38	0.24	NS
33	keeping of records of accidents for management use in the workshop	3.62	0.55	-0.53	0.51	NS
34	Planning for the Provision of materials and other equipments such as personal protective devices (PPE)	3.60	0.60	-0.69	0.03	S
35	Implementation of practices and strategies that improve a workstation layout and help reduce stress in the electrical installation workshops.	3.57	0.63	-0.66	0.09	NS
36	Training of an employee in variety of jobs rather than one specific task repeatedly.	3.56	0.56	0.78	0.08	NS
37	Adjustment and redesigning work stations and methods for craftsmen in the electrical industry.	3.33	0.66	0.43	0.26	NS
38	Early intervention to prevent injury in electrical workshop	3.36	0.71	1.09	0.32	NS
39	Evaluation of work in electrical installation workplaces	3.55	0.53	-1.50	0.07	NS
40	Provision of rest periods between jobs to reduce muscles strain	3.49	0.64	-0.86	0.86	NS
41	Provision of information for craftsmen to mitigating ergonomic hazards	3.54	0.66	-0.64	0.55	NS
42	Proper storage of tools and equipments after use.	3.95	0.65	1.07	0.16	NS
43	The enforcement of laws in the electrical installation workshop	3.44	0.63	1.05	0.01	S
44	Organizing job rotation where employee's cross-train craftsmen in jobs that use different muscle groups.	3.54	0.66	-0.27	0.88	NS
45	Division of tasks among units in electrical installation workshops	3.62	0.58	-0.93	0.15	NS
46	Developing checklist of jobs needing to be done in the electrical installation workshops.	3.57	0.66	0.85	0.73	NS
47	Provisions of required information to enable the workers discharge their works.	3.56	0.61	-0.49	0.21	NS
48	Proper location of resources to various units in electrical workshops	3.54	0.56	0.12	0.96	NS
49	Provision of services like: telephone, water, electricity at the workshop	3.60	0.52	0.60	0.85	NS
50	Provision of first aid unit in the workshop in case of electric shock, injuries, cut among others.	3.63	0.57	-1.59	0.00	S
51	Providing security post at the electrical installation workplaces	3.54	0.68	-0.62	0.68	NS
52	Promoting and Motivating workers as at when due to be happy in their work	3.65	0.62	0.72	0.52	NS
53	Recruiting right people to the right job	3.62	0.55	-0.53	0.51	NS
54	Acquisition of modern machinery and equipment for electrical installation craftsmen	3.66	0.48	0.68	0.19	NS
55	Provision of adequate and proper firefighting equipment	3.54	0.61	-1.51	0.08	NS
56	Discarding worn-out damaged tools and getting new ones	3.49	0.68	-0.45	0.54	NS
57	Keeping tools in boxes and racks when not in use	3.57	0.56	0.56	0.62	NS

Key: NS = Not Significant, S= Significant, t-cal = Calculated value of t-test using SPSS version 20, S.D = Standard Deviation, $\overline{X}$ = Mean, N_1 = number of Less Experienced Craftsmen N_2= number of Experienced Craftsmen, Level of Significance = 0.05.

The result in Table 7 shows that there is a significant difference in the mean responses of experienced and less experienced craftsmen on items 34, 43 and 50. Since their significance level ranges from 0.002 to 0.027. Therefore, the null hypothesis of no significance difference at 0.05 level of Significance was rejected for those items. The result also revealed that there was no significance difference in the mean responses of experienced and less experienced craftsmen on tems31,32,33,35,36,37,38,39,40,41,42,44,45,46, 47,48, 49,51,52,53,54,55,56 and 57, since their significance level ranges from 0.066 to 0.955 which are more than 0.05 level of significance. Therefore, the hypothesis of no significant difference was accepted at 0.05 level of significance for those items.

Hypotheses 4

There is no significant difference between the mean responses of experienced and less experienced craftsmen in the physical hazards associated with electrical installation craftsmen's workplaces.

Table 8: T-test analyses of responses of experience and less experience craftsmen on the ways of reducing ergonomic hazards in the electrical installation craftsmen's workplaces

S/N	**Ergonomic hazards and challenges can be reduced through;**	$\overline{X}$	**SD**	**t-cal**	**Sig**	**Decision**
58	Understanding workshop safety rules and regulation.	3.82	0.49	0.95	0.06	NS
59	Health education and awareness creation.	3.75	0.44	0.76	0.13	NS
60	Understanding and tolerating everything in order to fit in the electrical installation workplaces.	3.66	0.59	0.14	0.87	NS
61	Acquiring knowledge on appropriate use of tools and the importance of ensuring that electrical equipment guards are in place	3.60	0.52	1.56	0.02	S
62	Complying with the general rules for safe practice in the work environment at all times	3.57	0.58	0.54	0.37	NS
63	Understanding the essential features and working principles of ergonomics in their operations such as joining, cutting, installing, soldering among others	3.38	0.65	2.64	0.59	NS
64	Understanding the basic working principles of power tools such as soldering iron and drilling machine.	3.54	0.61	2.16	0.18	NS
65	Selecting and accurately use of hand tools for carrying out various fittings and assembly tasks.	3.72	0.52	1.12	0.19	NS
66	Having appropriate knowledge of cable jointing.	3.54	0.59	0.53	0.42	NS
67	Understand cutting through the joints and investigate the Soldering, brazing, and fusion.	3.59	0.58	1.18	0.13	NS
68	Handling materials and making accident report to the appropriate authority	3.68	0.50	-0.56	0.20	NS
69	Making use of protective wears such as hand gloves, coverall, eye shields among others, when working at all times.	3.71	0.49	-0.07	0.67	NS

Key: NS = Not Significant, S= Significant, t-cal = Calculated value of t-test using SPSS version 20, S.D = Standard Deviation, $\overline{X}$ = Mean of Craftsmen, N_1 = number of Less Experienced Craftsmen N_2= number of Experienced Craftsmen, Level of Significance = 0.05.

The result in Table 8 shows that there is a significant difference in the mean responses of experienced and less experienced craftsmen on item 61. Since the significance level is0.016. Therefore, the null hypothesis of no significance difference at 0.05 level of Significance was rejected for those items. The result also revealed that there was no significance difference in the mean responses of experienced and less experienced craftsmen on items 58,59,60,62,63,64,65,66,67,68 and 69. Since their significance level ranges from 0.060 to 0.665 which are more than 0.05 level of significance. Therefore, the hypothesis of no significance difference was accepted at 0.05 level of significance for those items.

Discussion

The findings of the study were organized and discussed in accordance with the research questions answered and null hypotheses tested. The finding shows that physical hazards occur when; Handling and using hand tools like; pliers, screw driver, chisel, and hammer; Stepping on obstructions left on floors such as nails, pieces of irons or bare conductor; Operating an unguarded electrical machines, are in line with the findings of Frank and Revonna (2000) which focuses on controlling physical hazards at work to prevent injury, illness, and death. Revonna went further to explains the proper controls for many types of physical hazards, including layout and building design, safeguarding of machinery, confined space entry, noise, radiation, ergonomics, electricity, thermal stressors, hand tools, woodworking, welding, machining, mobile equipment, materials handling, and workplace violence. Also Kadiri (2008) which states that once hazards have been identified and the risks assessed, appropriate control measures must be put in place and Amadi (2012) states that it is necessary (for one of the legally permissible reasons) to work on an energized electrical part and workers should avoid coming into contact with the source of the electrical hazard.

The result of the analysis of the hypothesis revealed that there was no significant difference in the responses of experienced and less experienced craftsmen on 16 Physical hazards associated with electrical installation craftsmen workplaces; and that there was significant difference in the respondents responses on 3 items which are in line with Smith (2001) which stated that physical hazard is an environmental factor which threatens an individual's physical safety, leads to death or ill health of the craftsmen. Therefore, health education is necessary to prevent the physical hazard. And Frank and Revonna (2000) which focused on controlling physical hazards at work to prevent injury, illness, and death. The result of this study revealed that workshop stress causes unhappiness due to too much work load or responsibility and harassment at workplace and this is in agreement with Rudakwe and Valent (2001) which stated that the goal of ergonomics is to reduce workshop stress, eliminate injuries and disorders associated with the over use of muscles, bad posture and repeated tasks. The author added that this is accomplished by designing tasks, work spaces control, displays, tools, lighting and equipments to fit the workers physical capabilities and limitations. Similarly, Boron, Estill and Steega (2001) explained that too much workload and responsibilities reduces productivity in the workshops.

The result of the analysis of the hypothesis revealed that there was no significant difference in the responses of experienced and less experienced craftsmen on 10 workshop stress associated with electrical installation craftsmen workplaces; and that there was significant difference in the respondents responses on 1item which are in agreement with Chiesa, (2010) which stated that stress can seriously interfere with one's job, family life and health.

Conclusion

In this study, there is need to understand workshop safety rules and regulations, plan for the provision of materials and other equipments such as personal protective equipments (PPE), provision of first aid unit in the workshop in case of electric shock, injuries, cut among others. Acquisitions of modern machinery and equipment for electrical installation craftsmen are also necessary in the electrical installation craftsmen workplaces. Craftsmen should be well educated on the hazards associated with electrical installation workplaces as well as the workshop stress factors to avoid hazards, so that there will be increase in productivity and hazards and challenges will be reduced to the barest minimum.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. Trainings, workshops and seminars should be organized for both

experienced and less experienced craftsmen in the electrical installation workplaces. This will help them in carrying out their jobs in hazard free environment.

2. Ergonomic hazards and challenges should be taught as a separate topic in electrical installation.

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STAKEHOLDERS' PERCEPTION OF PARTNERSHIP FUNCTIONS IN THE MANAGEMENT OF TECHNICAL EDUCATION PROGRAMMES OF COLLEGES OF EDUCATION IN LAGOS STATE

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Abstract

The study identified partnership functions required in the management of technical education programmes of colleges of education in Lagos State. Three research questions guided the study while three null hypotheses were formulated and tested at 0.05 level of significance. The study adopted survey research design. The population for the study was 586 comprising 186 lecturers in tertiary institutions and 400 supervisors in private sectors in Lagos State. The sample size for the study was 302 made up of lecturers in institutions and supervisors in registered private sectors in Lagos State. Purposive sampling technique was employed to select 116 supervisors from registered private industries while all the lecturers were studied. The instrument for data collection was structured questionnaire and three experts validated the instrument while Cronbach alpha reliability method was used to determine the internal consistency of the items and a coefficient of 0.82 was obtained. Mean was used to answer three research questions while t test statistic was used to test the null hypotheses at 0.05 level of significance. The study found out 41 items; 16 in instructional management, 15 in administering staff and students of technical education and 10 in financial management were required by private sectors in managing technical education programmes in colleges of education. There was no significant difference in the mean responses of lecturers and supervisors in private sectors on the private partnership functions required for involving private sectors in instructional management, staff and students' administration and financial management of colleges of education. Based on these findings, it was recommended that all the private partnership functions identified in this study should be used by school administrators for involving private sectors in managing technical education programmes in schools and colleges. It was also recommended that Private sectors should be educated on both direct and indirect benefits in partnering the schools in managing technical and vocational education programmes.

Introduction

Colleges of education (COE) play a vital role in the manpower development. Bakare and Adesuyi (2015) described colleges of education as the tertiary institutions established to train and equip students with knowledge, skills and values in order to become competent teachers for effective implementation of primary and junior secondary school curricula. Levine (2007) stated that college of education is devoted to scholarship in the field of education, which is an interdisciplinary branch of the social sciences encompassing sociology, psychology, linguistics, economics, political science, public policy, history, and others, all applied to the topic of elementary, secondary, and post-secondary education. Ellah (2007) also added that COE are tertiary institutions that prepare intermediate level teachers for a minimum of three years to make them qualify to teach their respective subjects. Dare (2015) explained that the graduates of colleges of education are expected to teach in primary and secondary schools, in order to nurture and shape the children who are the future and leaders of tomorrow. The objectives of the colleges of education as spelt out in the decree establishing them include: (i) to provide full-time courses in teaching, instruction and training in technical, vocational, sciences and, (ii) to conduct courses in education for qualified teachers, (iii) to arrange conferences, seminars and workshops related to the field of learning specified in paragraph (a) above and (iv) to perform such other functions as in the opinion of the college council. Colleges of education are institutions established and charged with responsibility of producing teachers for basic schools such as primary and junior secondary schools in the areas of science, vocational and technical education among others.

Technical and vocational education is an education for work. Uwaifo (2009) described technical and vocational education as any form of education whose purpose is to prepare person(s) for employment in an occupation or group of occupations. Acquisition of skills and techniques in technical and vocational education enables individuals to earn a living. Federal Government of Nigeria (2004) defined technical education as training or retraining programme, which is given in schools or classes under public supervision and control. In colleges of education, technical education programmes such as automobile technology, building, woodwork, metalwork and electrical/electronic technology are organized under a school of technical education. Each of the areas of technical education in colleges of education level is called a programme. Olaitan and Ndomi (2000) described programme as a planned list of instructions to be executed or carried out in a logical manner during learning or training. Quality and Qualification Ireland (QQI) (2013) reported that a programme is the learning package designed, developed and delivered by the teachers or experienced educators. Technical education programme is result oriented but capital intensive. Uwaifo (2009) stated that technical education programme brings about advancement that aims at fitting manpower for employment and provide continuing training for those already qualified, so that they can keep up with modern working methods. They cannot be run successfully without relevant materials and qualified personnel.

Teachers need relevant resource to teach the contents of technical education programme. In most colleges of education in Nigeria, some of these resources are not available for use in order to achieve purpose of instituting technical education. Resource materials such as machines, books, tools, equipments and instruments are obsolete and in bad conditions. It is observable that despite the huge investments by both the governments and the parents in education, in terms of human and material resources students are still graduating with little or no knowledge and skills for entry and continuity in jobs. In order to sustain technical education programmes in COE, there is need for establishing a partnership between the COE and private sectors. Private sectors are the consumers of the skills and knowledge acquired by the products of technical education programmes of colleges of education. Private sectors in this study are the industries owned by an individual, or groups of individuals, multinationals who have capacities to provide training materials, fund, finance and special training for staff and students of technical education programmes for the purpose of improving their knowledge, skills and attitudes. Partnership functions will help in eliminating most of the challenges facing technical education programmes of colleges of education in Lagos State

Function is an assignment, role or responsibility given to someone or something to perform. Microsoft (2009) defined function as an activity or role assigned to somebody or something. Function therefore is the activity that could be put in place by private sectors for effective management of technical education programmes. Function is a feature that can be adopted to promote the effectiveness and attempt to bring solution to any areas of difficulties and stress in organizations, groups and among family members. Function is always given to someone or something in order to achieve major objectives. The functions that could be performed by private partnership at different times depend on the nature of the challenge and available resources**.** E-economic UK (2015) defined a partnership as two or more persons in business with a view to making profits; the number is usually limited to a maximum of 20. In a partnership, the partners provide the capital and share the responsibility of running the business on agreement between its members. US-Small Business Administration (2014) reported that a partnership is a single business where two or more people share ownership. Each partner contributes to all aspects of the business, including money, property, labor or skill. In return, each partner shares in the profits and losses of the business. Partnership therefore is the joint efforts between government, school administrators and private sectors in managing technical education programmes in colleges of education. Management of technical education in this study is the efforts or activities required for effective instructional delivery, administering staff and students in addition to procurement and allocation of finance in the colleges. Partnership between the school and private sectors will bring about effective management of technical education programmes as this will lead to production of quality staffing, provision of modern training facilities such as machines, equipment, workshops, books and manual, well equipped classrooms and placement for students' practice teaching and students' industrial work experience scheme.. This study becomes necessary because it is obvious that the government is incapable of managing technical education programme. The major purpose of the study was to determine private partnership functions in the management of technical education programmes of colleges of education in Lagos State. Specifically, the study sought to:

1. Identify private partnership functions required in managing instructional service delivery in the colleges of education
2. Identify private partnership functions required in administering staff and students of technical education programmes
3. Identify private partnership functions required in financial management of technical education programmes in colleges of education

Methodology

This study employed survey research design. Adeyemo (2006) defined survey design as a way of establishing opinion on an issue of the day, attitude towards more basic issues and facts about the people being involved. Survey design was considered appropriate for the study since it elicited information from subjects on the private partnership functions strategies required in the management of technical education programmes of colleges of education.

The study was conducted in Lagos State and the population for study was 586 comprising 186 lecturers of Technical Education from Universities in Lagos (University of Lagos, University of Nigeria, Yaba College of Technology Campus) Federal College of Education (Technical) Akoka and Adeniran Ogunsanya College of Education Otto Ijanikin and 400 supervisors in private sectors in Lagos State. The sample for the study was 302 made up of lecturers and supervisors in registered private sectors in Lagos State. All the lecturers were involved in the study while purposive sampling technique was employed to select 116 supervisors in registered private industries in Lagos State. That is, only the supervisors working with registered industries were picked for the study.

Structured questionnaire having 45 items developed from the literature reviewed for the study was used for data collection. The questionnaire was divided into two main part I and II. Part I was used to obtain personal information from respondents, Part II contained three sections A-C, each section was based on the corresponding specific purposes of the study. Each item in the instrument was assigned a five response scale of Strongly Agree or Required (SA or SR)-5, Agree or Required (A or R)-4, Undecided (U)-3, Disagree or Not Required (D or NR)-2, and Strongly Disagree or Not Required (SD or SNR)-1point. The instrument was subjected to face validation by three lecturers and their suggestions were incorporated into the final draft of the questionnaire. The reliability coefficient of the instrument was determined by using cronbach alpha reliability method and 0.86 reliability coefficient value was obtained. Fifty six copies of the questionnaire were administered on the respondents at various institutions while fifty copies were collected back representing 89.28 percent return rate

Mean was employed for answering research questions while null hypotheses were tested using t-test, Any item with the mean value of 3.50 or above was considered as required or agreed, while any item with the mean value less than 3.50 was considered as not required or disagree. The null hypothesis of no significant difference was accepted for any item whose P- value was greater than 0.05, but rejected for any item whose P-value was less than 0.05.

Results

The results for the study were obtained from the research questions answered and hypotheses tested through data collected and analyzed.

Research Question 1

What are the private partnership functions required in managing instructional delivery in the colleges of education programme?

Hypothesis one

There is no significant difference in the mean responses of lecturers and supervisors on the private partnership functions required in managing instructional service delivery in the colleges of education.

The data for answering research question one and testing hypothesis one were presented in Table 1

Tables 1

Mean Responses of the Subjects on the Private Partnership Functions Required in Instructional Management of Technical Education Programmes

S/N	Functions	Mean	SD	Sig.	Remark, Ho
1	Provide modern facilities for teaching and learning technical education programmes	3.95	0.71	0.53	**Required, NS**
2	Complement efforts of government in providing well equipped classrooms for each section of technical education programmes	4.20	0.90	0.34	**Required, NS**
3	Help in equipping technical education drawing studios with modern facilities	3.85	0.81	0.56	**Required, NS**
4	Help in reviewing present contents of technical education programmes to reflect modern techniques, skills and knowledge needed in the industries	3.80	0.90	0.33	**Required, NS**
5	Help in maintaining machines and facilities when they are bad	3.78	0.83	0.24	**Required, NS**
6	Providing resource persons to implement some of the modern contents in technical education programmes	3.82	0.86	0.16	**Required, NS**
7	Granting teachers of technical education to visit relevant industries for more knowledge and skills about innovations	3.58	0.85	0.53	**Required, NS**
8	Donating technical books to implement technical education programme	3.50	0.89	0.41	**Required, NS**
9	Help in developing manual for practical classes	3.63	0.81	0.56	**Required, NS**
10	Allowing students to visit industries frequently for the purpose of equipping them with skills and attitudes	3.53	0.73	0.22	**Required, NS**
11	Donating mobiles such as Ipads, smart phones and laptops to teachers for proper implementation of technical education programme	3.80	0.81	0.34	**Required, NS**
12	Developing industries based instructional materials	3.78	7.00	0.26	**Required, NS**
13	Motivating students by awarding them scholarship	3.82	0.93	0.31	**Required, NS**
14	Help in conducting interview during staff selection and employment	3.56	0.81	0.34	**Required, NS**
15	Help retraining staff of technical education programmes	3.79	0.84	0.21	**Required, NS**
16	Setting up production units in each of the sections of technical education	3.73	0.88	0.25	**Required, NS**

Data in Table 1 reveal that 16 items had their mean values ranged from 3.50 to 4.20 and this shows that the mean value of each item was above the cut-off point of 3.50, indicating that

15 private partnership functions were required in instructional management of technical education programmes for optimum service delivery in the colleges of education. The Table also showed that the standard deviations of the items were within the range of 0.70 to 0.90; this indicated that the respondents were not far from the mean and one another in their responses. The table indicated that all the items had their P-values greater than 0.05. This indicated that there was no significant difference in the mean responses of lecturers and supervisors on the private partnership functions required in instructional management of technical education programmes for optimum service delivery in the colleges of education. Therefore, the null hypothesis of no significant difference was upheld for all the 15 private partnership functions

Hypothesis two

There is no significant difference in the mean responses of lecturers and supervisors on the private partnership functions required in administering technical education staff and students

Research Question 2

What private partnership functions are required in administering technical education staff and students?

The data for answering research question two and for testing hypothesis two were presented in Table 2

Tables 2
Mean Responses of the Subjects on the Private Partnership Functions required in Administering Technical Education Programme Staff and Students

S/N	Functions	Mean	SD	Sig.	Remark, Ho
1	Providing additional training for teachers of technical education in the industries	3.51	0.84	0.53	**Required, NS**
2	Sponsoring staff to participate in programme outside the country	3.80	0.97	0.34	**Required, NS**
3	Visit colleges of education to give professional talk	4.08	0.81	0.56	**Required, NS**
4	Help instilling disciplines in students and teachers	4.00	0.80	0.67	**Required, NS**
5	Educate students about the prospects in technical and vocational education	3.78	0.93	0.32	**Required, NS**
6	Organize career competition for students of technical education programmes	3.82	0.86	0.21	**Required, NS**
7	Participate in formulating policies that will benefit students and teachers	3.58	0.85	0.33	**Required, NS**
8	Liase with school authority and government on best way to improve teachers of technical education	3.55	0.91	0.41	**Required, NS**
9	Help in giving awards to outstanding staffs of technical education	3.63	0.81	0.33	**Required, NS**
10	Provide conducive offices to staff of technical education	3.53	0.86	0.34	**Required, NS**
11	Join school authority in provide special hostels for students of technical education	4.21	0.82	0.21	**Required, NS**
12	Sponsor staff development programmes	3.54	0.92	0.12	**Required, NS**
13	Assist in discipline staff for professional misconducts	3.58	0.85	0.32	**Required, NS**
14	Promote discipline learning among students of technical education	3.67	0.93	0.11	**Required, NS**
15	Help in taking decision on misbehave and disobedient students and staff	3.87	0.89	0.43	**Required, NS**

Data in Table 2 reveal that 15 private partnership functions had their mean values ranged from 3.51 to 4.21 and this shows that the mean value of each item was above the cut-off point of 3.50, indicating that 15 private partnership functions were required for administering technical education staff, and students. The Table also showed that the standard deviations of the items were within the range of 0.82 to 0.93; this indicated that the respondents were not far from the mean and one another in their responses. The table indicated that all the items had their P-values greater than 0.05. This indicated that there was no significant difference in the mean responses of lecturers and supervisors on the private partnership functions required for administering technical education staff and students. Therefore, the null hypothesis of no significant difference was upheld for all the 15 private partnership functions

Research Question 3

What are the private partnership functions required in financial management of technical education programme in colleges of education?

Hypothesis three

There is no significant difference in the mean responses of lecturers and supervisors on the private partnership functions required in financial management of technical education programme in colleges of education

The data for answering research question three and for testing hypothesis three were presented in Table 3

Tables 3

Mean Responses of the Subjects on the Private Partnership Functions Required in Financial Management of Technical Education in Colleges of Education

S/N	Functions	Mean	SD	Sig.	Remark, Ho
1	Establishing endowment fund by enabling bodies in the society	3.95	0.78	0.53	**Required, NS**
2	Donating buses to schools	3.52	0.87	0.34	**Required, NS**
3	Funding technical education in colleges of education from time to time	3.82	0.81	0.56	**Required, NS**
4	Ensuring that private sectors pay education tax	3.52	0.90	0.56	**Required, NS**
5	Giving financial supports to colleges of education	3.78	0.93	0.67	**Required, NS**
6	Providing infrastructure to schools for improving technical education programme	4.00	0.86	0.32	**Required, NS**
7	Giving loans to staff when salaries are delay	3.58	0.85	0.26	**Required, NS**
8	Set up special packages such as excess work load arrears for technical education staff	3.59	0.99	0.33	**Required, NS**
9	Paying salaries of security men in each schools	3.63	0.81	0.41	**Required, NS**
10	Partaking in decision on how funds are being spent on capital projects in schools	3.57	0.78	0.33	**Required, NS**

Data in Table 3 reveal that 10 items had their mean values ranged from 3.52 to 4.00 and this shows that the mean value of each item was above the cut-off point of 3.50, indicating that all the 15 private partnership functions were required in financial management of technical education programme in colleges of education. The Table also showed that the standard deviations of the items were within the range of 0.78 to 0.90; this indicated that the respondents were not far from the mean and one another in their responses. The table further indicated that all the items had their P-values greater than 0.05. This indicated that there was no significant difference in the mean responses of lecturers and supervisors on the private partnership functions required in financial management of technical education programme in colleges of education. Therefore, the null hypothesis of no significant difference was upheld for all the 15 partnership functions

Discussion of findings

The findings of this study in table 1-3 revealed that there are 41 private partnership functions (15 in instructional management, 15 in staff and students of technical education administration and 10 in financial management of technical education programmes in colleges of education) required for effective management of technical education programmes of COE in Lagos State. The findings were in agreement with the findings of Bakare and Adesuyi (2015) in a study on strategies required by technical teachers for effective management of workshop equipment in colleges of education in Lagos State where it was found that ten planning strategies, nine organizing strategies, ten monitoring strategies, and ten coordinating strategies were required by technical teachers for effective management of workshop equipment in colleges of education in Lagos State. These findings were in agreement with the opinion of Anthony (2004) who stated that organizing strategy is the process of creating a mechanism to put plans into action. These findings were in agreement with the opinion of Hugh (2008) who stated that monitoring strategy is the process that ensures whether the resources are obtained and used efficiently in achieving the organizational objectives. Edwards (2004) explained that monitoring strategy involves establishing performance standards and monitoring the output of tools and equipment to ensure each tool and equipments performance meets those standards

The findings of this study agreed with the findings of Ogbuanya and Bakare (2009) in a study on mechatronics skills required for integration into electrical/electronic engineering technology programme in polytechnics for sustainable employment of graduates in contemporary Nigeria. The findings revealed that 16 mechatronics contents and 40 mechatronics skills were required for integration into electrical/electronic engineering technology programme in polytechnics for sustainable employment of graduates. The findings of the study also agreed with the findings of Oziegbunam, (2012) in a study on strategies for effective management of electrical / electronic equipment in technical colleges in Anambra State where it was found that nineteen planning strategies, ten out of eleven organizing strategies, fifteen coordinating strategies**,** ten controlling strategies and fifteen evaluating strategies were needed for the effective management of electrical and electronic equipment in technical colleges in Anambra State**.** The findings of the above researchers in their various research activities helped to support the justification of the results of this study on the partnership strategies for involving private sectors in the management of technical education programmes of colleges of education in Lagos State.

Conclusions

Based on the findings of the study, the following conclusions were drawn:

It is obvious that the government is incapable of managing technical education programme due to the nature of the contents and facilities involved. No significant results have been seen despite the government efforts in funding and financing technical education programmes in various institutions. Graduates of technical education from various institutions are not skilled and lack methodologies in displaying knowledge and good attitudes to work because of lack of modern facilities. This study was now set up to identify partnership strategies for involving private sectors in the management of technical education programmes of colleges of education in Lagos State.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. All the private partnership functions identified in this study should be used by school administrators for involving private sectors in managing technical education programmes in schools and colleges.
2. Private sectors should be educated on both direct and indirect benefits of partnering the schools for managing technical and vocational education programmes.

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DRAINAGE MAINTENANCE SKILLS REQUIRED BY BUILDING TECHNOLOGY GRADUATES OF POLYTECHNICS IN LAGOS STATE

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Abstract

The study determined the drainage maintenance skills required by building technology graduates of polytechnics. Three research questions guided the study. The study adopted descriptive survey design and was carried out in Lagos State. The population for the study was 83 subjects comprised lecturers and supervisors in building construction industries. There was no sampling because of their manageable size. A 35-items structured questionnaire was used as instrument for data collection. The instrument was validated by three experts. Cronbach alpha method was used to determine the reliability of the instruments with a coefficient of 0.82. Eighty seven copies of the instrument were administered on the respondents by the researchers and research assistants on one to one basis. After one week, 82 copies of the questionnaire were retrieved and analyzed using mean to answer the research questions. The study found out that 15 maintenance skills are required by graduates for maintenance of stream channel and appurtenant, 10 facilities required by graduates of building technology for drainage maintenance and 10 safety skills are required by graduates of building technology for drainage maintenance. Recommendation include that all the identified maintenance skills should be used to retraining building construction graduates for effective performance. Relevant facilities should be made available either by government or individuals for the implementation identified maintenance skills.

Keywords: *stream channel, appurtenant, drainage, facilities, polytechnics*

Introduction

Polytechnic is a non university institution where various technological courses and programmes are offered to equip students with knowledge, skills and good attitudes for employment and national development. The programmes of the polytechnics in Nigeria are divided into two categories namely; national diploma and higher national diploma programmes. Students who finished national diploma programme or courses are awarded national diploma certificates while those who successfully completed Higher National Diploma Programme are awarded Higher National Diploma Certificates. According to National Board for Technical Education (NBTE) (2002), a polytechnic or college of technology refers to any non university tertiary institution in Nigeria offering varieties of technological/business diploma programmes at National Diploma, Higher National Diploma and Post Higher National Diploma levels that qualify holders for registration in their professional field. Some of the technological programmes/courses offer by polytechnics or colleges of technology in the country include: electrical/electronic technology, mechanical, civil and building technology.

Building technology is one of the technological courses in polytechnics where students are expected to acquire knowledge and skills for paid or self employment after graduation. According to Agbaoku and Agbaoku (2014) graduate of technical/technology education is a person who has received training in a recognised institution and is certified with award certificate of that institution in any technical programme such as automobile, electrical/ electronics, woodwork, metal work and building. Overtime, students who undertake study in building technology programme were being taught architectural and building designs. The course content for these courses covers idea generation of design concepts, blue print drawing of finished designs and functionality of the spaces designed are emphasised with aesthetics in the building elevations. Moreover, site planning and landscaping are not left out. These drawings are translated into reality through construction by the professional builders. But observing the environment, it was noticed that the building professionals are only concerned about the building structure and not the environment as the environment lack proper drainage network. Moreover, maintenance of the existing drainage is rather poor. This is due to the fact that the students who have been undertaking a course of study in building technology programme of polytechnics with respect to Lagos State have been taking lessons in building construction without being taught drainage maintenance skills or competencies. This is makes Graduates of polytechnics to be deficient in drainage maintenance. This is because drainage maintenance skills have not been included in the curriculum as one of the proficient skills needed to perform well in the field of building technology and maintenance. The general purpose of the study was to determine the drainage maintenance skills required by building technology graduates of polytechnics in Lagos State**.** Specifically, the study sought to:

1. Identify maintenance skills required by graduates of building technology for maintenance of stream channel and appurtenant

2. Identify facilities required by graduates of building technology for drainage maintenance

3. Identify safety skills required by graduates of building technology for drainage maintenance

Research Questions

The following research questions guided the study:

1 What are the maintenance skills required by graduates of building technology for maintenance of stream channel and appurtenant?

2 What are the facilities required by graduates of building technology for drainage maintenance?

3 What are the safety skills required by graduates of building technology for drainage maintenance?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

1. There is no significant difference in the mean responses of lecturers of building technology in polytechnics and supervisors in building construction industries on the maintenance skills required by graduates of building technology for maintenance of stream channel and appurtenant
2. There is no significant difference in the mean responses of lecturers of building technology in polytechnics and supervisors in building construction industries on the facilities required by graduates of building technology for drainage maintenance
3. There is no significant difference in the mean responses of lecturers of building technology in polytechnics and supervisors in building construction industries on the safety skills required by graduates of building technology for drainage maintenance

Method

Design of the Study

This study employed descriptive survey design. Adeyemo (2006) defined descriptive survey design as a way of establishing opinion on an issue of the day, attitude towards more basic issues and facts about the people being involved. It is used when facts are needed on a particular issue. Descriptive survey design was considered appropriate for the study since it elicited information from lecturers and supervisors of building industries on drainage maintenance skills required for integration to building technology programme of colleges of education.

Area of the Study

The study was carried out in Lagos State because Lagos State is presently experiencing environmental drainage problems as a mega city. The research work will enhance the acquisition of skills which are needed to correct the drainage system to foster a conducive environment.

Population for the Study

The population for the study was 87 which comprised of Building Technology Lecturers in Yaba College of Technology, Lagos State Polytechnics, Federal College of Education (Technical), Adeniran Ogunsanya College of Education, and University of Lagos and Supervisors of building Construction in relevant industries in Lagos State

Sample and Sampling Techniques

The sample size for the study is 45 lecturers and 42 supervisors. All the Lecturers were involved because of their limited number. Purposive sampling technique was used to select supervisors from registered construction industries in Lagos State.

Instrument for Data Collection

A structured questionnaire was used as the instrument for data collection. The questionnaire contained 80 items and was structured in line with research questions. The questionnaire was divided into two; part I and II. Part I was to obtain personal information from respondents, this part covers item 1-4 with options and blank space to enable respondents to complete as appropriate. Part II contains three sections A-C. Section A of the instrument dealt with research question one, the section covers items 1-15 to source for information on maintenance skills in stream channel and appurtenant required by graduates building technology, section B dealt with research question two, the section covers items 1-10 to source for information on the facilities for drainage maintenance while section C dealt with research question three and the section covers item 1-10, which was used to elicit information on safety skills required for drainage maintenance. The respond options attached to questionnaire items are as follows: Strongly Required (SR)-5, Required (R)-4, Undecided (UD)-3, Not Required (NR)-2, and Strongly Not Required (SNR)-1 point.

Validation of the Instrument

The instrument was subjected to face validation by three Lecturers in the Department of Industrial Technical Education, University of Nigeria, Nsukka. The experts were asked to read the item statements one by one and their suggestions were incorporated to the final draft of the questionnaire.

Reliability of the Instrument

The reliability coefficient of the instrument was determined by using Cronbach alpha reliability method. Copies of the structured questionnaire were administered on 10 Lecturers of Building Technology in tertiary institutions and 10 Supervisors in the Construction Industry in Ogun State and Statistical Package for Social Sciences (SPSS version 20) was used in computing the overall reliability coefficient and 0.82 was obtained.

Method of Data Collection

Eighty seven copies of the questionnaire were administered on the respondents at different institutions and construction industries with the help of three research assistants who knew the terrain of the study area. These research assistants were instructed on how the copies of the questionnaire should be administered on the respondents considered for the study. Out of the three research assistants, two were asked to administer copies of the questionnaire on the Lecturers in different institutions while the remaining one and the researcher herself administered the remaining copies of the questionnaire on the supervisors at different Construction Industries. After a week, 82 copies of the administered instrument were collected back from the respondents which represents 93.75 percent return rate.

Method of Data Analysis

Mean were employed to answer the six research questions. Null hypotheses were tested using t-test. Decision on research questions, any item with the mean value of 3.50 or above was considered as required, while any item with the mean value less than 3.50 was considered as not required. Decision on hypothesis testing, the null hypothesis of no significant difference was accepted for any item whose P- value was greater than 0.05, but it was rejected for any item whose P-value was less than 0.05.

Results

Data for answering Research question 1 are presented in Table 1

Table 1: Mean Response of Lecturers and Supervisors on Maintenance Skills in Stream Channel and Appurtenance required by Graduates of Building Technology in Lagos State

S/N	Maintenance Skills in Stream channel and appurtenance	Mean	S.D.	P-values	Remark	Ho
1.	Select relevant tools and materials for stream channel and appurtenance maintenance	3.73	0.65	0.10	*Required*	*NS*
2.	Observe safety practice when maintaining stream channel and appurtenance	3.70	0.70	0.43	*Required*	*NS*
3.	Inspect stream channel	3.61	0.72	0.33	*Required*	*NS*
4.	Identify bad pipes and channels	3.67	0.54	0.11	*Required*	*NS*
5.	Remove bad and obsolete pipes from the channel	3.81	0.77	0.13	*Required*	*NS*
6.	Remove cracked or corrosive pipes	3.64	0.65	0.32	*Required*	*NS*
7.	Design new stream channel	3.82	0.83	0.22	*Required*	*NS*
8.	Remove materials that lead to stream channel instability	3.61	0.69	0.17	*Required*	*NS*
9.	Identify appropriate materials and technology for maintenance of stream channel and appurtenance	3.80	0.77	016	*Required*	*NS*
10.	Select appropriate pipes to replace bad ones	3.93	0.75	0.23	*Required*	*NS*
11	Replace bad pipes in the stream channel	3.62	0.62	0.21	*Required*	*NS*
12.	Cut and remove grown trees in the stream channel	3.79	0.61	0.24	*Required*	*NS*
13.	Remove sediments and debris from stream channel	3.82	0.83	0.09	*Required*	*NS*
14.	Use long rods to through blocked channel	3.64	0.68	0.18	*Required*	*NS*
15.	Dredge stream channel periodically	3.68	0.69		*Required*	*NS*

Data in Table 1 on Research question 1 reveal that fifteen maintenance skills in stream channel and appurtenance had their means ranged from 3.61 to 3.93. Each mean is above the cut off point of 3.50 indicating that the fifteen skills are required by graduates of Building Technology of polytechnics for maintenance stream channel and appurtenance in Lagos State. The standard deviation values for the fifteen maintenance skills in stream channel and appurtenance range from 0.61 to 0.83 and were less than 1.96 that is 95% confidence limit. This shows that the respondents were not far from one another in their responses and that their responses were not far from the mean. The table also indicated that the items had p-values greater than 0.05. This shows that there was no significant difference in the mean responses of lecturers of building technology in polytechnics and supervisors in building construction industries on the maintenance skills required by graduates of building technology for maintenance of stream channel and appurtenant. Therefore, the hypothesis of no significant difference was upheld for the items

Data for answering Research question 2 are presented in Table 2

Table 2: Mean Response of Lecturers and Supervisors on the Facilities by Graduates of Building Technology for Drainage Maintenance

S/N	Facilities required for Drainage Maintenance	Mean	SD	P-values	Remark,	Ho
1.	Tools and equipment for demonstration activities	3.54	0.75	0.11	Required,	NS
2.	Workshop for practical work and demonstration	3.63	0.69	0.09	Required,	NS
3.	Marker board to explain processes in drainage maintenance	3.61	0.72	0.12	Required,	NS
4.	Real objects to observe features and components of drainage	3.82	0.64	0.15	Required,	NS
5.	Specimen to explain materials for drainage maintenance	3.59	0.68	0.21	Required,	NS
6.	Visual aids to present steps of maintenance operations	3.82	0.63	0.19	Required,	NS
7.	Charts to transmit concepts of drainage maintenance	3.98	0.63	0.15	Required,	NS
8.	Means of transportation for field trip	3.66	0.67	0.16	Required,	NS

9.	Models to be used as substitute for real objects/ features	3.51	0.68	0.21	Required,	NS
10.	Software packages to show quality of finished drainage systems	3.62	0.69	0.10	Required,	NS

Data presented in Table 2 on Research question 2 reveal that ten facilities required for drainage maintenance had their means ranged from 3.51 to 3.82. Each mean is above the cut off point of 3.50 indicating that ten facilities are required for maintenance of drainage maintenance in Lagos State. The standard deviation values for the ten facilities for drainage maintenance range from 0.64 to 0.75 and were less than 1.96 that is 95% confidence limit. This shows that the respondents were not far from one another in their responses and that their responses were not far from the mean. The table also indicated that the items had p-values greater than 0.05. This shows that there was no significant difference in the mean responses of lecturers of building technology in polytechnics and supervisors in building construction industries on the facilities required by graduates of building technology for drainage maintenance. Therefore, the hypothesis of no significant difference was upheld for the items

Data for answering Research question 3 are presented in Table 3

Table 3: Mean Response of Lecturers and Supervisors on the Safety Skills required by Graduates of Building Technology for Drainage Maintenance

S/N	Safety Skills	Mean	SD	P-values	Remark, Ho	
1.	Apply appropriate tools for appropriate a given job	3.58	0.72	0.10	Required	NS
2.	Put on necessary safety gadgets during maintenance work	3.59	0.64	0.09	Required	NS
3.	Use standardized tools and equipment for maintenance of drainage	3.54	0.81	0.12	Required	NS
4.	Observe safety rules as applicable to various tools and machines	3.73	0.62	0.45	Required	NS
5.	Carry stock with optimum caution	3.85	0.68	0.21	Required	NS
6.	Design all drainage features for safety	3.69	0.76	0.15	Required	NS
7.	Remove all trash, debris and sediments from drainage inlet	3.77	0.82	0.26	Required	NS
8.	Check top concrete slab of drainage systems periodically	3.62	0.72	0.43	Required	NS
9.	Seek for assistance to lift heavy objects	3.90	0.79	0.17	Required	NS
10.	Construct road camps on the road for periodic and routine checks	3.82	0.68	0.21	Required	NS

Data in Table 3 on Research question 3 reveal that ten safety skills required for drainage maintenance had their means ranged from 3.54 to 3.90. Each mean is above the cut off point of 3.50 indicating that ten safety skills are required by graduates for drainage maintenance. The standard deviation values for the ten safety skills for drainage maintenance range from 0.62 to 0.82 and were less than 1.96 that is 95% confidence limit. This shows that the respondents were not far from one another in their responses and that their responses were not far from the mean. The table also indicated that the items had p-values greater than 0.05. There was no significant difference in the mean responses of lecturers of building technology in polytechnics and supervisors in building construction industries on the safety skills required by graduates of building technology for drainage maintenance. Therefore, the hypothesis of no significant difference was upheld for the items

Discussion of Findings

The findings revealed 15 maintenance skills in maintaining stream channel and appurtenance, 10 facilities for drainage maintenance and 10 safety skills required by graduates for maintenance of drainages in Lagos State. The findings are in agreement with the study carried out by Omolola (2012) to identify supervisory skills in building construction required by building technology teachers in technical colleges in Ondo State. It was found out that skills are essential to train technical students for capacity building. The findings of the study was also in consonance with the finding of Ogbuanya and Bakare (2014) who carried out a study on mechatronics skills required for integration to electrical/electronic engineering technology programme in Polytechnics for sustainable employment of graduates in contemporary Nigeria and found out that skills in any training programme modifies the behaviour of students or the trainees. Also, the findings agreed with the opinion of Bakare (2014) who stated that having knowledge place performance by individual employee. The findings of this study also agreed with the findings of Amoyedo (2007) that skills are basic requirement for employment of graduates essential. Also, the findings agreed with the opinion of Ede, Miller and Bakare (2010) who stated that there is need to improve work skills of technical college graduates for effective operations. The findings of this study were in agreement with the findings of Elesho (2014) that maintenance skills are essential parts of the training programme most especially when building the capacities of individuals in technical area such as Building technology.

Conclusion

The following conclusions were drawn from the findings of the study:

The study identified the maintenance skills in catch basin, culvert and roadside ditches required by graduates of building technology of technical colleges in Lagos State in order for graduates to become better skilled and exhibit greater professionalism.

Recommendations

Based on the findings of this study, the following recommendations were made:

1. The identified maintenance skills should be used to train building technology graduates of polytechnics at various skills acquisition centres
2. Workshops and seminars should be organised by the polytechnics and other professional bodies in building related fields to train building technology lecturers on the skills required for drainage maintenance.
3. Curriculum planners and developers should integrate maintenance skills in to the curriculum of building technology of polytechnics

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PEDAGOGICAL PRACTICE IMPROVEMENT NEEDS OF ELECTRICAL INSTALLATION TEACHERS FOR EFFECTIVE TEACHING IN TECHNICAL COLLEGESIN OGUN STATE, NIGERIA

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Abstract

This study was conducted to investigate the pedagogical practice improvement needs of electrical installation teachers for effective teaching in technical colleges in Ogun State. The study adopted a survey research design. The population for the study was 55, comprising 25 electrical installation teachers and 30 electrical installation instructors. No sampling technique was used because the size of the population was manageable. Three research questions were raised and 3 hypotheses formulated to guide the study. The instrument used for data collection was a structured Electrical Installation Teachers' Pedagogical Practice Improvement Needs Questionnaire (EITPPINQ). The instrument was subjected to face validation by three experts. The reliability index revealed 0.90 by trial testing the instrument on five electrical installation teachers and five electrical installation instructors of Government Technical College outside the study area. Data collected were analyzed using mean and improvement need index (INI) to answer the research questions while t-test was used in testing the hypotheses at 0.05 level of significance. The findings indicated that electrical installation teachers need pedagogical practice improvement for effective teaching of electrical installation trade. Based on the findings, ways for competency improvement of electrical installation teachers were recommended which include organizing of capacity building training on pedagogical practices for electrical installation teachers for improved and quality instructional delivery across technical colleges in the state. It was also recommended that further pedagogical skill training is required for electrical teachers in technical colleges on the use of new and relevant technology facilities for training of students for relevance in 21st century work place.

Keywords: Pedagogical Practice, Electrical Installation, Teachers, Effective Teaching, Technical Colleges

Introduction

The nature and dynamics of Technical Education call for best pedagogical practices for required skills to be acquired by its students. The teaching and learning of trades or career jobs like electrical installation among other areas of Technical Education ought to be learnt with the best teaching methods and practices for effective result. Teaching is a pedagogical practice that can enhance skills and knowledge acquisition as well asgrowth and development (Akinduyo, 2014). Teaching as an act of guiding and imparting knowledge in and outside the classroom, can only be done professionally by qualified and trained teachers. The teaching profession in Nigeria seems to accommodate unqualified teachers who cannot bring about effective teaching and learning process; this is constantly linked with students' poor performance in school and practice after graduation (Famiwole & Okeke, 2013). Teaching task is so challenging that it surpasses holding chalk, standing before students and giving out different kinds of instructions. Effective teaching, which is an application of intellectual technique seems to be one important factor that can facilitate graduation of competent and productive citizens as well as overall national progress and development in Nigeria.

Effective teaching is a process whereby teacher successfully imparts knowledge and skills to students. Ogbuanya (2010) viewed effective teaching as the conscious and deliberate attempts by teachers to impart knowledge to students. The importance of effective teaching is to enable the students master the knowledge and skills imparted and be able to apply it to solve practical problems of life. Therefore, effective teaching is a successful effort made by electrical installation teachers to produce electrical installation graduates who will be self-reliant and be able to practice electrical installation trades after graduation. Electrical installation teachers in technical colleges need to be highly competent to be able to produce self-reliant graduates in electrical installation craft.

Technical colleges are regarded as the principal vocational institutions in Nigeria (Okoro, 2005). Technical colleges are institutions that provide secondary level education in Technical Education (Amenger, 2013). Technical college programmes are designed to last for three years and entrants are drawn from the holders of Junior Secondary School Certificate on evidence of possession of technical aptitude and successfully passing of entrance examination (Okorie, 2001). Technical college programmes are run majorly to produce craftsmen who will be self-reliant; this is the reason for the inclusion of Students Industrial Work Experience Scheme (SIWES) in the programme to further equip the students practically. The technical college education is targeted toward producing graduates with saleable skills, knowledge and attitude necessary for effective employment and those who would be able to function well in their place of employment. In technical colleges, technical teachers through theoretical and practical teachings give training to students in various trade areas which include woodwork, metalwork, building and electrical/electronic technology (Adeyemi & Uko-Aviomoh, 2004).

Electrical/electronic technology usually referred to as electrical installation and electronic trade is one of the trainings received in technical colleges under Technical Education and its area of coverage includes; radio, television and electronic work instruments mechanism, domestic appliance repair, machine and power engineering, electronics and communication, instrumentation and control, electrical installation and maintenance. Electrical installation is one of the skilled subjects taught in technical colleges that requires competent teachers for effective teaching. Francis (1985) hinted that electrical installation in a building comprises various kinds of electrical apparatuses fixed in position ready for use together with the necessary connecting wires and control gear. However, Electrical Installation and Inspections Acts (2004) explained that electrical installation involves the wires, machinery, apparatus, appliances, devices, material and equipment used or intended for use by an individual or group of people of an establishment. Thus, electrical installation comprises connection, installation, testing and inspection of electrical systems for a variety of purposes (Ogbuanya, 2004, 2009).

The aim of electrical installation trade in technical colleges is to provide students the competency needed to install, operate, maintain and repair electrically energized systems such as residential, commercial and industrial electrical wiring of D.C motors, A.C motors, generator controls, electrical distribution panels and instruction in the use of test equipment and meters (National Business and Technical Examination Board (NABTEB), 2007). The curriculum of electrical installation craft in Technical College comprises three modules namely: domestic and industrial installation, cable jointing and battery charging, winding of electrical machines (NABTEB, 2007). In essence, emphasis should be laid on the actual job situation in the teaching of electrical installation as a Vocational and Technical Education-based subject. The nature and dynamics of electrical installation trade in this 21st century call for best pedagogical approach or applications in students training if the needed results must be achieved (Obiekezie & Onyechi, 2010). However, Oranu (2003) posited that most of the graduates roam the streets because they acquire little or no practical skills during their formal education training and that they find it difficult to set up their own workshops. Nwachukwu (2010) argued that employability skills that are needed for the workplace and self-establishment are lacking because Technical Education graduates most especially at the technical college level are not well prepared prior to entering the workforce. Moreover, some of the few graduates that succeeded in establishing their own workshops cause more havoc to the faulty electrical and electronic gadgets contracted to them for repair and maintenance (Ogbuanya, Bakare & Igweh, 2009; Amenger, 2013). The poor career practice exhibited by technical college graduates may be as a result of failure of the teachers to appropriately impart relevant saleable skills to the students or deficiency of the teachers in actual practical skills transmission based on poor pedagogical practices which include instructional planning and implementation. Thus, electrical installation teachers require regular pedagogical improvement practices for effective teaching and training of the students.

Teaching for skill acquisition and self-reliance has been the ultimate aim for Electrical/Electronic technology and other technology subjects in Technical Colleges in Nigeria. Training to the extent of acquiring adequate skill and subsequent self-reliance requires a good teaching strategy capable of facilitating development in thinking ability. Hence, the teaching and learning of trades or career jobs like electrical installation ought to be carried out with best pedagogical practice most especially teaching methods for effective result. Correct pedagogical practice or approach which includes effective instructional planning, implementation and evaluation is required to produce technical manpower required for effective industrialization of a nation (Faraday, Overton & Cooper, 2011). Effective pedagogical practice is largely linked with students learning, skill acquisition and good performance (Shen, Popink, Cui, & Fan, 2007;Amenger, 2013). Teachers are responsible for instructional preparation and delivery with quality planning, implementation and evaluation of scientific content that is transmitted to the students (Wiles &Bondi, 2010; Obradović, 2013). The level of students' learning is majorly hinged on effective pedagogical practices of the teachers (Obradović, 2013). Thus, Obiekezie and Onyechi (2010) agreed that electrical installation graduates among others would be key drivers toward industrialization iftrained with appropriate pedagogical approach by technical teachers.

In the time past and even recently efforts have been made to update regularly the knowledge and pedagogical skills of technical teachers in the light of changes in technology through workshops, seminars and conferences. This is because despite the initial training of teachers, electrical installation teachers seem to be deficient in competency required for saleable skills. Nwanoruo (2001) stated that a teacher who is well trained at the beginning of a career rapidly falls behind as a result of later developments in his/her area of specialization, unless such a teacher continues to receive additional training. According to Asele (2008), educational planners envisage that no matter the efficiency of the pre-service training given to teachers, there will be areas of inadequacies. Manifestation of teachers' deficiency in recent technological advancement and applications seems evident in the inability of technical college teachers to produce graduates who can be gainfully employed in industries or establish personal workshop and practice electrical installation trade without problems. Okoro (2006) pointed out that objective of Technical Education could only be justifiable, if the products as individual (graduates) can perfectly carry-out the skills learnt or operations by themselves. Okoro (2006) further asserted that such operations called for skill acquisition which is based on teacher's competency. The assertion of Okoro (2006) corroborated the opinion of Ogbuanya (2010) that effective preparation of any caliber of students is dependent on the quality of the teachers. In the same vein, Federal Government of Nigeria (FGN) (2004) believes that no education system can rise above the quality of teachers in the system. It is therefore necessary that areas where electrical installation teachers need improvement be investigated. This is the only way such deficiencies can be known, highlighted and taken care of so that teachers can teach effectively and be able to produce self-reliant graduates.

Statement of the Problem

Electrical installation being one of the trades offered in technical colleges have diverse job opportunities for technical college graduates usually referred to as craftsmen. Electrical installation curriculum provides opportunity for acquisition of skills like domestic installation, industrial installation, cable jointing, battery charging and winding of electrical machines among others which will enable graduates of technical college to be both employable and self-reliant. However, the graduates are weak in practice of electrical installation trade. Most technical graduates specializing in electrical and electronics trade areas such as electrical installation are unemployed and thereby roam the streets because they acquire little or no practical skills during the formal training. As a result of poor skill acquisition, they find it difficult to set up their own workshops. It becomes evident that employability skills that are needed for workplace and personal establishment of the trade are lacking because technical education graduates are not well prepared prior to entering the workforce. The lack of competence and adequate skills for electrical installation practice displayed by technical college graduates may result from pedagogical deficiencies of the teachers in imparting required relevant saleable skills to the students during the training. The inevitable consequences of student's poor skill acquisition which is most likely to be as a result of poor pedagogical practices among the teachers will be unemployment and increase in social vices like theft, robbery, kidnapping, assassination among many others. Hence, in order to ascertain quality skill acquisition among the students, improvement in electrical installation teachers' pedagogical practices becomes imperative so as to drastically reduce deficiency problem in imparting the required competencies needed by the students to face the challenges of the trade in the world of work.

Purpose of the Study

The general purpose of the study was to investigate the pedagogical practice improvement needs of electrical installation teachers for effective teaching in technical colleges in Ogun State**,** Nigeria. Specifically, the study determines:

1. pedagogical practice improvement needs of electrical installation teachers for effective instructional planning.

2. pedagogical practice improvement needs of electrical installation teachers for effective instructional implementation.

3. pedagogical practice improvement needs of electrical installation teachers for effective instructional evaluation.

Research Questions

The study answered the following research questions:

1. What are the pedagogical practice improvement needsof electrical installation teachers for effective instructional planning?

2. What are the pedagogical practice improvement needs of electrical installation teachers for effective instructional implementation?

3. What are the pedagogical practice improvement needs of electrical installation teachers for effective instructional evaluation?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

1. There will be no significant difference between the mean responses of electrical installation teachers and instructors on the pedagogical practice improvement needs of electrical installation teachers of technical colleges for effective instructional planning
2. There will be no significant difference between the mean responses of electrical installation teachers and instructors on the pedagogical practice improvement needs of electrical installation teachers of technical colleges for effective instructional implementation
3. There will be no significant difference between the mean responses of electrical installation teachers and instructors on the pedagogical practice

improvement needs of electrical installation teachers of technical colleges for effective instructional evaluation.

Method

Design of the Study

Survey research design was adopted for the study. This design according to Nworgu (2006) is aimed at collecting data on, and describing in a systematic manner the characteristics, features or facts about a given population. This type of design uses questionnaire to collect data from the respondents. This design is considered appropriate for this study as itsought opinion ofrespondentson areas where electrical installation teachers need pedagogical practice improvement with a structured and validated questionnaire.

Population for the study

The population for the study was 55electrical installation teachers and electrical installation instructors from the seven technical colleges offering electrical installation in Ogun State. The information was obtained from the Ministry of Education, Science and Technology,Ogun State in 2016. The entire population was used for the study because of the manageable size.Hence, no sampling technique was adopted in the study. The populationof 55 comprised 25 Electrical Installation teachers and 30 Electrical Installation instructors who are currently teaching electrical installation trade in the seven Technical Colleges offering electrical installation in Ogun State.

Instrument for Data Collection

The instrument for data collection was a structured Electrical Installation Teachers' Pedagogical Practice Improvement Needs Questionnaire (EITPPINQ). The questionnaire contains 29 items which are divided into four sections. The first section comprised items designed to obtain demographic information from respondents; the second, third and fourth parts consisted items designed to determine the pedagogical practice improvement needs of electrical installation teachers for effective instructional planning, implementation and evaluation respectively in technical colleges in Ogun State. The questionnaire was divided into two categories of needed and performance. The needed category was assigned a five point response scale of Very Highly Needed (VHN) (4), highly needed(HN) (3), Moderately needed(MN) (2), Slightly needed(SN) (1), and Not needed(NN) (0), while the performance category was assigned a five point response scale of Very high performance (VHP) (4), high performance(HP) (3), Moderate Performance(MP) (2), Low Performance(LP) (1), and No Performance (NP) (0). The respondents completed the needed category of the questionnaire by indicating the level at which each item was needed and performance category at the level to which they could perform each item. The difference between the needed mean and performance mean constituted the gap for which competency improvement is needed by the teacher.

Validation and Reliability of the Instrument

The instrument was face validated by three experts from Industrial Technical Education Department, University of Nigeria, Nsukka. To determine the reliability of the instrument, the instrument was pilot tested on five Electrical Installation Teachers and five Electrical Installation Instructors in a Government Technical Collegethat is not part of the study area but has the same demography with the study area. Cronbach alpha (α) was used to determine the internal consistency of the instrument anda reliability index of 0.90 was obtained.

Method of Data Collection and Analysis

The researchers and two other research assistants administered and collected the instrument by hand with 100% return rate. The copies of the instrument retrieved were analyzed using weighted mean and improvement needs index (INI) to answer the three research questions. Decision for mean was based on real limit of numbers thus: 3.50-4.00 (Very Highly Needed/Very High Performance), 2.50-3.49 (Highly Needed/High Performance), 1.50-2.49 (Moderately Needed/Moderate Performance), 0.50-1.49 (Slightly Needed/Low Performance) and 0.00-0.49 (Not Needed/No Performance). On the other hand, the three null hypotheses were analyzed using inferential statistics (t-test) at 0.05 significant level. The calculated t-value was compared with the t-table value in each of the cases. To take decision for hypotheses, any item which t-calculated is less than t-table, the hypothesis of no significant difference was upheld at the probability of 0.05 level of significance, but where t-calculated is greater than the t-table, the hypothesis of no significant difference was rejected at 0.05 level of significance and at appropriate degree of freedom.

RESULT

The data for answering research questions are presented in tables 1 to 3. The remark on each item either indicate IN – Improvement Needed or INN- Improvement Not Needed.

Table 1: Performance Gap Analysis of the Mean Responses of Teachers and Instructors of Electrical Installation on the Pedagogical Practice Improvement Needs of Electrical Installation Teachers for Effective Instructional Planning N=55

S/N	Pedagogical Practice for Effective Instructional Planning	$\bar{X}_n$	$\bar{X}_p$	PG $\bar{X}_n - \bar{X}_p$	Remarks
1	Identify the topic to be taught to the students from a module unit	2.72	3.14	-0.42	INN
2	Formulate specific objective for the lesson	3.60	2.89	0.71	IN
3	Determine the basic skills to expose students	3.74	2.89	0.85	IN
4	Identify the appropriate teaching aids for the topic	3.21	2.89	0.32	IN
5	Select content of instruction from a module unit	2.98	3.05	-0.07	INN
6	Arrange selected instructional content logically and sequentially	3.31	3.09	0.22	IN
7	Identify appropriate method for content delivery	3.45	3.18	0.27	IN
8	Develop the lesson for instruction in line with the objectives	3.22	2.96	0.26	IN
9	Determine relevant evaluation strategies that will lead to achievement of the objectives	3.39	2.90	0.49	IN
10	Identify appropriate records to be kept on instruction and evaluation	3.05	3.43	-0.38	INN

Table 1 revealed that 7 out of 10 pedagogical practice items for effective instructional planning had performance gap values ranging from 0.22 to 0.85 and were positive; this is an indication that electrical installation teachers need improvement in 7 pedagogical practices for effective instructional planning. The table revealed that3out of 10 competency items had negative performance gap of -0.42, -0.07 and -0.38 which is an indication that improvement is not needed by electrical installation teachers in the 3 competency items. Hence, electrical installation teachers need improvement in morepedagogical practices for effective instructional planning.

Table 2: Performance Gap Analysis of the Mean Responses of Teachers and Instructors of Electrical Installation on the Pedagogical Practice Improvement Needs of Electrical Installation Teachers for Effective Instructional Implementation N=55

S/N	Pedagogical Practice for Effective Instructional Implementation	$\bar{X}_n$	$\bar{X}_p$	PG $\bar{X}_n - \bar{X}_p$	Remarks
11	Introduce the lesson topic.	2.81	3.54	-0.73	INN
12	Present the objectives of the lesson	2.94	3.60	-0.66	INN
13	Intimate students with evaluation strategy to be used for the lesson	3.41	3.03	0.38	IN

14	Deliver the lesson content logically and sequentially using the selected teaching aids at appropriate time	3.60	3.10	0.50	IN
15	Organise practical as demanded by the topic either in group or individually	3.23	2.90	0.33	IN
16	Involve students in the lesson through activities	2.94	3.14	-0.20	INN
17	Supervise students' activities	3.34	2.80	0.54	IN
18	Respond to students' questions appropriately	3.50	2.96	0.54	IN
19	Assign students' projects to related instructional activities	3.23	2.78	0.45	IN
20	Collect students/assignment for assessment	2.89	3.56	-0.67	INN

Table 2 reveals that 6 out of 10 pedagogical practice items for effective instructional implementation had performance gap values ranging from 0.33 to 0.54 and were positive; this is an indication that electrical installation teachers need improvement in 6 pedagogical practices for effective instructional implementation. The table shows that 4 out of 10 items had negative performance gap of -0.73, -0.66, -0.20 and -0.67 which is an indication that improvement is not needed by electrical installation teachers in the 4 competency items. Hence, electrical installation teachers need improvement in more pedagogical practicesfor effective instructional implementation.

Table 3: Performance Gap Analysis of the Mean Responses of Teachers and Instructors of Electrical Installation on the Pedagogical Practice Improvement Needs of Electrical Installation Teachers for Effective Instructional Evaluation N=55

S/N	Pedagogical Practice for Effective Instructional Evaluation	$\bar{X}_n$	$\bar{X}_P$	PG $\bar{X}_n - \bar{X}_p$	Remarks
21	Specify the instructional objectives to be assessed	3.47	3.00	0.47	IN
22	Select assessment techniques to be used in order to achieve the objectives	3.10	3.05	0.05	IN
23	Administer the test	2.83	3.59	-0.76	INN
24	Observe and supervise the students performing the test independently	2.80	3.59	-0.79	INN
25	Asses the learner's performance	3.61	2.52	1.09	IN
26	Assign grade to evaluate students' performance	2.96	3.48	-0.52	INN
27	Record students marks and grades in report sheet	2.52	3.60	-1.08	INN
28	Provide justified feedback to students on their performance in the test/task	3.50	2.96	0.54	IN
29	Revise the test with the students	3.36	3.16	0.20	IN

Table 3 revealed that 5 out of 9 pedagogical practice items for effective instructional evaluation had performance gap values ranging from 0.05 to 1.09 and were positive; this is an indication that electrical installation teachers need improvement in 5 pedagogical practices for effective instructional evaluation. The table revealed that 4 out of 9 competency items had negative performance gap of -0.76, -0.79, -0.52 and -1.08 which is an indication that improvement is not needed by electrical installation teachers in the 4 competency items. Hence, electrical installation teachers need improvement in more pedagogical practices for effective instructional evaluation.

Testing of Hypotheses

The data for testing hypotheses 1 to 3 are presented in tables 4 to 6. The remark on each item either indicate S= Significant or NS = Not Significant

Table 4: t-test Analysis of the Mean Responses of Teachers and Instructors of Electrical Installation on the Pedagogical Practice Improvements Needs of Electrical Installation Teachers for Effective Instructional Planning $N_1 = 25; N_2 = 30$

S/N	Pedagogical Practice for Effective Instructional Planning	X_1	S^2_1	X_2	S^2_2	t- cal	Remarks
1	Identify the topic to be taught to the students from a module unit	3.36	0.86	2.96	1.15	0.40	NS
2	Formulate specific objective for the lesson	2.72	1.02	2.70	1.02	0.07	NS
3	Determine the basic skills to expose students	2.84	0.98	2.66	0.88	0.68	NS
4	Identify the appropriate teaching aids for the topic	3.04	1.01	3.00	1.05	0.14	NS
5	Select content of instruction from a module unit	3.20	0.86	2.93	1.01	0.36	NS
6	Arrange selected instructional content logically and sequentially	2.88	1.12	2.76	1.04	0.38	NS
7	Identify appropriate method for content delivery	2.88	1.05	2.83	1.01	0.16	NS
8	Develop the lesson for instruction in line with the objectives	2.92	0.95	2.93	1.04	0.04	NS
9	Determine relevant evaluation strategies that will lead to achievement of the objectives	2.76	1.09	3.00	1.05	0.18	NS
10	Identify appropriate records to be kept on instruction and evaluation	2.60	1.04	3.10	0.99	0.18	NS

Other abbreviations include the following:

N_1 = Number of Electrical Installation Teachers

N_2= Number of Electrical Installation Instructors

S_1^2 = Variance of Teachers of Electrical Installation

S_2^2 = Variance of Instructors of Electrical Installation

X_1 = Mean of Teachers of Electrical Installation

X_2 = Mean of Instructors of Electrical Installation

Df = 53

p = 0.05

t-tab= 1.68

Table 4 revealed that each of the ten pedagogical practices for effective instructional planning had their calculated t-values ranged from 0.04 to 0.68 which were less than t-table value of 1.68 at 0.05 level of significance and at 53 degree of freedom (df). This indicated that there was no significant difference between the mean responses of teachers and instructors of electrical installation on the pedagogical practice improvements needs of electrical installation teachers of technical colleges for effective instructional planning. Therefore, the null hypothesis of no significant difference between the mean responses of teachers and instructors of electrical installation on the pedagogical practice improvements need of electrical installation teachers of technical colleges for effective instructional planning was upheld.

Table 5: t-test Analysis of the Mean Responses of Teachers and Instructors of Electrical Installation on the Pedagogical Practice Improvements Needs of Electrical Installation Teachers for Effective Instructional Implementation $N_1 = 25; N_2 = 30$

S/N	Pedagogical Practice for Effective Instructional Implementation	X_1	S^2_1	X_2	S^2_2	t-cal	Remarks
11	Introduce the lesson topic.	3.60	0.57	3.50	0.97	0.45	NS
12	Present the objectives of the lesson	3.72	0.45	3.50	0.86	0.14	NS
13	Intimate students with evaluation strategy to be used for the lesson	2.92	1.07	3.10	0.99	0.44	NS
14	Deliver the lesson content logically and sequentially using the selected teaching aids at appropriate time	2.56	0.91	2.83	0.98	0.57	NS
15	Organize practical as demanded by the topic either in group or individually	3.28	0.98	3.20	0.92	0.31	NS
16	Involve student in the lesson through activities	3.16	0.85	3.13	0.73	0.12	NS
17	Supervise students' activities	3.16	0.85	3.50	0.73	0.15	NS
18	Ask and respond to students' questions appropriately	3.56	0.58	3.10	1.02	0.28	NS
19	Assign students' projects to related instructional activities	3.16	0.85	3.30	0.65	0.19	NS
20	Check or collect students/assignment for assessment	2.72	1.10	3.16	0.91	0.24	NS

Table 5 revealedthat each of the ten pedagogical practicesfor effective instructional implementation had their calculated t- values ranged from 0.12 to 0.57 which were less than t-table value of 1.68 at 0.05 level of significance and at 53 degree of freedom (df). This indicated that there was no significant difference between the mean responses of teachers and instructors of electrical installation on the pedagogical practice improvements needs of electrical installation teachers of technical colleges for effective instructional implementation. Therefore, the null hypothesis of no significant difference between the mean responses of teachers and instructors of electrical installation on the pedagogical practice improvement need of electrical installation teachers of technical colleges for effective instructional implementation was upheld.

Table 6: t-test Analysis of the Mean Responses of Teachers and Instructors of Electrical Installation on the Pedagogical Practice Improvements Needs of Electrical Installation Teachers for Effective Instructional Evaluation $N_1 = 25; N_2 = 30$

S/N	Pedagogical Practice for Effective Instructional Evaluation	X_1	S^2_1	X_2	S^2_2	t-cal	Remarks
21	Specify the instructional objectives to be assessed	3.56	0.58	3.40	0.77	0.18	NS
22	Select assessment techniques to be used in order to achieve the objectives	2.96	0.93	3.23	0.77	0.11	NS
23	Administer the test	2.76	0.83	3.00	0.87	0.39	NS
24	Observe and supervise the students performing the test independently	2.68	0.90	3.06	0.94	0.54	NS

25	Asses the learner' performance	2.60	0.91	2.63	0.85	0.14	NS
26	Assign the grade to evaluate students' performance	2.80	1.08	3.13	0.86	0.27	NS
27	Record students marks and grades in report sheet	2.52	1.12	2.66	1.15	0.47	NS
28	Provide justified feedback to students on their performance in the test/task	2.88	0.83	3.10	0.80	0.19	NS
29	Revise the test with the students	3.04	0.88	3.26	0.86	0.29	NS

Table 5 revealed that each of the nine pedagogical practices for effective instructional evaluation had their calculated t- values ranged from 0.11 to 0.54 which were less than t-table value of 1.68 at 0.05 level of significance and at 53 degree of freedom (df). This indicated that there was no significant difference between the mean responses of teachers and instructors of electrical installation on the pedagogical practice improvement need of electrical installation teachers of technical colleges for effective instructional evaluation. Therefore, the null hypothesis of no significant difference between the mean responses of electrical installation teachers and the instructors on the pedagogical practice improvement need of electrical installation teachers of technical colleges for effective instructional evaluation was upheld.

Discussion

The overall findings of this study revealed18pedagogical practices in which electrical installation teachers and instructors of technical colleges need improvement for effective instructional planning, implementation and evaluation. These pedagogical practices include to formulate specific objective for the lesson, determine the basic skills to expose students, identify the appropriate teaching aids for the topic, arrange selected instructional content logically and sequentially, identify, appropriate method for content delivery, develop the lesson for instruction in line with the objectives, determine relevant evaluation strategies that will lead to achievement of the objectives, intimate students with evaluation strategy to be used for the lesson, deliver the lesson content logically and sequentially using the selected teaching aids at appropriate time, organise practical as demanded by the topic either in group or individually, supervise students' activities, ask and respond to students' questions appropriately, assign students' projects to related instructional activities, specify the instructional objectives to be assessed, select assessment techniques to be used in order to achieve the objectives, asses the learner' performance, provide justified feedback to students on their performance in the test/task and revise the test with the students. These findings are in consonance with the opinion of Knowles (2000) who established that development of lessons for instruction in line with the objectives determines lesson outcome. This finding also established the view of Ani, Olaitan, Akubilo and Amadi (1989) and Ogbuanya (2010) who affirmed that only competent teachers can provide effective teaching which is a conscious and deliberate attempt to impart knowledge to the students.

There was no significant difference between the mean responses of teachers and instructors of electrical installation on the pedagogical practice improvement needs of electrical installation teachers of technical colleges for effective instructional planning, implementation and evaluation. The implication of the findings is that experience of teachers and instructors did not significantly influence their opinions on each competency items in pedagogy.This finding validate the opinion of Obiekezie and Onyechi (2010) who opined that the nature and dynamics of electrical installation trade in this 21st century call for best pedagogical approach or applications in the students training if the needed results must be achieved which places demand on regular teachers competency improvement exercises. The finding also agrees with the view of Obiekezie and Onyechi (2010) who established that improved and best pedagogical practices by electrical installation teachers would produce electrical installation graduates among others who would be key drivers toward industrialization. However, Ogbuanya (2010) in support of the findings explained that effective preparation of any caliber of students is dependent on the quality of the teachers. This assertion laid credence to the view of the Federal Government of Nigeria (FGN) (2004) who pointed out that no education system can rise above the quality of teachers in the system.

Conclusion

The study based on its findings concludes that there are gaps in the pedagogical practices viz-a-viz: instructional planning, implementation and evaluation exhibited by teachers and instructors in electrical installation trade programme offered in the technical colleges. Therefore, electrical installation teachers may not be able to train competent, skilled and self-reliant graduates in domestic installation, industrial installation, cable jointing, battery charging and winding of electrical machines as expected except appropriate training is provided to improve the pedagogical practices of the teachers and instructors required for effective instructional planning, implementation and evaluation.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. Capacity building training on pedagogical practices should be organized for electrical installation teachers in order to improve their quality of instructional delivery across technical colleges in the state.
2. Further pedagogical skill trainings on use of new and relevant technology facilities should be made compulsory for electrical installation teachers in technical colleges for training of students for relevance in 21st century work place.
3. Electrical installation teachers and instructors should be motivated through awards of scholarships for higher degrees.
4. All the technical teachers who have not gotten teaching qualification should be encouraged to pursue Postgraduate Diploma in Education (PGDE) or Postgraduate Diploma in Technical Education (PGDTE).

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SUPERVISORS' PERCEPTION OF CORE CONTENTS IN ANTI-LOCK BRAKING SYSTEM OF MODERN VEHICLES FOR RE-TRAINING OF MOTOR VEHICLE MECHANIC WORK GRADUATES

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Abstract

The study determined the core contents in anti-lock braking system of modern vehicles for re-training of motor vehicle mechanic work graduates in Lagos State. Three research questions guided the study while the three null hypotheses formulated were tested at 0.05 level of significance. A descriptive survey design was employed for the study. The population for the study comprised 204 supervisors in 68 registered automobile maintenance industries in Lagos State. A structured questionnaire item was used for collecting data from the respondents. The instrument was validated by three experts. Cronbach alpha reliability method was employed to determine the internal consistency of the questionnaire items and 0.82 was obtained as the reliability coefficient. Mean was used for answering research questions while t-test was used to test the hypotheses of no significant difference at 0.05 levels of significance and 183 degree of freedom. It was found out that all the thirteen competencies in servicing, twenty four competencies in repairing anti-lock braking system and ten safety competencies identified were required by graduates of MVMW for maintaining anti-lock braking system. Recommendations include that all the contents or competencies identified in the study should be used to retrain the graduates of MVMW. It was also recommended that experts and specialists in ABS maintenance should be employed to train the graduates of MVMW at skill acquisition centres

Introduction

Technical colleges are secondary institutions where individuals are trained to acquire skills knowledge and attitudes required for either self or paid employment. Technical colleges offer varieties of technical and vocational trades to include motor vehicle mechanic work (MVMW). Olayinka (2009) stated that MVMW is designed to produce competent auto mechanics craftsmen for Nigeria technological and industrial development. The aim of motor vehicle mechanic work according to National Board for Technical Education (NBTE) (2004) is to give training and impart the necessary skills leading to the production of craftsmen, technicians and other skilled personnel who will be enterprising and self-reliant. The graduates of MVMW are called auto mechanic craftsmen and are expected to acquire necessary skills to test, diagnose, service and completely repair any fault on the motor vehicle to the manufacturers' specification. Fadairo (2015) stated that the components of MVMW are arranged in modules for easy assimilation by learners. These components include: engine maintenance, suspension, auto electricity and transmission reconditioning work, major engine repair works, service station mechanic, steering and braking system.

A brake is a mechanical device which inhibits motion, slowing or stopping a moving object or preventing its motion. A vehicle brake therefore is a device used to slow down a vehicle by converting its kinetic energy into heat energy. Various types of vehicle brakes include disc brakes, drum brakes, emergency brakes, air brakes, vacuum brake and anti lock braking system is the most recent one found in modern vehicles. Heibing (2011) defined anti-lock braking system (ABS) as an automobile safety system that allows the wheels on a motor vehicle to maintain tractive contact with the road surface according to driver inputs while braking, preventing the wheels from locking up (ceasing rotation) and avoiding uncontrolled skidding. Reynold (2006) stated that ABS is an automated system that uses the principles of threshold braking and cadence braking which were practiced by skillful drivers with previous generation braking systems. Anti lock braking system does this at a much faster rate and with better control than a driver could manage.

Typically ABS includes a central electronic control unit (ECU), four wheel speed sensors, and at least two hydraulic valves within the brake hydraulics (Gerald, 1994). The ECU constantly monitors the rotational speed of each wheel; if it detects a wheel rotating significantly slower than the others, a condition indicative of impending wheel lock, it actuates the valves to reduce hydraulic pressure to the brake at the affected wheel, thus reducing the braking force on that wheel; the wheel then turns faster. KI4CY (2003) explained that anti-lock braking systems use different schemes depending on the type of brakes in use. They can be differentiated by the number of channels: that is, how many valves that are individually controlled and the number of speed sensors. The schemes according to Heibing (2011) include four-channel, four-sensor ABS; three-channel, four-sensor ABS; three-channel, three-sensor ABS; two-channel, four sensor ABS and one-channel, one-sensor ABS. Anti-lock braking system in cars and most multi-purpose vehicles (MPV's) and pick-up trucks works on all four wheels. This promotes directional stability and allows steering while maximizing braking. ABS uses wheel speed sensors to determine if one or more wheels are trying to lock up during braking (Omkar Phatak, 2011). If a wheel tries to lock up, a series of hydraulic valves limit or reduce the braking on that wheel. This prevents skidding and allows driver to maintain steering control.

There are four main components of ABS: speed sensors, valves, a pump, and a controller (Sam, 2013). A speed sensor is used to determine the acceleration or deceleration of the wheel. These sensors use a magnet and a coil of wire to generate a signal. There is a valve also in the brake line of each brake controlled by the ABS. On some systems, the valve has three positions: In position one, the valve is open; pressure from the master cylinder is passed right through to the brake. In position two, the valve blocks the line, isolating that brake from the master cylinder. This prevents the pressure from rising further should the driver push the brake pedal harder. In position three, the valve releases some of the pressure from the brake. Club (2013) explained that the majority of problems with the valve system occur due to clogged valves. The pump in the ABS according to WiseGeek (2013) is used to restore the pressure to the hydraulic brakes after the valves have released it. The controller is an ECU type unit in the car which receives information from each individual wheel speed sensor, in turn if a wheel loses traction the signal is sent to the controller (Sam, 2013), the controller will then limit the brake force (EBD) and activate the ABS modulator which actuates the braking valves on and off.

Computer-controlled anti-lock braking system (ABS) is an important safety feature which is equipped on most new vehicles (Nice, 2000). When brakes are applied suddenly, ABS prevents the wheels from locking up and the tires from skidding. The system monitors the speed of each wheel and automatically pulses the brake pressure on and off rapidly on any wheels where skidding is detected (Club, 2013). This is beneficial for driving on wet and slippery roads. ABS works with the service brakes to decrease stopping distance and increase control and stability of the vehicle during hard braking but still create some maintenance problems for the owners of cars in Lagos State where modern cars are mostly used (Reynold, 2006). The ABS is a complex and sophisticated unit of motor vehicle and this makes it so difficult for road side mechanic to maintain. The modern car owners hardly locate efficient automobile craftsmen who can service and repair mal-functional ABS. The qualified automobile maintenance industries who can handle anti-lock braking systems are few in number compare to number of vehicles in Lagos State. The maintenance of ABS in these maintenance industries is very expensive and most of the car owners could not afford it. The road side automobile technicians who claim to be skilled in ABS maintenance mostly cause more damage to ABS in modern cars contracted to them. In order to provide solution to these problems and to expand the chance of employment of individuals who graduated from technical colleges without jobs, there is need to develop maintenance contents in anti-lock braking systems. Maintenance contents are the skills, knowledge, and attitudes or competencies required for effective servicing and repairing of anti locking braking system. Possession of maintenance abilities will enable motor vehicle mechanic work graduates to set up their workshops and maintain all kinds of ABS on various vehicles. These abilities or competencies therefore could be used to retrain the graduates because ABS is a recent technology and the curriculum of technical colleges does not specify the teaching of ABS to students. The general purpose of the study was to determine the core contents in anti-lock braking system of modern vehicles for re-training motor vehicle mechanic work graduates in Lagos State. Specifically the study sought to achieve the following:

1. Identify the core skills required by graduates of MVMW for servicing anti-lock braking system
2. Identify the core skills required by graduates of MVMW for repairing anti-lock braking system
3. Identify the Safety skills required by graduates of MVMW when maintaining anti-lock braking system

Research Questions

The following research questions guided the study:

1. What are the core skills required by graduates of MVMW for servicing anti-lock braking system?
2. What are the core skills required by graduates of MVMW for repairing anti-lock braking system?
3. What are the safety skills required by graduates of MVMW when maintaining anti-lock braking system?

Hypotheses

The following hypotheses were tested at 0.05 level of significance:

H0$_1$: There is no significant difference in the mean ratings of responses of the experienced and less experienced supervisors in automobile maintenance industries on core skills required by graduates of MVMW for servicing anti-lock braking system

H0$_2$: There is no significant difference in the mean ratings of responses of the experienced and less experienced supervisors in automobile maintenance industries on core skills required by graduates of MVMW for repairing anti-lock braking system

H0$_3$: There is no significant difference in the mean ratings of responses of the experienced and less experienced supervisors in automobile maintenance industries on safety skills required by graduates of MVMW when maintaining anti-lock braking system

Method

Survey research design was employed for this study. Osuala (2005) stated that survey research focuses on people and their opinions, attitudes, motivations and behavior. The survey research design is appropriate for this study because it aims at the determination of core skills required by graduates of motor vehicle mechanic work for maintaining anti-lock braking system of modern cars in Lagos State.

The study was carried out in Lagos State, which is an industrialized State and one of the States with highest number of modern car owners with high rate of unemployed graduates of motor vehicle mechanic work who migrated from other parts of the country. The population for the study was 204 experienced and less experienced supervisors in 68 Registered Automobile Maintenance Industries in Lagos State. There was no sampling because of the manageable size of the population. A structured questionnaire made up of 40 items was developed for collecting data in accordance with the research questions. The instrument was in three sections A-C. Section A of the instrument was for collecting data on competencies required by graduates of MVMW for servicing anti-lock braking system, section B was for collecting data on competencies required by graduates of MVMW for servicing anti-lock braking system while section C was prepared to collect data on safety competencies required by graduates of MVMW when maintaining anti-lock braking system. Each questionnaire item was assigned a five point response scale of highly required, required, undecided, slightly required and not required with values of 5, 4, 3, 2 and 1.

Three Lecturers in the Department of Industrial Technical Education, University of Nigeria Nsukka validated the instrument for the data collection. The internal consistency of the questionnaire items was determined using Cronbach alpha technique and a reliability coefficient of 0.82 was obtained. The 204 copies of the questionnaire were administered on respondents with the help of three research assistants who understand the terrain of study area. One hundred and eighty five out of 204 copies of the questionnaire administered were retrieved representing 90.68 percent return.

The data collected were analyzed using mean for answering the research questions and the t-test was employed for testing the null hypotheses at probability level of 0.05 and 183 degree of freedom. An item with a mean rating of 3.50 or above was regarded as agree while any item with the mean rating below 3.50 was regarded as disagree. In taking decision on the hypotheses tested, the hypotheses of no significant difference was accepted where the P-value is greater than 0.05 levels and this indicated that there was no significant difference in the mean ratings of the responses of the two groups of respondents on that item. If the p-value is less than 0.05 levels, this indicated that the hypothesis of no significant difference in the mean ratings of the responses of the two groups of respondents was rejected for that item.

Results

The results for the study were obtained from the research questions answered through data collected and analyzed.

Table 1: P-Values and Mean Ratings of the Responses of Supervisors on Core Contents required by Graduates of MVMW for Servicing Anti-lock Braking System

S/N	Competency Items	X	SD	P-value	Remarks,	Ho
1	Identify the needed materials for servicing of ABS	3.72	0.73	0.33	Required,	NS
2	Remove the wheels in order to clean the brakes	3.50	0.61	0.91	Required,	NS
3	Manually clean the brakes on the car	3.81	0.53	0.53	Required,	NS
4	Replace the brake fluid as often as recommended by your vehicle's owner's manual	3.72	0.62	0.59	Required,	NS
5	Recalibrate the speed sensors	3.57	0.78	0.56	Required,	NS
6	Top the brake fluid container as recommended by the manufacturers	3.62	0.63	0.62	Required,	NS
7	Change the brake lining if bad	3.61	0.70	0.72	Required,	NS
8	Check the positions of the brake sensors	3.56	0.82	0.78	Required,	NS
9	Check the lines of the ABS for leakages and functionality	3.69	0.69	0.71	Required,	NS
10	Identify the causes of ABS delay for rectification	3.68	0.80	0.44	Required,	NS
11	Check the service manual for the voltage and resistance values on various pins and sensors	3.55	0.78	0.43	Required,	NS

12	Consult the service manual for a chart of specific values of components	3.76	0.88	0.21	Required, NS

Table 1 revealed that all the 12 core items had their mean values ranged from 3.50 to 3.81 which were above the cutoff point of 3.50. This indicated that all the 12 competencies were required by graduates of MVMW for servicing anti-lock braking system. Data presented in Table 1 also showed that all the core skills had their P-values ranged from 0.21 to 0.91 and were greater than 0.05 at 183 degree of freedom. This indicated that there was no significant difference in the mean ratings of responses of the experienced and less experienced supervisors in automobile maintenance industries on competencies required by graduates of MVMW for servicing anti-lock braking system. Therefore, the null hypothesis of no significant different was upheld for the 12 core skills required by graduates of MVMW for servicing anti-lock braking system.

Table 2

P-Values and Mean Ratings of the Responses of Supervisors on Core Contents required by Graduates of MVMW for Repairing Anti-lock Braking System

S/N	Competency Items	X	SD	P-values	Remarks, Ho
1	Select appropriate tools and other materials for ABS repair	3.61	0.76	**0.23**	Required, NS
2	Select a set of front and rear brakes pads and linings and 4 support jacks	3.56	0.81	**0.41**	Required, NS
3	Pump the brakes 24 to 40 times while the key is in the off position to relieve the ABS system of any build up pressure	3.78	0.72	0.33	Require, NS
4	Use the floor jack to hoist the car	3.59	0.63	0.09	Required, NS
5	Place the support stands on the metal frames on both sides	3.60	0.87	0.12	Required, NS
6	Remove the tire and to reveal the rotor and caliper	3.74	0.66	0.59	Required, NS
7	Remove the caliper	3.59	0.82	0.54	Required, NS
8	Remove the old pads and replace them with the new pads	3.79	0.63	0.23	Required, NS
9	Check the master cylinder, brake lines and vacuum hoses	3.61	0.76	0.11	Required, NS
10	Ask assistant to pump the brake while watching	3.56	0.82	0.34	Required, NS
11	Make sure that the hoses do not expand when pressure is applied	3.69	0.69	0.20	Required, NS
12	Replace the damaged hose if happens	3.78	0.50	0.56	Required, NS
13	Replace the brake fluid	3.70	0.61	0.56	Required, NS
14	Pump the brakes to remove any air that may have entered the lines during your repair	3.96	0.45	0.67	Required, NS
15	Reattach the caliper	3.99	0.53	0.66	Required, NS
16	Put the tires back on the car	3.98	0.41	0.58	Required, NS
17	Lower the vehicle off of the supports	3.95	0.34	0.78	Required, NS
18	Pump the brakes several times to rebuild pressure	3.78	0.38	0.91	Required, NS

	in the ABS system.					
19	Move the key to the on position to see if the ABS warning lights come on	3.97	0.62	0.74	Required,	NS
20	Turn the car on and gently back up, applying the brakes lightly	3.91	0.61	0.56	Required,	NS
21	Re-inspect the pad or lining if the brakes feel soft or spongy	3.89	0.52	0.74	Required,	NS
22	Complete the work one wheel at a time	3.78	0.43	0.53	Required,	NS
23	Remove any bad principal components of the ABS	3.63	0.83	0.22	Required,	NS
24	Spend the required time to make sure that it is set up completely before moving to another tire	3.78	0.67	0.11	Required,	NS

Table 2 revealed that all the 24 items had their mean values ranged from 3.56 to 3.98 which were above the cutoff point of 3.50. This indicated that all the 24 core skills were required by graduates of MVMW for repairing anti-lock braking system. Data presented in Table 2 also showed that all the competencies had their P-values ranged from 0.09 to 0.91 and were greater than 0.05 at 183 degree of freedom. This indicated that there was no significant difference in the mean ratings of responses of the experienced and less experienced supervisors in automobile maintenance industries on core skills required by graduates of MVMW for repairing anti-lock braking system. Therefore, the null hypothesis of no significant different was upheld for the 24 core skills required by graduates of MVMW for repairing anti-lock braking system.

Table 3
Mean Ratings of the Responses of Supervisors on Safety Skills required by Graduates of MVMW when Maintaining Anti-lock Braking System

S/N	Core skills	X	SD	P-values	Remarks,	Ho
1	Use relevant tools and equipment for the maintenance of ABS	3.78	0.75	0.23	**Require,**	**NS**
2	Put on appropriate dresses such as overall and gloves	3.69	0.68	0.34	Required,	NS
3	Move the key to the on position to see if the ABS warning lights come on	3.81	0.68	0.33	Required,	NS
4	Turn the key to the off position when ready for operation	3.74	0.61	0.51	Required,	NS
5	Do not use a block of wood or some other item to support the weight of the vehicle	3.53	0.80	0.23	Required,	NS
6	Never crawl under a vehicle that has not been properly supported	3.72	0.69	0.54	Required,	NS
7	Take care not to get any dirt on the rotor, as it will affect the performance of the brakes	3.60	0.67	0.22	Required,	NS
8	Do not rush the job	3.56	0.77	0.78	Required,	NS
9	Use first class car jacks while maintaining ABS	3.69	0.69	0.37	Required,	NS
10	Apply recommended, brake shoes, brake lining, hoses and brake fluid	3.78	0.82	0.67	Required,	NS

Table 3 revealed that all the 10 core items had their mean values ranged from 3.53 to 3.81 which were above the cutoff point of 3.50. This indicated that all the 10 safety skills were required by graduates of MVMW when maintaining anti-lock braking system. Data presented in Table 3 also showed that all the skills had their P-values ranged from 0.22 to

0.78 and were greater than 0.05 at 183 degree of freedom. This indicated that there was no significant difference in the mean ratings of responses of the experienced and less experienced supervisors in automobile maintenance industries on the safety skills required by graduates of MVMW when maintaining anti-lock braking system. Therefore, the null hypothesis of no significant different was upheld for the 10 safety skills required by graduates of MVMW when maintaining anti-lock braking system.

Discussion of results

The results of the study reveal that the graduates of motor vehicle mechanics work required 13 core skills in servicing anti-lock braking system, 24 core skills in repairing anti-lock braking system and safety skills when maintaining anti-lock braking systems. These results agreed with the findings of Akinduro (2006) who conducted a study on electrical installation and maintenance work skills needed by technical college graduates to enhance their employment in Ondo state where he found out that graduates require various work skills in domestic and industrial installation, cable joint, battery charging and electrical machine winding for employment after graduation. The findings of the study were in agreement with the findings Dangana (2006) who conducted a study on technical skills improvement needs of auto electronic technicians for the maintenance of modern day automobile in Niger State and found out that 10 major skills in the electrical principles, 8 practical skills 11 skills in the knowledge of basic functions of tools and equipment, and 8 safety skills are needed by the auto-electronic technicians in order to improve their maintenance skills on modern day automobiles. The findings of this study also in line with findings of Bakare (2006) who carried out a study on safety practice skills needed by electrical electronic students of technical colleges in Ekiti State. The author found out that students of electrical/electronic needed safety practice skills in using hand tools, operating power tools, operating electric machines, working electrical workshops and using instructional manuals or guide. The findings of the authors cited above help to validate the findings of this study.

Conclusion

There is high time to train people for effective maintenance of ABS in modern cars. The modern car owners hardly locate efficient automobile craftsmen who can service and repair mal-functional ABS. The qualified automobile maintenance industries who can handle anti-lock braking systems are few in number compare to number of vehicles in Lagos State. It is in this direction that this study was conducted to identify core contents in form of competencies required by graduates of MVMW for servicing and repairing faulty ABS for car owners.

Recommendations

1. All the core contents identified in this study should be used to organize re-training for the graduates of MVMW
2. Necessary facilities should be given to the graduates of motor vehicle mechanic work
3. Qualified training personnel should be invited to train the graduates of MVMW on effective maintenance of ABS

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STRATEGIES FOR ENHANCING EFFECTIVENESS OF STUDENTS INDUSTRIAL WORK EXPERIENCE SCHEME TOWARDS DEVELOPING WORK SKILLS AMONG POLYTECHNICS STUDENTS IN SOUTH WEST NIGERIA

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Abstract
The study determined the strategies for enhancing effectiveness of SIWES towards developing work skills among polytechnics students in South West, Nigeria. Three research questions were answered and two hypotheses were tested at 0.05 level of significance. Descriptive survey design was adopted. The population for the study was 115 lecturers and managers. Instrument for data collection was Enhancing Performance of Students in Industrial Work Experience Questionnaire. Three experts validated the instrument for data collection. The internal consistency of the questionnaire items was determined by using Cronbach alpha reliability method and 0.93 reliability coefficient was obtained. The data generated were analyzed using mean to answer research questions while t-test was used to test the hypotheses. Findings revealed that work skills required by students for effective job performance should focus on building positive working relationships; polices, program and procedures of developing work skills should reflect culture and environment of students and aim of SIWES should be made clear to employers and students. It was recommended that there should be greater and maximum cooperation between TVET institutions and industrial organizations in designing appropriate curriculum; SIWES must be properly monitored. It was also recommended that employers, polytechnics and other vocational institutions should partner to develop employability contents in TVET curriculum and provide life skills training for students during SIWES.
Keywords: Work skills, Effectiveness, SIWES, Enhancing, Job Performance and Developing

Introduction

Skills are the expertise or capacity to do a job or task, it is the special ability to perform a difficult task quickly and skillfully with hands so that it seems easy. Skill is the ability to demonstrate competence in the performance of a range of varied work activity, most of which may be routine (Olabiyi, 2004). Skill includes ability, and the application of significance range of fundamental principles and cluster of activities in occupation Okorie, 2000; Kwasu, 2004). Work skills allow employee to do a particular job effectively and these skills are needed for everyday life. Employers place a lot of emphasis on finding candidates with the right skills and competencies for their organizations, depending on the occupation sector and profession they choose to work in, there could be very specific skills, abilities and knowledge needed to do the job. A number of researchers Dabalen, Oni and Adekola (2000); National University Commission (NUC, 2004), have revealed that apart from the qualifications that graduates possess, there are other attributes (non-academic skill requirements) which employers of labour require and emphasize.

These attributes according to Dabalen, Oni & Adekola (2000) therefore include analytical skills, communication skills, personal and social skills, technical and managerial skills among others. Boeteng and Ofori-Sapong (2002), in linking these attributes to experience, stressed that experience requirements are now stated in terms of competencies and skills rather than years. Employers of labour force are not only interested in those having higher education but also practical skills appropriate for job fulfillment. It is a paradox that large numbers of graduates go jobless for years while commerce and industrial organizations complain of lack of skilled workers. In the view of Akanmu (2011) skills required should meet international standards to enable graduate work in any other parts of world. Akanmu further explained that employers want their graduate recruits to be technically competent and to be well equipped with complementary life skills such as problem solving, reflective and critical thinking, interpersonal and team skills. Other desirable skills include effective communication, character, integrity and high level of personal ethics, self-discipline, organizing skills and abilities to translate ideas into action.

Following from these requirements, and the growing concern of industries and commerce, that graduates of the institutions of higher learning lack adequate practical background studies preparatory for employment. ITF introduced Students Industrial Work Experience Scheme (SIWES) in 1973, as a policy measure to bridge the gap between theory and practice. The policy on SIWES was introduced with the aim of making the training program an effective instrument of productivity, skilled work and employment promotion. The relationship between education and work calls for acquisition of relevant work skills to be able to meet demand of industrial sector, which could be achieved through students' industrial work experience scheme and technical vocational education institutions. SIWES is a skill training program designed to expose and prepare students in institutions of higher learning for industrial working situations they are likely to meet after graduation (Okorie, 2000). It is a co-operative arrangement between the school and industries for all students undergoing courses that call for exposure in industrial activities during their training in schools. Also, SIWES is designed to expose students to skill and needed work experiences in handling equipment, machinery and tools that may not be available in educational institutions.

Work experience is the acquisition of relevant production skills needed in industry, commerce and work situations through exposure to theory and practice and challenges on-the-job. In the process of acquiring the relevant production skills, theoretical and practical knowledge are necessary. Theory involves classroom activity which is the basic principles of skill acquisition that serve as guide needed for production in work situations. Practice on the other hand is an effective performance of a specific task by doing a physical work. Traditionally, tertiary institutions are excessively oriented towards theory with research aided program of activities for work situations. Their curriculum is drawn more from libraries than from the industrial work setting where the production takes place, this then suit the intellectually able that have less aptitude for practical work skills. This training will complement the classroom teaching and workshop practices, thereby developing general and specific skills, knowledge and attitude. SIWES is financed by the Federal Government of Nigeria and it is operated through the industrial training fund (ITF) in collaboration with the National University Commission (NUC), National Board for Technical Education (NBTE), National Commission for Colleges of Education (NCCE) and the industries (ITF, 1990).

Achieving a better balance between the country's changing occupational employment requirements and the qualifications of Nigerian workers according to Okorie (2000) requires combined efforts of technical institutions and industries to provide adequate educational and training resources. The students during their training are expected to be exposed to resources and relevant activities that will not only offer the desired practice in work skill development but also assist teachers in evaluating the extent to which the desired work skills have been acquired, there is need for polytechnics institutions and industries to provide environments that are rich and full of opportunities for the students to practice the skill required (Ezeji, 2001). To complete the training of polytechnics students in a skill that is saleable in occupational life, part of the training must take place under actual production. This observation highlights the need for polytechnic and other technical vocational institutions to ensure that their students are effectively participating in work experience for effective work skill development.

The major aim of Technical Vocational Education and Training (TVET) is to prepare people for (self-) employment and to be a medium of evolution for people to the world of work; by making individual to have a sense of belonging in their communities. Consequently, TVET is seen as an instrument for reducing extreme poverty (Hollander & Mar, 2009). But it seems that the school is failing in its responsibility, for research evidences confirmed that many people lose their jobs due to lack of desirable work skills (Olabiyi, 2004); Izueke & Nzekwe, 2013). The implication of this is for TVET institutions to further deploy and strengthen their commitment toward effectiveness of SIWES and producing skilled graduates that will meet up with the challenges of virtual workplaces. Effectiveness is the indication for the impact of a group of activities performed on the achievement of intended learning outcome. In relation to SIWES, it is the observed impact of SIWES in achieving the set goals and objectives. An effective SIWES is the result oriented. It is rooted on functional components whose characteristics enhance the achievement of results within the framework of the set goals and objectives.

The present state of SIWES has not been promising, SIWES is meant for on-the-job practical experience for students undergoing all courses that demand exposure in industrial activities during their training, by exposing students to work methods and machinery that may not be available in the institutions. Therefore, all human and material resources required for the successful execution of SIWES should be given adequate attention by the government, policy makers (ITF) and TVET institutions. Since this attention has not been provided for the needed improvement for the available human and material resources, the state of effectiveness of SIWES has remain very low, and may remain so until adequate attention is given to it (Olaitan Nwachukwu, Onyaemachi, Igbo & Ekong, 1999). Thus, this necessitates the study.

Statement of the Problem

The apparent lack of work skills among graduates has been blamed on TVET institutions spend time theorizing at the expense of developing practical skills because of lack of materials and facilities needed to infuse in students, necessary work skills likely to be required in commerce and industries (Olaitan, Nwachukwu, Igbo, Onyemachi & Ekong, 1999; Izueke & Nzekwe, 2013). The SIWES has been on since 1973 with students participating, yet Nigerian graduates of higher institutions are being rated low and unemployable by industrial organizations. A minister of Science and Technology under President Obasanjo, Professor Isoun (2006), lamented that no fewer than 60 percent of the nation's graduates were either unemployable or needed re-training to make them relevant in today's emerging economies. In his own perception of the situation, Chairman of the House of Representatives Committee on Youth and Social Development, Depo (2009) observed that of the over 40 million unemployed youths in the country, 23 million are unemployable and therefore susceptible to crime. The result of a study carried out on graduate turnout, skills and graduate unemployment in Nigeria by Akinyemi, Ofem & Omore (2010) shows that Nigerian graduates largely, lack basic work skills that are needed in the modern workplace

Unfortunately, lack of basic work skills results to negative attitude which are manifested in the form of deficiency in thinking creatively, decisions making, problem solving, precision, dexterity, co-ordination and lack of other work related inter-personal skill in the areas of technology, instruments, tools and information systems, self-directed, good work attitude, co-operative, self-motivated and self-management exhibited by TVET graduates especially polytechnic graduates. These negative dispositions to work skills have contributed in great measure to people losing their jobs, failing to be promoted, and in ability to sustain their jobs or advancement in their professions. A nation with high turnover rate of graduates and not getting job or being promoted in their work places is certainly in a problem socially, economically, and politically. These situations may ultimately lead to frustrations, lawlessness and brain drain of its citizens. Such a society would be in siege mentality and no nation would be advocate for such situation.

To prevent such situation, polytechnics institutions, whose part of the responsibility is to prepare individuals for work has to be turned to. Such situation should be formally addressed by TVET institutions and industrial training fund (ITF) to enable polytechnic students who would be tomorrow's adult workers to have a smooth transition from school to the world of work. It was in order to bridge the gap that SIWES was introduced in the education of students who training involves technical bias to serve as tool for TVET graduates for acquiring appropriate work skill and practical work experience (Okorie, 2001). However, research evidence on the implementation of students industrial work experience suggests that SIWES has not been very effective in helping students to acquire the necessary work skills (Ezeji, 2000). Is it therefore necessary to develop strategy for enhancing the performance of SIWES towards developing work skills among polytechnic graduates? This question constitutes the problem to which this study was set to address.

Purpose of the Study

The general purpose of the study was to determine strategies for enhancing the performance of students in industrial work experience scheme towards developing work skills among polytechnics students in South West, Nigeria. Specifically, it sought to ascertain appropriate work skills required and strategies for enhancing the performance of industrial work experience to develop work skills among polytechnic students.

Research Questions

The following research questions guided the study:

1. What are the appropriate work skills required by polytechnics students for effective job performance?
2. What are the strategies to enhance effectiveness of industrial work experience to develop required work skills among polytechnic students?
3. Is there any significant different in the mean rating of employers/managers and lecturers on appropriate work skill required by polytechnics students?

Hypotheses

The following hypotheses were formulated and tested at 0.05 level of significance:

Ho_1: There is no significant difference in the ratings of lecturers and managers/employers on strategies to enhance effectiveness of SIWES to develop required work skills among polytechnic students.

Ho_2: There is no significant difference in the ratings of male and female respondents on appropriate work skills required by polytechnics students for effective job performance.

Method

The study adopted a descriptive survey design. Descriptive survey design was considered appropriate since it identifies present condition, prevailing needs as well as provides information on which to base sound decision (Osuala, 2001). There exists a need to determine strategies for enhancing the performance of students in industrial work experience towards developing work skills among polytechnics students. Hence, the researchers sought the expertise of polytechnics lecturers and personnel managers in industries purposefully selected for the study.

Area of the Study

The study covered the four States in the South-West Geo-political zone of Nigeria namely; Oyo Lagos, Osun and Ogun. The choice of this zone was motivated by the fact that this area is well known as industrial centre and for their efforts in acquiring education. It covers all the Federal Polytechnics located in this Zone. The industrial and service organizations covered were those that have the capacity to accept students for SIWES training programme.

Population for the Study

The population for the study was defined as polytechnics lecturers in public federal polytechnics and employers of students on SIWES. To ensure that a representative sample was selected from the population, the researchers defined specific selection criteria used in selecting participants for the study. Polytechnic lecturers with a minimum of fifteen years teaching and research experience, and a significant contribution to issues in SIWES were considered the base selection criteria for participants for the study. Hence, a total of 120 polytechnics lecturers and 50 personnel managers were first listed as potential participants for the study having met the base selection criteria. After several considerations and review the list was reduced to a total of 125 participants; selected 97 lecturer and 28 managers. Participants were purposefully selected to ensure that only those with adequate knowledge of SIWES related issues were chosen, and also to ensure that quality data was generated.

Instrument for Data Collection

The instrument for data collection was titled: Enhancing Performance of Students in Industrial Work Experience Questionnaire (EPSIWESQ). The EPSIWESQ is a structured questionnaire that consists of three sections, A, B and C. Section A. sought personal information from respondents which included; institution/organization name, position, gender, qualification, teaching and research experience. Section B contained 11 items specifically aimed at determining the appropriate work skills required by polytechnics students for effective job performance. While section C contained 15 items aimed at determining strategies to enhance effectiveness of industrial work experience to develop required work skills among polytechnic students. The EPSIWESQ was structured on a five point Likert scale.

Validation of the Instrument

In order to ensure the validity of the instrument, the questionnaire was subjected to face and content validity. This was done by ensuring that the entire questions covered the range of meanings included with the concept (content validity) and that the research instrument relates to statement of problems, research questions and hypotheses. Drafts copies of the questionnaire were given to three lecturers in the Department of Science and Technology Education, University of Lagos and a manager each from ITF Lagos and NESTLE food Agbara Ogun State. Expert's suggestions and recommendations were duly incorporated into the final draft of the EPSIWESIC. Cronbach Alpha value obtained for EPSIWESQ pilot study for Section B-ά =.88; Section C – ά = .82; and overall – ά =. 93.

Method of Data Analysis

Data were analyzed using descriptive and inferential statistics. The analysis was carried out using the Statistical Package for Social Sciences (SPSS) version 16.0. Raw data was first coded and fed into the SPSS program and mean, standard deviation and t-test statistics were specifically used to analyze the data. The cut-off point set for accepting or rejecting an item was set at 3.50. Hence, items with mean values of 3.50 and above were accepted while items below 3.50 were also rejected. The hypotheses were tested using t-test at .05% level of significance. Out of a total of 125 questionnaires that were packaged and distributed, only 115 of them were retrieved, making up a total of 92% retrieval rate.

Results

Table 1: Mean and SD of Managers/Employers and Lecturers on Work Skill Required by Students for Effective Job Performance (N= 115)

S/No	Item statements	Mean	SD
1	Facility to build positive working relationships that help everyone to achieve goals and business objectives	3.79	.69
2	Ability to show an understanding of what the organization wants to achieve through its products and services, and how it competes in its marketplace	3.84	.53
3	Capability to strike the balance of being confident in oneself and not arrogant, also have confidence in colleagues and the company worked for.	3.91	.73
4	Ability to show employers how to decide what is important to focus on and get done, and how to go about meeting deadlines	3.70	.94
5	Ability to take a logical and analytical approach to solving problems and resolving issues from different angles	3.80	.89
6	Ability to identify challenges and provide solution by contributing to the productive outcome	4.01	.89
7	Skilled in assigning and delegating responsibilities well, setting deadlines and leading by motivate teams and other colleagues that may work for them.	3.99	.44
8	Ability to develop employability skills such as problem solving, self-directed, entrepreneurial development and team work skills	3.80	.80

9	Ability to effectively handle new technologies devices and machines that are available in industries and commerce for maximum out put	3.81	.98
10	Skilled in recognizing operation and requirements of real-life business, thus leading to the development of professional ethics, social and cultural understanding	4.39	.73
11	Capability to carry out an independent and initiative demanding work.	3.80	.89

Table 1 shows the responses of polytechnic lecturers and personnel managers on work skills required by students for effective job performance through SIWES. Respondents agreed to all items as shown in Table 1. Items had mean values ranging from 3.70 to 4.39 respectively. Findings revealed that work skill required by students for effective job performance should focus on building positive working relationships; understanding of what the organization wants to achieve, identify challenges and provide solution, effectively handle new technologies devices and machines, as well as carry out an independent and initiative demanding work.

Table 2: Mean and SD of Managers/Employers and Lecturers on Strategies for Enhancing SIWES Performance towards Work Skill Development (N=115)

S/No	Item statements	Mean	SD
1	Polices, program and procedures of developing work skills should reflect culture and environment of students	4.76	.45
2	SIWES should collaborate and generate human resources needed to provide adequate pedagogical and infrastructural facilities to meet with the changing need of the skill personnel	4.37	.89
3	Occupation skill standard should be set by institutions and ITF to enhance growth in industry and skills in student	4.47	.63
4	Industry and commerce should be encourage to invest in skill acquisition training program for work skill development	4.52	.55
5	Aim of work experience should be made clear to employer and employees involved in skill development program	4.36	.81
6	Institutions and ITF should ensure that work conditions and the environment will not endanger learner's health, moral and family life	4.33	.85
7	Teachers and parents teaching student offering courses requiring work experience should be well informed of the nature and purpose of SIWES	4.56	.49
8	SIWES should help students in the keeping and management of records through completion of charts, rating forms, and other instruments necessary for work experience.	4.51	.50
9	Teaching of values should be emphasize and reinforced, if good behavior is reinforced and good role models are presented, work skill can be developed.	4.43	.72
10	Effective monitoring machinery should be put in place to check the activities of staff and students on SIWES by institutions and ITF	4.28	.69
11	Work skills should be developed using a democratic approach so that students' awareness of values, attitudes, and worker responsibilities is increased.	4.56	.73
12	ITF needs to provide a comprehensive and up to date directory of Employers who accept students for SIWES and reduce their tax.	4.58	.56

Table 2 shows respondents rating of strategies that can be adopted to enhance SIWES performance towards effective work skill development among polytechnics students. All the strategies listed had mean values ranging from 4.28 to 4.76 respectively; hence the items were remarked as agreed, since each mean value exceeded the cut-off value of 3.50. Findings revealed that respondents agree with all the strategies suggested by the researcherfor enhancing SIWES performance towards effective work skill development among polytechnics students which include; Polices, program and procedures of developing work skills should reflect culture and environment of students; aim of work experience should be made clear to employer and employees; teaching of values should be emphasize and reinforced and effective monitoring machinery should be put in place to check the activities of staff and students on SIWES by institutions and ITF.

Table 3: Mean and SD of Managers/Employers and Lecturers on Work Skill Required by Students for Effective Job Performance (N= 115)

S/No	Item statements	Lect. Mean	Lect. SD	Emp. Mean	Emp. SD
1	Facility to build positive working relationships that help everyone to achieve goals and business objectives	3.79	.69	4.14	.88
2	Ability to show an understanding of what the organization wants to achieve through its products and services, and how it competes in its marketplace	3.84	.53	3.81	.73
3	Capability to strike the balance of being confident in oneself and not arrogant, also have confidence in colleagues and the company worked for.	3.91	.73	4.20	.59
4	Ability to show employers how to decide what is important to focus on and get done, and how to go about meeting deadlines	3.70	.94	4.40	.72
5	Ability to take a logical and analytical approach to solving problems and resolving issues from different angles	3.80	.89	4.12	.80
6	Ability to identify challenges and provide solution by contributing to the productive outcome	4.01	.89	4.37	.65
7	Skilled in assigning and delegating responsibilities well, setting deadlines and leading by motivate teams and other colleagues that may work for them.	3.99	.44	4.00	.90
8	Ability to develop employability skills such as problem solving, self-directed, entrepreneurial development and team work skills	3.80	.80	4.02	.59
9	Ability to effectively handle new technologies devices and machines that are available in industries and commerce for maximum out put	3.81	.98	3.96	.92
10	Skilled in recognizing operation and requirements of real-life business, thus leading to the development of professional ethics, social and cultural understanding	4.39	.73	3.97	.95
11	Capability to carry out an independent and initiative demanding work.	3.80	.89	4.08	.75

Table 3 shows the mean ratings of each of the two sub-groups, polytechnics lecturers and employers on the variables of appropriate work skill required for effective job performance, using 3.50 as the baseline for agreement on work skill required. The intensity of the extent of appropriate work skill required on each variable can be seen from the mean ratings. From the mean responses it would be seen that the respondents agreed on all the items of appropriateness work skill. Similarly, the result of the hypothesis showed that there is no significant difference in the mean ratings of lecturers and employers on the appropriateness work skill.

Table 4: t-test results of Status Difference Work Skill Required for Effective Job Performance (N=115)

	Status	**N**	$\overline{X}$	***SD***	**t-cal.**	ρ
Work skills	Lecturer	87	4.43	.54	.693	.503
	Employer	28	4.28	.28		

Similarly, the result of the hypothesis one showed in Table 4 below indicate that there is no significant difference in the mean ratings of lecturers and employers/managers on the work skill required for effective job performance by polytechnics students. (t=.693, ρ>.05)

Table 5: t-test results of Status Difference on Strategies to enhance effectiveness of SIWES (N=115)

	Status	**N**	$\bar{X}$	***SD***	**t-cal.**	**ρ**
Strategies	Lecturer	87	4.39	.48	.258	.797
	Employer	28	4.20	.40		

Table 5, shows that lecturers had relatively higher mean scores than the employers on the strategies to enhance effectiveness of SIWES program to develop required work skills towards job performance. However, there were no statistically significant differences between lecturer' and employer' mean score on strategies (t=.258, ρ>.05). The implication is that lecturers and employers hold the same view on strategies to enhance effectiveness of SIWES program.

Table 6: t-test results of Gender Difference on Strategies to enhance effectiveness of SIWES (N=115)

	Status	**N**	$\bar{X}$	***SD***	**t-cal.**	**ρ**
Gender	Male	78	3.63	.50	.659	.512
	Female	37	3.57	.61		

As shows in Table 6, there were no statistically significant differences between male and female lecturers and employers on the strategies to enhance effectiveness of SIWES program to develop required work skills towards job performance. (t=.659, ρ>.05). The result shows that male and female lecturers and employers hold the same view on strategies to enhance effectiveness of SIWES program.

Discussion

The study sought to identify strategies for enhancing the performance of SIWES towards developing work skills among polytechnics students as well as to ascertain appropriate work skills required for effective job performance among polytechnic students. Based on the data collected and analyzed, findings indicate that polytechnics lecturers and employers of SIWES students recommend that appropriate work skills required should focus on; Building positive working relationships; having employability skills such as problem solving, self-directed, entrepreneurial development and team work skills. Furthermore, respondents agreed that work skill which include; identifying challenges and provide solution by contributing to the productive outcome; effectively handling of new technologies devices and machines and recognizing operation and requirements of real-life business should be the focus of SIWES to enhance job performance. Izueke & Nzekwe (2013) reported that one of the most important and an obvious goal of industrial work experience to the student is the acquisition of actual real world experience, and it gives a full and realistic view of workplace environment.

Hence, enhancing performance of SIWES is thus a necessary way of exposing students to industrial practical works and generating a pool of indigenous trained manpower sufficient to meet the needs of the Nigerian economy. To elucidate this Olabiyi (2004) in a survey carried out to determine relevance of SIWES to skill acquisition among technical college students in Lagos state reports that the SIWES helps the student to recognize the operation and requirements of real-life business, thus leading to the development of entrepreneurship, global outlook, professional ethics, social and cultural understanding. SIWES offers students the opportunity to acquire useful skills such as communication, problem solving, analytical, decision-making, leadership, team work, networking and interpersonal empathy, sensitivity and friendship (Awe, 2008).

Findings from the study also revealed some strategies that can be adopted in enhancing SIWES performance towards effective work skill development. Respondents agree that some of these strategies should include; Polices, program and procedures of developing work skills should reflect culture and environment of students; SIWES should collaborate and generate human resources needed; occupation skill standard should be set by institutions and ITF. Furthermore, respondents agreed that effective monitoring machinery should be put in place; teaching of values should be emphasize and reinforced and ITF needs to provide a comprehensive and up to date directory of employers who accept students for SIWES and reduce their tax and Institutions and ITF should ensure that work conditions and the environment will not endanger learner's health, moral and family life. The findings are congruent with Izueke & Nzekwe *(*2013) who recommend that greater and maximum cooperation between universities and industrial organizations in designing education curriculum and what students are taught in SIWES. Arukwe, (1990) and Olabiyi, (2013) suggested that employers, polytechnics and other vocational institutions should partner to develop employability content in higher education curriculum and provide life skills training for students during SIWES. SIWES should be adequately funded to ensure that every department participates (Awe, 2008)

The findings of the study revealed no significant difference between the lecturers and employers of SIWES students on work skill required for effective job performance. This would suggest that lecturers and employers have the same perception about the work skill required for effective job performance by polytechnics students. The finding is consistent with other studies who found no significant difference work skill required for effective job performance (Olabiyi, 2004; Chinedu & Olabiyi, 2015). The implication is that most of the graduates will be efficient in key employability skills such as problem solving, self-directed, entrepreneurial development and team work skills.

This study found no statistically significant differences between the lecturers and employers mean score on strategies that can be adopted in enhancing SIWES performance towards effective work skill development. This suggests that lecturers and employers of SIWES students were similar in the opinion on strategies that could use to enhance job performance of polytechnic students. The obvious implication of this is that the respondents aware that SIWES operation need effective strategies to enhance work skill. Finding support past research Okoro (2003); Okorie (2001) which suggested that effective monitoring machinery should be put in place to check the activities of staff and students on SIWES by institutions and ITF and work skills should be developed using a democratic approach so that students' awareness of values, attitudes, and worker responsibilities is increased, thereby, enhance student job performance. The result of the finding show that there were no significant difference between lecturers and employers of SIWES students and their gender on strategies that can be adopted in enhancing SIWES performance towards effective work skill development. This would suggest that male and female lecturers and employers have the same perception about suggested strategies. This finding is consistent with other studies which found no significant difference in strategies for improving SIWES performance (Kwasu, 2004; Olabiyi, 2004).

Conclusion

The study sought to identify strategies for enhancing the performance of SIWES towards developing work skills among polytechnics students. The finding suggests that SIWES should specifically focus on work skill development. Work skills are very essential for polytechnic and other TVET graduates asit enables them to be gainfully employed and productive, enabling them to become responsible citizens. The study also highlighted some strategies that can be adopted for enhancing SIWES performance. It is believed that if these strategies are duly adopted, it would ensure that SIWES helps students to develop practical skills to reflect upon in future studies. In the same vein gives the student opportunity to come in contact with professionals that he can rely upon in the development of his career.

Recommendations

The following recommendations are made based on the findings of this study;

1. Employers and TVET institutions should partner to develop employability content in higher education curriculum

and provide life skills training for students during SIWES

2. Effective monitoring machinery should be put in place to check the activities of staff and students on SIWES by institutions and
3. Administrators in TVET institutions should utilize SIWES to prepare youths to develop profitable social habits required by the society and basic computer literacy training program to enhance job performance.
4. Efforts should be made to strengthen the collaboration between industries, TVET institutions and TVET providers so as to enable that relevant content that meets labour needs are taught to participants of various TVET programs.

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DEVELOPMENT AND VALIDATION OF INSTRUMENT FOR ASSESSING PRACTICAL SKILLS IN METALWORK IN TECHNICAL COLLEGES FOR ENTREPRENEURSHIP DEVELOPMENT

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Abstract
Technical education as fancied by Federal government is education that provides students with sound technical knowledge and vocational skills needed for economic and manpower development. The government made all effort by financing technical education at craft level but the products lack vocational skills, competencies and learning experiences needed for entrepreneurship development. The practical skills embedded in Metalwork were not identified and assessed by instructors of technical colleges because most instructors are deficient in instrument development. On this precept, the development and validation of instrument for assessing practical skills in Metalwork in technical colleges is inevitably carried out. Two purposes, research questions were posed and one research hypothesis formulated. The study is an instrumentation design. The study was carried out in Enugu and Ebonyi States. The *population for the study was 113 final year students of mechanical technology. Factorial analysis was used to sieve out 309 test items out of 441 items used for data collection. The data was analyzed using factorial for validity of test items and Cronbach Alpha (∞) for reliability. The instrument indicated a high reliability coefficient of 0.91. The findings revealed that the test items were valuable, suitable and appropriate for assessing practical skills in metalwork. The instrument could inculcate vocational skills to metalwork students, enhance economic, manpower and entrepreneurship development to technical education graduates.*
Keywords*: Entrepreneurship, Entrepreneurship Development, Assessment, Technical College, Metalwork and Ability*

Introduction

Entrepreneurship is a global issue that cannot be neglected in the discourse of technological development and innovations of the economy. Entrepreneurship deals with the acquisition of skills, creativity and involves the process of exploring, setting up business enterprise or programme and nurturing it to success. According to Okoye-Nebo, Iloanya and Udenze (2014) entrepreneurship is posited as the process through which individuals identifies opportunities, allocate resources and create values. Similarly Onyencho and Ezeano (2011) stressed that entrepreneurship aims at skill acquisition, self-reliance and performs numerous functions through which individual discover new ways of using existing resources and materials to produce completely new or changed version of existing resources. Succinctly entrepreneurship embodies skill acquisition, creativity and ability to discover new things or ideas so as to create values from the existing resource or programme.

Entrepreneurship development is the development that accrued from the utilization of entrepreneurial skills on existing resources, programme and materials to produce or generate new products or services to suit existing market demands. In education sector particularly in technical colleges' entrepreneurship development is needed for the teaching and assessment of practical skills to meet the skill demand of industries. Assessment should entail more of the process than the product so as to observe students learn the procedural methods of accomplishing tasks.

Assessment of practical skills is concerned with teachers exposing students to practical tasks following a sequential procedure. According to Alonge (2004), assessment generally is the system of testing as well as measuring educational achievement on the basis of student's performance and produce feedback to them. Hence, in technical college, the testing for skills requires performance testing on the job but such emphasis is not anchor to, thus producing incompetent graduates. According to Uya (2014) most technical education graduates lack requisite skills, competence and entrepreneurial acumen owing to inadequate resources as well as lack of commitment on part of students. Highlighting the statement Ogbonna (2016) remarked that graduates un-skillfulness can be attributed to instructors' inability to identify the skills from the curriculum as well as scoring the skill needed. Okonjo-Iwuala (2013) further buttressed that incompetency among graduates is as result that higher institution of learning lack tools and machines to give students the skill employers need. As a result of these deficiencies, necessary skills needed for economic and manpower development was not imparted to technical college students.

Technical college is described as vocational institutions were vocational training are given to students to equip them with skills for entry into different occupations. According to Ogbonna (2016), technical college is an institution where students are trained in various occupations or trades to acquire saleable skill that will enable them to function better in life. Technical college trains students in various trades like building, woodwork, electrical, electronics, metalwork and automobile technology. The scope of this study is metalwork.

Metalwork is an aspect of mechanical trade that is concerned with activities like designing, processing and fabrication of metalwork products. Chapman (2007) defined metalwork as an area of study that involves activities like shaping and hammering of these metals into required shape according to need. The trade was designed to inculcate skill to these students but they lack these skills because there are insufficient tools and material provided for the programme couple with inability of instructors to identify the skills in the curriculum. To improve on these challenges there is need to provide necessary tool and materials as well as develop and validate instrument for teaching and assessing of practical skills in metalwork for entrepreneurship development. The skills identified in the instrument are taught and trial-tested to check whether the skills are relevant and valid to the subject matter content.

Validity can be described as the process that determines the extent to which a test measures what it supposed to measure. Akujo and George (2010) defined validity as the ability of an instrument to measure the subject matter content in relation to the instructional objectives. Validity measures such traits as skills, competencies, behavior and creativity exhibited in carrying out tasks. The developed instrument is trail-tested and field tested to verify whether the test items measures practical skills it intends to measure. If the test items in the instrument are employed in several testing and it produces a positive result by measuring the supposed trait, it is said to be reliable. The reliability of an instrument is ascribed as the instrument that measures the required amount skills acquired by students when exposed some demonstrations. Ofuebu and Izueke (2011) opined reliability as the ability of an instrument to measure consistently the phenomenon it is designed to measure. The instrument develop will be tested to assess the amount of skills acquired by students of different ability level, for instance high and low ability students.

The assessment of the high and low ability students is called ability testing. Ability is defined by Mac-Donald and Sampo (2002) as the characteristics of an examinee that the test measure in relation to knowledge and specific skills included in the content. In the same vein, Ogbonna (2016) defined ability as the skill a trainee has acquired in the course of demonstrating or performing practical activities involved in various tasks or a particular task. The ability level considered in the study is the high and low ability groups. The high ability group includes students that are brilliant or well knowledgeable while the low ability group depicts the dull or less knowledgeable students. The instrument should be able tooffer entrepreneurship development by identifying tasks, inculcating skills and competencies in metalwork to students through various training and workshop activities. By the use of the developed instrument the written test strategies used by instructors according to Peace and Walker (2006) in place of performance test method will be eliminated. It of this precept that there is need to develop and validate instrument for assessing practical skills in metalwork for entrepreneurship development

Statement of the Problem

Inculcation of practical skills in technical college plays a major role in the training of students. Unfortunately, most instructors according to Peace and Walker (2006) assess students with written test method only in place performance test method which is invalid and unreliable because the skills needed to be assessed in performing different tasks are not assessed. Consequently, Uya (2014) pointed out that most technical education graduates lack requisite skills, competence and entrepreneurial acumen as a result of inadequate resources (human) and material provided to school for the training. Also, Ogbonna (2016) remarked that lack of skills by graduates can be attributed to instructor's inability to identify tasks and skills embedded in the content as well as scoring the skills needed. These aforementioned deficiencies contributed to students' un-skillfulness and incompetence in various occupations or trade. Consequent upon these, there is need to develop and validate instrument that can guide instructors in identifying, teaching and assessing practical skills in metalwork so as to improve students skills, competence and knowledge in the subject matter and facilitate entrepreneurship development.

Purpose of the Study

The study was designed to develop and validate performance test assessment instrument for assessing practical skills in metalwork for entrepreneurial development. Specifically, the study seeks to:

1. determine the validity of the performance assessment instrument.
2. establish the reliability of the instrument.

Research Questions

Two research questions were developed for the study:

1. What is the validity of the test items in the performance assessment instrument developed?
2. What is the reliability of the performance test assessment instrument?

Hypothesis

A null hypothesis which was formulated and tested at 0.05 level of significance

1. There is no significant difference between the mean performance of student of high ability and those of low ability in practical skills in metalwork in technical college

Method

The study adopted instrumentation design. The study was carried out in Enugu and Ebonyi States. Four technical colleges were selected from both states. A population of 113 SSIII students of mechanical trades was used for the study. The population was manageable, thus, there was no sampling. The instrument for data collection was developed from National Board for Technical Education (NBTE) 2007 and course specification of Metalwork at NTC. level. Four hundred and forty one test items were initially generated, validated by three experts in Industrial Technical Education and two experts in Measurement and Evaluation Department, in University of Nigeria, Nsukka. The test items in the instrument were trial tested on eighteen students in each technical college in Enugu and Ebonyi states respectively and analyzed with factorial design to sieve out good test items. The reliability coefficient of the trial test was established using Cronbach Alpha formular which yielded a coefficient of 0.98.Three hundred and nine test item embedded in fifty eight practical tasks had a factor loading of above 0.35were sieve out for field testing. Table of specification was formulated using Padleford (1984) model of psychomotor domain. The test items was distributed into the six levels of Padelford, thus, Perception= 42 items, Motivation=43 item, Imitation=55item, Performing=98 items, Adopting = 34 items and Innovation=37 items. Each item in the instrument was assigned four response options; demonstration of any four tasks=4mks, demonstration of any three tasks=3mks, demonstration of any two tasks= 2mks and demonstration of any task=1mk. Two research assistants in each technical college rated students' performance as they carry out tasks from 1to 58tasks. Factorial analysis was employed to answer research question one, Cronbach Alpha was used to test for the reliability coefficient in research question two, the t-test statistics of no significant difference was used to test the hypothesis at 0.05 level of significance.

Results

The result of the study was obtained from the research questions and the hypothesis tested and is presented in Tables 1, 2 and 3.

Research Question 1

What is the validity of the test items in the performance assessment instrument developed?

Table 1

Summary of the Result Of Factorial Analysis According Tasks and Test Items

S/No	Tasks	No. of Test Items in Topics	Remarks
	Bench work		
1	Measuring task	4	Valid
2	Marking task	8	Valid
3	Cutting metal with hacksaw	5	Valid
4	Fixing blade to hacksaw	3	Valid
5	Cutting metal with power hacksaw	5	Valid
6	Bending tasks	5	Valid
7	Holding tasks	4	Valid
8	Striking tasks	2	Valid
	Total	36	
	Machining operation		
9	Center punch for drilling	3	Valid
10	Setting up drilling machine	2	Valid
11	Drilling hole in metal plate	3	Valid
12	Drilling hole in metal rod	6	Valid
13	Drilling a blind in hole in metal bar	6	Valid
14	Boring a metal bar	6	Valid
15	Counter bore in metal bar	3	Valid
16	Counter sink in a metal	5	Valid
17	Reaming hole in a metal	4	Valid
18	Tapping thread in a blind hole of metal rod	8	Valid
19	External threading of metal pipe	4	Valid
20	Joint preparation for riveting	7	Valid
21	Hand riveting tasks	4	Valid
22	Machine riveting tasks	4	Valid
	Grinding		
23	Mounting grinding wheel in machine spindle	2	Valid
24	Sharpening a cutting tool	4	Valid
25	Grinding twist drill point angle	2	Valid
26	Grinding flat drill point angle	5	Valid
27	Dressing and truing grinding wheel	3	Valid
28	Maintaining grinding wheel	3	Valid
	Lathe work		
29	Plain turning on metal bar	5	Valid
30	Plain turning on metal pipe	4	Valid
31	Step turning on metal rod	3	Valid
32	Chamfering the metal rod	4	Valid
33	Facing operation on metal rod	7	Valid
34	Facing operation on metal pipe	7	Valid
35	Knurling operation on metal pipe	5	Valid

36	Thread cutting on the lathe	3	Valid
37	Thread cutting on the bench	12	Valid
38	Die cutting on the bench	3	Valid
39	Testing holes and surfaces	5	Valid
40	Construction of hammer head	10	Valid
41	Construction of hammer handle	9	Valid
42	Assembling of hammer and polishing	5	Valid
	Total	166	
	Forging operation		
43	Forging using upset method	8	Valid
44	Forging using setting down method	6	Valid
45	Forging using scarf weld	5	Valid
46	Producing of chisel	6	Valid
	Total	25	
	Metal Joining operation		
47	Soldering operation	11	Valid
48	Brazing	8	Valid
49	Joint preparation and setting up of gas welding	7	Valid
50	Fusion welding operation	4	Valid
51	Arc welding operation	6	Valid
52	Production of square butt joint	8	Valid
	Total	49	
	Fitting operation		
53	Sawing a metal plate	3	Valid
54	Filing metal flat and square	9	Valid
55	Production of open- ended spanner	11	Valid
56	Scrapping operation	3	Valid
57	Making a vice clamp	5	Valid
58	Production of try square	6	Valid
	Total	38	

The whole instrument contained fifty eight practical tasks with corresponding three hundred and nine test items on areas of bench work, machining, forging, metal joining and fitting operations. These test items scored 0.35 and above factor loading according to Merridith (1967) which are considered valid.

Out of three hundred and nine test items, bench work had 8 practical tasks with corresponding 36 test items, machining had 34 practical tasks with corresponding 166 test items, forging had 4 practical tasks with corresponding 11 test items, metal joining had 6 practical tasks with 49 test items and fitting had 6 practical tasks with corresponding 38 test items. These indicated that the above practical tasks and skill test items are valid and suitable for assessing practical skills in Metalwork at N.T.C. level.

Table 2
Reliability Coefficient of the Instrument and the Clusters using Cronbach Alpa Statistics

S/No	Clusters	No. of Tasks	Reliability Coefficient	Remark s
1	Bench work	8	0.77	High coefficient
2	Machining	34	0.84	Very high coefficient
3	Forging	4	0.54	Moderate coefficient
4	Metal joining	6	0.48	Just average coefficient
5	Fitting	6	0.66	Moderate coefficient

Total	58

The reliability coefficient of the performance assessment instrument used for assessing practical skills of N.T.C. students in Metalwork on areas of bench work, machining, forging, metal joining and fitting operations are summarized in table 2 above. The computation of the reliability coefficient of the entire instrument after field testing was 0.91. While the reliability of the cluster are: bench work operation=0.77, machining operation =0.84, forging operation= 0.54, metal joining operation=0.48 and fitting operation=o.64.he values indicated high measure of consistency of scores in various tasks and skills. The coefficient of concordance of the entire instrument using Kendalls W test which resulted to 0.66.That showed that there was high agreement of relationship between assessors of the instrument.

Table 3

Hypothesis t-test Computation

Group Statistics

Pretest	N	Mean	Std. Deviation	Std. Error Mean
>= 54.00	58	74.6419	13.44059	1.76484
< 54.00	55	72.0680	10.50945	1.41709

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
posttest	Equal variances assumed	.185	.668	1.130	111	.261	2.57390	2.27803	-1.94017	7.08796
	Equal variances not assumed			1.137	107.170	.258	2.57390	2.26336	-1.91287	7.06066

From the data analysis of the t-test statistics, it revealed that the performance assessment instrument developed discriminated significantly between the performance of students of high ability group and those of low ability group. The t-test calculated is 1.130 and t-tabulated is 0.185. This depicts that the calculated t-test value was more than the critical value of (t) for the entire instrument at 0.95 level of significance. Hence, the null hypothesis (Ho) was rejected and the alternative hypothesis (H_A) upheld. Therefore, students of high ability group performed significantly better than students of low ability group.

Discussion

Out of the practical skill test items generated, four hundred and forty one test items were selected, reworded, modified and used for pilot testing. The instrument was pilot tested and the scores obtained were further subjected to factorial analysis using principal component martrix and varimax rotation. 309 test items were found ideal, valuable, and suitable and were used for data collection. According to Uzoagulu (2007), items that satisfies all psychometric properties are adequate for selection. Also Arwokeni (2007), remarked that factorial analysis is used in analyzing construct validation by extracting as many significant factors from the score data as possible. For the fact that ability level was measured, factorial analysis becomes relevant. The test items having 0.35 and above were considered important factors and those below were rejected. The reliability coefficient for pilot and field testing were 0.98 and 0.91 respectively. The scores were also subjected to analysis using Kendall (w) coefficient of concordance which had a coefficient of 0.66 for the entire items. That implied that there was a good relationship between assessors both in pilot and field testing. In line with the findings of reliability of the clusters Hopkins (1981) noted that it is worthy and encouraging to have substantial reliability in skill assessment with low internal consistency of subsection than the reverse. The t-test calculated is greater than t-test tabulated. On this note the instrument is considered suitable for measuring practical skills in Metalwork.

Conclusion

Based on the analysis of the findings, the instrument developed for assessing practical skills in Metalwork in Technical Colleges possess high validity and reliability. The instrument indicated above average agreement between assessors in the ranking of scores given to students based on the criteria of measurement. The instrument discriminated between the mean performance of students of high ability group and those of low ability group in Metalwork. The test items in the instrument were satisfactory in terms of item difficulties and discrimination capacities.

Recommendations

The researcher recommends that the practical test items of the instrument is item oriented so as to obtain estimate of item parameter and students ability level since the test items were pilot tested, the scores subjected to factorial analysis to sieve out items that met the recommendation of Merridith (1967) on factor analysis. The test items were further subjected to field testing to satisfy all psychometric properties required of instrument development. Hence, the researcher recommends that the test items are valuable, appropriate and can be used to measure practical skills in Metalwork at N.T.C.

In addition, the test items require facilities in area of machining to ensure the implementation of Metalwork content. Okoro (2002) remarked that the major problem of developing technical education in Nigeria is inadequate training facilities, government grant and personnel. To curb these problems, the National Board for Technical Education, both at the federal and state levels should provide schools with modern facilities and resources for the implementation of the programme to enhance entrepreneur development.

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BLENDED INSTRUCTION SKILLS NEEDS OF FABRICATION AND WELDING CRAFT PRACTICE TEACHERS IN TECHNICAL COLLEGES FOR EFFECTIVE TEACHING IN LAGOS AND OGUN STATES

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Abstract

The study determined the blended instruction skills needs of fabrication and welding craft practice teachers in technical colleges for effective teaching in Lagos and Ogun States. *Three research questions guided the study. A descriptive survey design was employed. The population for the study consisted of 56 Fabrication and Welding craft teachers. No sampling was made because of the relative small size of the population. Instrument for data collection was structured questionnaire. The instrument was validated by three experts. The internal consistency of the questionnaire items was determined by using Cronbach alpha reliability method and 0.83 reliability coefficient was obtained. Data were analyzed using mean and standard deviation. The findings of the study revealed that respondents agreed that Fabrication and Welding craft teachers needed 15 modern fabrication and welding skills, 25 pedagogical skills for more effective training of students. The study also identified 16 strategies for acquiring the required skills for blended instruction in technical colleges for effective teaching in Lagos and Ogun States. It was recommended that blending of instructional techniques should be adopted to make instructions.*

Keywords: Blended Instruction, Fabrication and Welding, Effective teaching, Revamping depressed economy.

Introduction

Blended Instruction is one of the various methods used to deliver meaningful learning experiences. It is a result of the advancements in communication and network technologies. Blended instruction refers to the mixture of different delivery methods and learning strategies that will optimize the learning experience of the user, in which classroom training sessions, Computer Based Training (CBT) and Web Based Training (WBT) can be combined as a way to train the learners. Blended instruction is a method for organizing the learning environment; facilitated by effective combination of different modes of delivery, models of teaching and styles of learning (Signh & Reed cited in Sahin, 2010 and Heinze & Procter, 2006).Driscoll (2010) and Dziuban, Hartman & Maskal, (2005) viewed blended instruction as a pedagogical approach that combines the effectiveness and socialization opportunities of the classroom with the technologically enhanced active learning possibilities of the online environment. Amadi, Chiorlu and Obed (2016) classified teaching facilities/resources as any item, which aids, stimulate and motivate the learner as well as simplified the processes of classroom teaching. Osinem (2008) further classifies facilities/resources into two, human and material resources. Human resources according to Osinem (2008) are those personnel who aid or assist in imparting knowledge and skill to the learners. While material resources are those that help the teacher to take the world into the classroom, thus making remote an abstract idea concrete and immediate to the experience of the students. Learning is made more interactive and significant when students are provided with a set of tools and resources, particularly when it takes place in a more dynamic environment like that of blended instruction. Woodal (2010) stated that its goal is to empower the individual to achieve understanding of a given topic, improve job performance skills and derive results that support employment. Baffa (2012) posited that domains in blended instructions consist of instructor-led classroom, workshops/laboratory activities, coaching/mentoring and on-the-job training (OJT). Instructors may also use live face-to-face classrooms (informal), where students actually have control of their learning experiences and freedom to interact with peers without the instructor looming overhead.

Fabrication and Welding Craft (FWC) practice is one of the available options under mechanical trades at craft level and an integral part of Technical and Vocational Education and training (TVET).The National Policy of Education (2013) defined Technical and Vocational Education and Training as a comprehensive term referring to those aspects of the education process involving in addition to general education, the study of technologies and related sciences and the acquisition of practical skill , attitudes, understanding and knowledge relating to occupations in various sectors of economy and social life. Fabrication and Welding Craft practice is one of the various crafts specified to be offered under mechanical trade in Technical Colleges (TC) and Vocational Enterprise Institutions (VEIs) (NBTE 2016). Fabrication and Welding Craft practice like other occupations in TVET comprises of a blend of both theory and practical that will equip the learner to possess necessary skills and knowledge sufficient to design and construct various equipment, objects, tools, machineries that may involved soldering, riveting, welding, heat treatment, casting, forging etc.

Fabrication and Welding Craft practice is a 3-year vocational training course offered in a Technical College (TC) or at Vocational Enterprise Institutions (VEIs) to qualify trainee for the award of National Technical Certificate (NTC) or National Vocational Certificate (NVC) respectively. The NTC and NVC certificates are recognized by National Board for Technical Education, NBTE. The minimum standards for the two programs in terms of curriculum and modules specifications are determined by the NBTE. According to the NBTE, the Curriculum for the NTC programs in Technical College for Fabrication and Welding Craft is broadly divided into three components: general education, which accounts for 30% of the total hours required for the program, trade theory, trade practice and related studies which account for 65% and supervised industrial training/work experience, which accounts for about 5% of the total hours required for the program. This component of the course which may be taken in industry or in college production unit is compulsory for the full-time students.

The curriculum for the program in Vocational Enterprise Institutions (NVC) in Fabrication and Welding Craft is in flexible modular form and is structured to have three parts (i.e. NVC Part I, NVC Part II, and NVC Final) each taken in a span of one year. According to the policy document, each part contains a cogent and flexible structure and content that would allow the trainee a practical working skill unit and the possibility to exit at that level. Each part incorporates six months. The NBTE listed six options under mechanical trades, these are: fabrication and welding craft, foundry craft, marine engineering, mechanical engineering craft practice, plumbing and pipe fitting, refrigeration and air conditioning work. Oranu, (2003) described mechanical / metalwork trade generally as all encompassing trade that involves activities in occupations that entail designing, processing and fabrication of metal products; it includes activities in foundry, forging, machine shop and welding. Onwuchekwa (2012) posited that metalwork trades are one of the oldest trades to be learnt by man and that working on metals for the production of various articles of importance to man is as old as man himself. Onwuchekwa described metalworkers to include welders, panel beaters, fitters, machinists among others. Fabrication and welding craft includes all metalwork activities such as: sheet metal work, gas welding, metal arc welding, and structural steelwork to mention but few. The goals of Technical and Vocational Education and Training as stated in the National Policy on Education, (NPE, 2013) are to: provide manpower in applied sciences, technology and business particularly at craft, advance craft and technical levels; provide the technical knowledge and vocational skills necessary for agricultural, commercial and economic development; and give training and impart the necessary skills to individual for self-reliance economically.

Efforts of government on skills acquisition led to the establishment of institutions at all levels of educational system for the production of craftsmen, technicians and other skilled personnel who will be enterprising and self-reliant (Ogbu, 2007). Technical College is an institution for further education that provides courses in technology, art, science, crafts and advanced crafts. It is education for work which prepares an individual to be gainfully employed (Amadi, Chiorlu and Obed, 2016). Lagos and Ogun States are the two states in the south west where we have largest concentration of industries as well as highest number of government owned technical colleges.

Skill is that ability a person possesses to perform a given task expertly. According to Hull in Mamman (2009), skill is a manual dexterity acquired through repetitive performance of an operation. Abdullahi (2010) opined that skill is the capability of accomplishing a job with precision of certainty, practical knowledge in combination with ability, cleverness and expertness. Ohia (2012) defined skill as that expertness, practiced ability or proficiency displayed in the performance of a task. Nigeria economy is no doubt in a state of distress presently, one of the solutions to address the depressed economy is to choose the option to give training and impart the necessary skills to individual for self-reliance economically' which is one of the goals of the TVET as stated in the NPE. This and other lofty goals to achieve a vibrant economy for our nation can be achieved when teachers in the technical colleges acquire the skills needed to blend the traditional methods of teaching with different delivery methods and learning strategies that will optimize the learning experience of the user, in which classroom training sessions, Computer Based Training (CBT) and Web Based Training (WBT) can be combined as a way to train the learners.

Statement of the Problem

In recent years, the knowledge being impacted by Fabrication and Welding craft teachers unto trainees in Technical Colleges has been criticized as being outdated and ineffective. Technological advancement of the present time has gone beyond the use of mechanical / automated machines as majority of our industries today have gone digital. For any technical college graduate to be gainfully employed and make meaningful impact in this present day economy, such graduate has to been in tune with the 'state of the art' technologically. The instructional techniques in fabrication and welding craft in the technical colleges must be in conformity with the world's transformation from crude technology to modern technology. Some of the known techniques in fabrication and welding are outdated and no more in use especially in advanced countries. New techniques of gas welding, metal arc-welding, heat treatment of metal have been developed for efficiency and high degree of precision. Unfortunately, as observed by Amadi, Chiorlu and Obed (2016) Metalwork students upon graduation from technical colleges are presently finding it hard toperform effectively in industries using modern equipment like the computer numerical control (CNC) machines. Shittu (2013), Atsumbe, Okoro and Ogwo (2012) also assert that products of technical colleges are found to possess less than satisfactory levels of employability skills. However, if fabrication and welding teachers in technical colleges adopt blended instruction for teaching the students, the hope of the technical college graduates of securing employment or becoming self-reliant or advancing in their academic pursuit will be very high.

Research Questions

The following research questions guided the study:

1. What are the modern fabrication and welding craft (FWC) practice skills needed to be blended by (FWC) practice teachers in technical colleges for effective teaching in Lagos and Ogun States?
2. What are the pedagogical skills needed to be blended by (FWC) practice teachers in technical colleges for effective teaching in Lagos and Ogun States?
3. What are the strategies for acquiring the required skills by (FWC) practice teachers in technical colleges for effective teaching in Lagos and Ogun States?

Method

This study was conducted using descriptive survey design. A survey research design is one, which involves the assessment of opinion using collection of detailed descriptions of existing phenomenon with the intent of using the data to justify current conditions and practices or to make better plans for improving phenomenon (Shittu, 2009). The study was conducted in all technical colleges and Federal science and technical colleges offering fabrication and welding craft practice in Lagos and Ogun States. The population for the study comprised all the fabrication and welding workers / teachers in technical colleges in Lagos and Ogun States. Data made available from Lagos State ministry of Science and Technology, Ogun State Ministry of Education, Science and Technology as well as Federal Ministry of Education and Youth Development showed that there were 56 teachers of fabrication and welding craft practice in the 16 technical colleges in the two states. No sampling was done since the population was manageable in size.

The instrument used for data collection was a well structured questionnaire items. The questionnaire was developed after a review of available literature on fabrication and welding craft practice. The instrument was face-validated by three lecturers in the Department of Science and Technology Education, University of Lagos, Akoka. The reliability of the instrument was established using Cronbach Alpha Reliability technique. The reliability coefficient was found to be 0.97. The data collected from the questionnaire were analyzed using mean and standard deviation to answer each of the three research questions developed for the study. The t-test was used to test the null hypothesis at probability of 0.05 level of significance.

Results

Table 1

Mean and Standard Deviation of Response Scores of fabrication and craft practice teachers on modern fabrication and welding craft (FWC) skills needed to be blended in technical colleges for effective teaching in Lagos and Ogun States **N = 56**

S/N	Item statements	$\bar{x}$	SD	Decision
	Modern fabrication and welding craft practice Skills			
1.	Read and transfer measurements from digital measuring instruments onto sheet metal correctly	4.60	0.50	Needed
2.	Read and interpret measurement correctly using digital thickness-gauge when measuring the thickness of sheet metal for a specific job	4.79	0.42	Needed
3.	Operate a digitally controlled power hacksaw for cutting structural steels and beams	4.45	0.71	Needed
4.	Operate a digitally controlled power guillotine for cutting sheet metal	4.40	0.67	Needed
5.	Operate a digitally controlled power press for bending sheet metal	4.79	0.42	Needed
6.	Operate a digitally controlled drilling machine for drilling holes on sheet metal	4.60	0.50	Needed
7.	Operate a digitally controlled folding machine for folding sheet metal	4.69	0.47	Needed
8.	Operate a digitally controlled angle-grinder for smoothening a welded surface	4.69	0.70	Needed
10.	Operate a digitally controlled Oxy-acetylene welding apparatus for gas welding operation	4.45	0.67	Needed
11.	Operate a digitally controlled electric arc-welding apparatus	4.38	0.66	Needed
12.	Draw and develop patterns for various sheet metal shapes using Auto-CAD	4.38	0.66	Needed
13.	Operate a digitally controlled Oxy-acetylene welding apparatus for gas welding operation	4.79	0.42	Needed
14.	Operate a digitally controlled Smith forge	4.79	0.42	Needed

15.	Operate a digitally controlled circular cutter	4.91	0.30	Needed

Data in Table 1 revealed that fabrication and welding craft practice teachers needed all the items listed as modern fabrication and welding craft practice skills needs are needed by FWC practice teachers in technical colleges in Lagos and Ogun States for effective teaching with mean ranges from 4.38 to 4.91.

Table 2

Mean and Standard Deviation of Response Scores of fabrication and craft practice teachers on modern fabrication and welding craft (FWC) skills needed for blended instruction in technical colleges for effective teaching in Lagos and Ogun States

N = 56

S/N	Item Statements	$\bar{x}$	SD	Decision
A	**Pedagogical Skills on Instructional Planning**			
1.	Examine the curriculum of the training program module	4.60	0.50	Needed
2.	Establish objectives of instruction	4.79	0.42	Needed
3	Determine content of instruction from a module unit	4.60	0.50	Needed
4.	Specify instructional concepts in a learnable unit during the laboratory or classroom practice	4.45	0.71	Needed
5.	Arrange selected instructional contents in order of presentation	4.40	0.67	Needed
6.	Identify and select relevant instructional materials for instruction	4.79	0.42	Needed
7.	Select and adopt relevant methods for content delivery	4.60	0.50	Needed
8.	Identify appropriate and adequate learning experience for instruction	4.69	0.47	Needed
9.	Select and emphasize appropriate technique for instructional delivery	4.69	0.70	Needed
10.	Identify and select appropriate instructional evaluation technique to be used	4.45	0.67	Needed
B	**Pedagogical Skills on Instructional Implementation**			
11.	Select and use relevant instructional method to link the previous experience with the new learning	4.38	0.66	Needed
12.	Present selected objectives of the instruction	4.79	0.42	Needed
13.	Present selected content and arrange its delivery in sequential order	4.79	0.42	Needed
14.	Use appropriate questioning techniques to determine students entry behavior	4.91	0.30	Needed
15.	Present selected learning materials at the appropriate time	4.38	0.66	Needed
16.	Introduce learner's instructional activities at the appropriate time	4.45	0.67	Needed
17.	Identify learner's errors in the laboratory or classroom work practices	4.38	0.66	Needed
18.	Adopt appropriate instructional assessment technique to be used Correct identified learner's errors	4.60	0.50	Needed
19.	Adjust and control instructional strategies in response to learners' feedback	4.79	0.42	Needed
20	Re-visit the instructional strategies in-line with the obtained feedback	4.60	0.50	Needed
C	**Pedagogical Skills on Instructional Evaluation**			
21	Select the evaluation to be used	4.36	0.45	Needed
22	Develop the evaluation strategies to be used	4.45	0.67	Needed
23	Specify the instructional objectives to be evaluated	4.38	0.66	Needed
24	Administer the technique (test or task)	4.45	0.67	Needed
25	Observe and supervise the learners performing the test or task	4.60	0.50	Needed

The analysis in Table 2 indicates that fabrication and welding craft practice teachers needed all the 25 items listed on pedagogical skills for blended instruction in technical colleges in Lagos and Ogun States for effective teaching with mean ranges from 4.38 to 4.91

Table 3
Mean and Standard Deviation of Response Scores of fabrication and craft practice teachers on the Strategies for acquiring the Required skills for blended instruction in technical colleges for effective teaching in Lagos and Ogun States **N = 56**

S/N	Item statements	$\bar{x}$	SD	Decision
1.	Accessing operational details of digitalized fabrication and welding equipment via Information and Communication Technology (ICT)	4.40	0.67	Needed
2.	Work-based learning in the form of On-the job training	4.60	0.50	Needed
3.	Through industrial visits	4.79	0.42	Needed
4.	Interaction with other professional colleagues on use of digitalized Equipment	4.45	0.71	Needed
5.	Off-the-job training in which extensive practical equipment / new skills are acquired	3.00	1.40	N/Needed
6.	Consultation with external experts on the same field	4.79	0.42	Needed
7.	Exhibition of new technologies on digitalized equipment	4.60	0.50	Needed
8.	Workshop training on strategies for mastering use of modern digital equipment	4.69	0.47	Needed
9.	Seminars on strategies for new skill on digital fabrication and welding equipment	4.69	0.70	Needed
10.	Team-working on strategy can foster efficiency, proficiency, and making skill natural to teachers	4.45	0.67	Needed
11.	Understanding general digital equipment working principles	4.38	0.66	Needed
12.	Supervising students placement in the world of fabrication and welding with in-house personnel	4.38	0.66	Needed
13.	Supervising relevant skill tasks	4.79	0.42	Needed
14.	Understanding information search and use of libraries, references, journals and manufactures' technical manuals	4.79	0.42	Needed
15.	Undertaking sabbaticals	3.01	1.30	N/Needed
16.	Engagement in laboratory practical project session	4.45	0.67	Needed

Data in Table 3 show that the respondents agreed on 14 items but disagree on two items, 5 - Off-the-job training in which extensive practical equipment / new skills are acquired and 15 – undertaking sabbaticals with mean 3.00 and 3.01 respectively.

Discussion

The findings of research question 3 as revealed in table 3 showed that, the respondents from the technical colleges in both Lagos and Ogun States disagreed with undertaking Off-the-job training in which extensive practical equipment where new skills may be acquired and undertaking sabbaticals as strategies for achieving blended instructions in technical colleges in the two states. Their disagreement on the two items might be traced to the fear of conceding their commitment to their dependants to go on off-the-job training and sabbaticals. Secondly they might be considering their supplementary means of surviving that could be jeopardized. The two factors might hamper their decision to go on off-the-job training or sabbaticals. 14 strategies among which include industrial visits, on-the-job learning, consulting with external experts were agreed with as means or avenue through which blended instructional skills can be acquired. This is in line with assertion of some authors like Driscoll (2010), (Signh & Reed cited in Sahin, 2010), Amadi, Chiorlu and Obed (2016) among others that different ways in which the skills are acquired in all cases involve those strategies that were agreed with by the respondents in the technical colleges in Lagos and Ogun States.

Conclusion

Based on the findings of this study, the following conclusions were drawn: Fabrication and Welding Craft practice teachers background lack quality in terms of bended instructional skills required of them that were not sufficiently possessed. This in turn leads to shallow and manual skills with which they trained students. This paper recommends that there is need for students to be able to assess larger networks and work on digitally controlled equipment available for modern fabrication and welding activities, identify and use more sophisticated metal finishing and heat treatment gadgets. Operate digital annealing, tempering, normalizing and hardening equipment. Make use of digital seamless and digital spot welding machines to mention but few. To enable the teachers teach more effectively and for addressing the depressed economy, there is urgent need to examine the curriculum of the training program modules, to establish objective of instruction, select and use of relevant of relevant instructional method to linking the previous experience (old technology skill) with (new technology skill), assess learner's performance and also provide justified feedback to learners on their performance in the test/task.

Recommendations

The following are the recommendations made based on the findings of the study:

1. Technical teachers like whoever ought to teach technical subject like fabrication and welding craft in any of the technical colleges should undergo intensive training under craftsmen in technical education studies up to Bachelor of Education Degree (B.Ed) from a reputable and recognized university.
2. Extensive training should be organized for fabrication and welding craft practice teachers in the technical colleges in the two states to keep them abreast with the contemporary practices and update their skills in fabrication and welding craft practice.
3. The government of Lagos and Ogun States should encourage fabrication and welding teachers by giving them incentives and financial support to go on re-training courses or programs.
4. The management of fabrication and welding and allied industries and in-house personnel should be co-opted to consolidate teachers teaching with actual work experience.

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ADULT FARMERS' TRAINING NEEDS FOR IMPROVING CASSAVA FLOUR PROCESSING AND PACKAGING IN IMO STATE

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Abstract

This study determined the adult farmers' training needs for improving cassava flour processing and packaging in Imo State. Two research questions guided the study while two null hypotheses formulated were tested at 0.05 level of significance. A descriptive survey design was adopted for the study. The population for the study was 2,232 which consisted 2,202 registered adult farmers and 30 extension officers from the State. There was no sampling because of the manageable size of the population. The instrument for data collection tagged Adult Farmers' Training Needs for Improving Cassava Flour Processing and Packaging Questionnaire was developed by the researchers and used to collect data for the study. Three experts validated the instrument. A reliability co-efficient of 0.86 was established using Cronbach Alpha reliability method. Research questions were answered using mean and the null hypotheses were tested using t-test at .05 level of significance. The findings from the study revealed that there is significant mean difference between the responses of extension officers and adult farmers in the training needs for improving flour processing and packaging. Based on the findings of the study, it was recommended among others by the researchers that the findings of the study should be packaged into a training programme and used to train adult farmers on cassava processing and packaging by the state and local governments.

Keywords: cassava flour, adult farmers, training needs, processing and packaging.

Introduction

Cassava is an important food crop in Nigeria in general and in Imo state in particular. As a food crop, it plays a vital role in the food security of the world because of its capacity of yields under marginal soil condition and its tolerance to drought. Cassava provides a major source of household income; often for women and the very poor through its production, marketing and processing (FAO, 2007). Cassava products are major sources of dietary fibres and so have some laxative effect, thereby protecting the lower sections of the gastrointestinal tract against cancer of the colon and rectum (Saani, Oguntona and Naaziya-Dixon, 2010).

New economic partnership for African Development (NEPAD, 2004) has identified cassava as poverty-alleviation crop and has developed a market-oriented strategy for the sub-sector, based on the global cassava development strategy (GCDS). This choice is partly due to the recognized importance of the crop as a famine reserve crop, its production being relatively simple, demanding low agronomic inputs with little or no fertilization. Other advantages of the crop include efficiency in calorie production compared to other crops. According to Katz and Weaver (2003), cassava tubers are cooked in various ways in order to turn them to food. The soft boiled tubers have a good flavor and can replace boiled potatoes in many ways. Cassava flour can as well be used in place of wheat flour. Cassava in Nigeria and Imo state in particular is currently used for two main purposes; 90% as human food and only 5 – 10% as secondary industrial material. About 10% of Nigeria's industrial demand consists of improved quality cassava flour used in biscuit and confectionaries production (FAO, 2007). Imo State Agricultural Development Programme (IMADP) (2011) observed that 90% of cassava processors in Imo state concentrate on processing of cassava into fufu and garri only, other processing options such as flour and starch are not given attention. In Imo State, cassava is traditionally processed before consumption into garri (roasted fermented granules), fufu (dried fermented starch flour), lafun (dried fermented flour), tapioca (unfermented roasted granules from starch) and pupuru (smoked dried fermented balls). Processing of cassava is at substantial level. This is because the processors do not have relevant skills and facilities and as such, the processors use crude methods and facilities such as one or two heap fermentation followed by pounding and drying of their products (IITA, 1993).

Cassava flour processing is a means of treating cassava raw tubers in order to change and preserve them into powder. This adds value to the product and extends the shelf-life. Cassava tubers deteriorate within three to four days after harvesting and thus are either consumed immediately or processed into different forms with better storage qualities. The bulkiness and high perishability of harvested cassava roots make immediate processing of roots necessary. IITA (2004) observed that there are a lot of deficiencies in preparing unfermented and fermented cassava flour using traditional methods. These deficiencies are as follows. It was observed that: although drying the chunks or the whole tubers usually results in their outer surface being sufficiently dry, the moisture level inside the chunks of tubers is still considerably higher than the safe value, the process is quite unhygienic; spreading the products on the ground makes it vulnerable to contamination to foreign bodies or dust and drying causes a major bottleneck in flour production, particularly during the rainy season when the product can become mouldy and lose quality.

Compared to the traditional methods used in Imo State, the improved method for processing cassava increases productivity and improves quality and storability of cassava products. It also enhances the potential for cassava growers in Nigeria in general and Imo state in particular to develop non-traditional cassava products. IITA (2004) identified the objectives of improved cassava processing as: to reduce the drudgery and labour intensiveness of traditional cassava processing methods and thus increasing productivity; to produce an end product of better and more uniform quality; to ensure the reduction of total elimination of undesirable toxic constituents in cassava so that it is suitable for human consumption; to promote the establishment of economically viable small- and medium-scale cassava-based industries and create new opportunities for employment in rural areas; to reduce the amount of fuel used for drying cassava by introducing fuel-efficient devices and techniques; to promote the export potential of cassava products.

Cassava flour can be prepared in a manner which makes it suitable for use as an important confectionary and bakery ingredient (that is, as unfermented, well processed flour referred to technically as improved quality cassava flour). In this form, it can be used in place of wheat flour in many industrial applications (Azuogu, Adeye, Lomo and Achem, 2010). Improved quality cassava flour is an unfermented smooth odourless, white or creamy flour, blend with no gluten. With the increase availability of improved processing methods, technologies for processing cassava into quality fermented flour are now more accessible. These technologies can be used to produce partial/whole substitute for wheat flour from 5 – 100% in bakery and confectionary products such as bread, cake, biscuit, meat pie, sausage rolls, doughnuts, chin-chin, etc. some of these snacks have neither noticeable change in texture, flavor, aroma nor colour (Sanni, Oguntona and Naaziya-Dixion, 2010).

Flour has potential in many developing countries, particularly in Nigeria where there is a large consumption of bread made from 100% imported wheat (Onabulu, 2009). The degree of replacement can lead to different grades of breads and pastry products and prices for the consumer. Nigeria imports over one million tonnes of wheat annually. At 10% substitution of cassava flour in wheat flour and with the current national demand, more than 300,120,000 metric tonnes of improved cassava flour is required. This highlights the need for adult farmers skills in processing high quality cassava flour in Imo State. The steps or procedures for processing improved quality cassava flour according to IITA (2004) and Onabulu (2009) include: healthy and fresh cassava tubers harvested 10 – 12 months after planting should be processed within 12 hours after harvesting. This helps to improve yields and meet industrial standards for fibre and starch. Farmers, processors, and marketers should stick to a particular product. The use of mix varieties should be avoided. This helps to improve yields and meet with industrial standards for fibre and starch; healthy tubers should be stored from the lot for processing and peeling with knives or mechanical peeler to remove woody tips. The rind should be completely removed to ensure low fibre and white colour of the finished product; Cassava tubers should be washed in clean water and grate to obtain uniformly smooth mash. If the mash is not uniform, grate again until smooth mash is obtained; Load the mash into sacks and press to remove moisture as possible. According to IITA (2004), pressing should be done immediately after grating to avoid the onset of fermentation. Sacks should be double to avoid bursting and the pressing time depends on the efficiency of the press and moisture contents of the mash. Different types of pressers with various capacities are currently used. Good drainage system is required for safe disposal of the effluent to avoid environmental pollution and public health hazards; cake breaking/sifting or sieving is done by sifting with non-rusting sifter into clean basin. It can also be done by placing the pressed cake into the grater and disintegrate for drying using sifter made of stainless steel material; chipping/slicing activity follows using the unit operation for only low cyanide cassava varieties. Manual or motorized slicer or chipper should be used. Cassava tubers should be thinly sliced, if manual chipper is to be used to facilitate the drying process. The process is simple with the advantage of yielding a product with slightly higher starch content but comprises other quality requirements like colour, odour and taste to a large extent. If drying is not done rapidly, this process should not however be used for cassava with high cyanide content (more than 100kg/kg HCNsq) because the process does not afford sufficient contact between endogenous enzymes (Linamarase) and cyanogens for effective detoxification of the product; sifted cake should be dried in a dryer to reduce moisture level to acceptable level according to national regulatory standards. Sun drying is done by the use of mechanical or solar dryer to reduce the moisture. Black polythene sheets are used to spread clumps or mash on elevated platforms to facilitate drying by absorption or solar heat and the elevated platforms prevents dust and other dirt from contaminating the drying product. Drying should be done rapidly to prevent fermentation which would impart unacceptable flavor to the pastries (Codex Standard, 1985); milling is done to obtain fine textured flour using hammer mill or disc attraction mill after which packaging of the product is done.

Cassava flour packaging refers to the manner of presentation of cassava flour for sale and the correct environmental condition for flour during the length of time for storage and/or distribution to consumers. Proper packaging adds value to the products. The use of inferior materials in packaging of cassava offers little in the way of barrier properties needed for a long shelf life which may lead to wastage (Practical Action on Technical Brief, PATB, 2010). Improved packaging innovation presentation can make cassava flour attractive to consumers. More recently, the traditional use of cassava is changing from primary human consumption to processing industrialized products (FAO, 2007). Poor packaging limits trade and increase waste. Food waste in Imo State devastates individuals, economies and the environment. There is need to develop technologies that extend the freshness and shelf-life of food. In developing countries like Imo State while also educating food producers, retailers and consumer on how processing and packaging prevents waste. Food packaging can extend the shelf life of fresh food for weeks, reduce the amount of food lost during transportation and reduce waste in homes. For example, food processing and packaging helps keep for a longer time compared to when they are not processed. Peter and Ann (2002) perceived that the actual use of any packaging material will depend mostly on the cost and availability in a particular area. The choice of packaging material as stated by Daramola, Idowu, Atande and Oguntoona (2010) depends on the nature of the product, the storage and handling conditions among other factors. There may be particular marketing reasons for choosing a certain type of package and these are very important in package selection. Cassava product is hygroscopic (it absorbs moisture from air) and should be packaged in air-tight and moist-proof bags, especially in area of high humidity to retain the low moisture content and prevent mold growth (USAID, 2010).

Cassava flour should be packaged in containers which will safeguard the hygiene, nutritional technological and organoleptic qualities of the product. The packaging materials shall be made of substances which are safe and suitable for the intended use. They should not impart any toxic substance or undesirable odour or flavor in the product. They must be clean, sturdy and strongly sewn or sealed with specific instructions for use boldly written on the packaging materials. PATB (2010) maintained that packaging could influence significantly not only the chemical, functional, microbial and sensory quality of food but also the shelf-life, inadequate packaging of flour therefore has profound effect on the whole pattern and total amount of food consumed in Imo State. The author further stated that basic skills needed by adult farmers to succeed in cassava flour packaging include: a good level of physical fitness, good observational skills and the ability to spot faults, patience to carry out repetitive tasks, ability to work quickly to meet production, good team working skills and the ability to work on your own, the ability to follow strict health and good standards of personal hygiene.

A good agricultural education programme designed to produce professional should apart from enriching the trainees with knowledge, fact, theories and principles provided also training needed to acquire expertise in cassava production, packaging and utilization. Training need is a condition where there is a gap between "what is" and "what would be" in terms of incumbent knowledge, skills and attitudes for a particular situation at one point in time. The gap is called "a problem" which usually occurs when differences exist between desired performance and actual performance. Training according to Olaitan, Nwachukwu, Igbo, Onyemaechi and Ekong (1999) is the process of making better the knowledge and competences of personnel in an occupation.

Training could be through in-service programmes, short courses workshops, conferences, seminars or by retraining in situations where knowledge acquired have become absolute. To acquire the needed skills in cassava processing and packaging, adult farmers have to pass through series of training. Training is generally through practical exposure or informal institutions established for the purpose of providing exposure in required skills. Skill therefore is a product of training. Skills according to Etuk (2000) are important for the social values. Skills requirement essentials for development of intrinsic potentials in individual skills have long been recognized as the basis for the wealth creation of the nation's development in many of the western countries, it has shown that a nation makes spectacular achievements by virtue of the skills, ingenuity and technical know-how of its people. Adult farmers in Imo state lack such skills and as such, should be trained so as to meet up with the demands of the day. Putting an end to global hunger and the preservation of our planet are two of the world's greatest challenges and adult farmers in Imo State need to do more to make food available through processing and packaging of cassava flour.

Adult farmers in the context of this study are male and female adults who work for a common interest of processing cassava tubers into flour and package for successful economic living in Imo State. There is insufficient skills among the existing work force (adult farmers) resulting in low performance of task of firms, industries and organizations to enhance adult farmers empowerment. There seem to be inadequate awareness in the processing and packaging of cassava flour by adult farmers in Imo State. This is shown in their stereotype processed products and usage of cassava in Imo State. The emerging technologies have changed the way works are done and bring about a shift of work force requirements from low skills to a well informed high technical and vocational skill (Vize, 2010). It is imperative therefore that adult farmer should have necessary technical and vocational skills to succeed in life.

Purpose of the study

The general purpose of this study was to determine adult farmers training needs for processing and packaging cassava flour in Imo State. Specifically, the study sought to;

1. Determine adult farmers training needs for improving cassava flour processing in Imo State, Nigeria.
2. Determine adult farmers training needs for improving cassava flour packaging in Imo State, Nigeria.

Research questions

The following research questions guided the study:

1. What are the adult farmers training needs for improving cassava flour processing in Imo State, Nigeria?
2. What are the adult farmers training needs for improving cassava flour packaging in Imo State, Nigeria?

Hypotheses

The following null hypotheses were tested at 0.05% level of significance:

1. There is no significant difference between the mean responses of extension officers and adult farmers on the training needs for improving cassava flour processing in Imo State, Nigeria

2. There was no significant difference between the mean responses of extension officers and adult farmers on the training needs for improving cassava flour packaging in Imo State, Nigeria.

Method

The study adopted descriptive survey design. A descriptive survey design, in the opinion of Ali (2006) is a descriptive study which uses sample of an investigation to document, describe and explain what is in existent or nonexistent on the present status of phenomena being investigated. In survey study, views and facts are collected through questionnaire, interviews among others, analyzed and used for answering research questions. The study was conducted in Imo State of Nigeria. The population for the study was 2,202 registered adult famers and 30 extension officers working with the Imo State agricultural development programme making a population of 2,232 subjects.

The instrument for data collections was a structured questionnaire developed by the researchers. The instrument was designed to have two components of needed and performance columns. Each column was on four point scale of highly needed or high performance, needed or performance, slightly needed or slight performance and not needed or no performance with corresponding values of 4, 3, 2 and 1. The instrument titled adult farmers' training needs for improving cassava flour processing and packaging questionnaire was face validated by three experts. The internal consistency of the questionnaire items was determined using Cronbach alpha reliability method and 0.73 was obtained as reliability coefficient of the entire questionnaire. Two thousand two hundred and thirty two copies of the instrument were duly administered and retrieved with 100% return rate.

Data collected were analyzed using mean of need and performance improvement need index to answer the research questions. T-test was used to test the null hypotheses at 0.05 level of significance and at relevant degree of freedom.

Results

Data for answering research questions and null hypotheses are presented in Tables below:

Table 1: Mean rating of adult farmers and extension officers weighted mean on cassava flour processing in Imo State, Nigeria

S/N	Items statement - Cassava flour processing	$EO\bar{X}$	$F\bar{X}$	PG $EO\bar{X} - F\bar{X}$	Remark
1	Ability to select raw materials to ensure the quality of the final products.	3.23	2.20	1.03	Needed
2	Ability to crop within two days of harvest for product quality.	2.67	2.38	0.28	Needed
3	Ability to apply proper hygienic practices.	3.03	2.69	0.34	Needed
4	Adopting the technique of timely processing of products.	3.10	2.77	0.33	Needed
5	Ability to use peeling machines.	3.17	3.52	0.65	Needed
6	Ability to carry out different dewatering techniques.	3.27	2.62	0.58	Needed
7	Ability to operate drying machines.	3.20	2.62	0.58	Needed
8	Ability to carry out fine milling operations.	3.13	3.13	0.00	Not needed
9	Ability to test products in numerous receipts.	3.17	2.61	0.56	Needed
10	Ability to be self-reliant in thought and actions.	3.10	3.10	0.00	Not needed
11	Ability to apply good management practices.	3.27	2.61	0.66	Needed
	Total	3.27	2.51	0.40	Needed

Note: $EO\bar{X}$ = Extension officers weighted mean

$F\bar{X}$ = Farmers weighted mean

Table 1 reveals that 9 out of the 11 skills of cassava flour processing have their performance gap range from 0.28 to 1.03 and are positive. This indicates that cassava product processing into four require retraining in the 9 skills, two (2) skills, that is item 8 and 10 have their performance gap as being neutral. This indicates retraining in the two skills are not needed since the flour processing needs overlap one another, it is difficult to isolate the two flour processing needs during training without a gap. Therefore, adult farmers require training in all identified flour processing skills but less emphasis will be giving to the two skills that were negative. Table 1 shows the total responses in cassava product processing into flour indicating that farmers need a retraining on the whole as the performance gap is positive value of 0.51. Thus result however is further subjected to the t-test analysis in order to ascertain if it is significant.

Results of testing null hypothesis 1

Table 2: t-test analysis of responses of extension officers and adult farmers on the training needs for improving cassava product processing into flour in Imo State, Nigeria

Source of variation	N	$\bar{X}$	SD	Df	T_{cal}	T_{cri}	Decision
Extension officers	30	29.50	5.50	2230	4.78	10.96	*
Adult farmers	2202	24.39	5.83			0	

* = Significant at .05 level of significance.

Table 2 shows that, the calculated t-value (t_{cal}) 4.78 is greater than the t-critical (t_{cri}) 1.96. Therefore, the null hypothesis is rejected. The adult farmers require retraining for improving cassava product processing into flour in Imo State.

Table 3: Mean ratings of adult farmers and extension officers on the training needs for improving cassava flour packaging

S/N	Items statement - Cassava flour packaging	$EO\bar{X}$	$F\bar{X}$	$EO\bar{X} - F\bar{X}$	Remark
1	Exposure to techniques that aid flour distribution.	3.17	2.27	0.90	Needed
2	Adopting rapid distribution of flour techniques.	2.93	2.35	0.58	Needed
3	Ability to reduce post harvest losses through better innovation.	2.90	2.39	0.51	Needed
4	Ability to handle different packaging materials.	3.03	2.48	0.55	Needed
5	Exposure to chip drying techniques.	2.60	2.62	-0.02	Not needed
6	Ability to attract buyers by making products attractive.	3.00	2.22	0.78	Needed

7	Ability to flour packaging regulation.	2.97	2.54	0.43	Needed
8	Ability to label packages correctly.	3.10	3.16	-0.06	Not needed
9	Good observation skills.	2.80	2.22	0.58	Needed
10	Ability to spot faults.	3.10	3.16	-0.06	Not needed
11	Ability to adopt effective marketing strategy.	2.90	2.82	0.08	Needed
12	Ability to use different packaging sizes for conveniences.	3.20	2.46	0.74	Needed
13	Ability to have knowledge on consumers right	2.97	2.34	0.63	Needed
14	Having a good level of physical fitness.	2.90	2.60	0.30	Needed
15	Patience to carry out repetitive tasks.	2.90	2.60	0.30	Needed
16	Ability to work quickly to meet packaging targets.	2.80	2.48	0.32	Needed
17	Good team working skills	3.17	2.59	0.59	Needed
18	Ability to work on your own.	2.97	2.33	0.64	Needed
19	Ability of following strict health and safety guidelines.	3.00	2.69	0.31	Needed
20	Good standard of personal hygiene.	3.10	2.45	0.65	Needed
	Total	2.98	2.50	0.48	Needed

The data in the Table 3 shows that 18 out of 20 skills for flour packaging have their performance gap range from 0.08 to 0.90 and are positive. This indicates that cassava flour packaging required re-training in the 18 skills. Two (2) cassava flour packaging have their performance gap as -0.06 and -0.02. Thus, indicates that cassava flour packaging did not require re-training in the two skills. The Table also reveals that total responses on cassava flour packaging need re-training on the whole as the performance gap is a positive value of 0.48. However, in order to ascertain if the result is significant, the responses were further subjected to the analysis of t-test

Result of testing null hypothesis 2 is represented in the table 4.

Table 4: T-test analysis of responses of extension officers and adult farmers on their training needs for improving cassava flour packaging

Source of variation	N	$\bar{X}$	SD	Df	T_{cal}	T_{cri}	Decision
Extension officers	30	68.83	5.84	2230	7.09	1.96	*
Adult farmers	2202	59.30	7.33				

* = Significant at .05 level of significance.

As shown in Table 4, the total t_{cal} 7.09 is greater than t_{cri} 1.96. Therefore, the null hypothesis two is rejected. The adult farmers require re-training for improving cassava flour packaging.

Discussion

Adult farmer's training needs for improving cassava product processing into flour is generally obtained through exposure to task. Null hypothesis one was rejected, indicating that the adult farmers need adequate and improved training to acquire the relevant skills for improving cassava flour processing. The study revealed that the adult farmers are still using traditional methods of processing cassava into flour. This may be attributed to lack of or inadequate access to training facilities, inability to procure the processing hardware and so on. This finding is in line with the study of IITA (2004) that processing of cassava is still at subsistence level. Adult farmers do not adhere to cassava processing standard. The findings is in agreement with the work of Etuk (2000) who pointed out that for skills to be acquired, there must be quality training and training materials in order to achieve quality output. The implication is that adult farmers will continue to adopt traditional method of skills in cassava processing as they are unable to access improved training and processing facilities. Therefore, adult farmers in Imo State should be given training.

The findings on adult farmers training needs for improving cassava flour packaging revealed that lack of training has a significant influence on the poor performance of adult farmers in cassava flour packaging. The working condition of the adult farmers does not promote better processing and packaging. This finding is in line with the report of IITA (2004) and IMADP (2011) that acquisition of skills and availability of relevant processing and packaging facilities promote production of high quality products, the absence of which renders the adult farmers incapable of processing and packaging cassava flour to required standards.

Conclusion

The findings showed significant difference between the responses of extension officers and adult farmers in their training needs. The packaging of cassava flour requires some detail industrial knowledge and skills of which they do not have adequate exposure. Based on the findings of this study, it is concluded that the adult farmers in Imo State need re-training on cassava processing and packaging of flour. There is need for the adult farmers to be provided with good processing and packaging facilities at least at the co-operative society level so that farmer could access the modern facilities, otherwise they will continue to use the crude facilities and local method at subsistence level. The researchers therefore conclude that the farmers need re-training to keep them abreast of the changing technologies.

Recommendations

1. The findings of the study should be packaged into a retraining programme and used to train adult farmers on cassava processing and packaging by the state and local governments.
2. To ensure quality cassava flour from adult farmers in Imo State, Nigeria, the farmers should be trained and re-trained by the state and the local governments agricultural development programme authority through seminars and workshops.
3. Adult farmers in Imo State should organize themselves into multi-purpose cooperative societies in order to cater for training and funding from government and international donors.
4. Central processing and packaging skills should be built by local government authorities in strategic locations so that cassava processor could avail themselves of the facilities. This is because these facilities are too expensive for the farmers to afford.
5. Adult farmers should accept the training programme when organized and take advantage of such opportunity to update their knowledge and skills in processing and packaging of cassava flour.
6. The entrepreneurs in cassava production industry should be allowed access to these skill items in processing and packaging of flour and use them to increase production.

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WORKSHOP FACILITIES FOR SKILL ACQUISITION IN ELECTRICAL/ELECTRONIC TECHNOLOGY COURSES INTECHNICAL COLLEGES IN LAGOS STATE

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Abstract
This study examined the workshop facilities for skill acquisition of electrical/electronic courses in technical college in Lagos state the researcher employed survey research design for this study. The population for the study was 120 Electrical/Electronic students in semi and final year classes in the six technical colleges in Lagos State. The population was manageable and therefore, the entire population constituted the sample. A 27- item questionnaire was developed. Three experts validated the instrument. Cronbach alpha reliability method was used to test the internal consistency of the instruments and reliability coefficient of 0.98 ·was obtained. Data collected was analyzed using, mean and standard deviation via the Statistical Package for Social Sciences (SPSS). The findings of this study revealed that workshop facilities like Electrical appliances, Machine tools, Equipment and Electrical materials, are not available in the workshop; most of the available facilities are not functioning, and teachers cannot use and operate most of the workshop facilities. The researcher recommended that Special intervention funds should be set aside by government for the procurement of workshop facilities to technical colleges, such channels should be named Technical Education Intervention Fund (TEIF) and Electrical/Electronic Teachers should be trained and retrained on how to operate and use workshop facilities.

Keywords: facilities, workshop, hand-tools, skill acquisition, functionality

Introduction

Facilities are things used to facilitate learning. Ogbodo (1995) defined facilities as the things that facilitate teaching and learning process in schools and includes all kinds of building, teaching aids and devices such as modern educational hardware and their software in the form of magnetic tapes, films and transparencies. Training facilities as defined by International Labour Organization (ILO) (2002) are tools, equipment, devices, materials and or media that aid and support the teaching – learning situation. Agbo (2000) described training facilities or training resources as something designed or created to provide a service or fulfill a need or goals.. Facilities for training students may include numerous hand tools, screw drivers, pliers, projectors, consumable materials and workshops. The acquisition of skills acquired by trainees/learners depends on the facilities used during training. Robert (2012) explained that facilities help trainers to translate abstract ideas to concrete ideas. Bakare and Adelaja (2013) explained that training facilities make the teaching and learning interesting when properly applied. After a training module has been implemented, a good teacher will select relevant evaluation techniques to monitor the progress of the students.

Students' practical projects are an important part of the curriculum in technical colleges, but a supportive school environment is a fundamental requirement for the successful implementation of the curriculum. This aspect of the curriculum can only be implemented where facilities in the workshop are adequate and relevant. Availability of appropriate facilities enhances student learning by allowing them to be involved in demonstrations, and practice will continue to build their skills. However most of the technical colleges in Nigeria have been forced to perform below standard due to purported non-availability, poor management or utter neglect of the required facilities in the workshops for effective training. Puyate (2010) the present state of facilities in TVE institutions is very poor, there is no planned measures of maintenance of the already broken down equipment or means of acquiring new ones.

Workshop facilities include hand tools, machine tools and measuring tools which are used in the classroom and workshops to facilitate interest and the acquisition of practical skill respectively. Nwachukwu (2001) described workshop facilities as all the practical and skill development resources that would facilitate the processes of teaching and learning and evaluation of vocational and technical skill. Nwachukwu explained further that workshop facilities includes machine tools, hand tools, and measuring tools that could be utilized in directing and controlling vocational and technical operation and for reinforcing the teaching and learning of specific skill. Olaitan, Nwachukwu, Igbo, Onyemachi, and Ekong(1999) described tools and machines as those portable and heavy instruments or devices for performing special operations in vocational technical education especially in the teaching and learning situations. Measuring are the instruments or devices commonly utilized in transmitting knowledge in the laboratory to the learners.

Learning through the practical way or learning by doing with the right type of tool has been an age long traditional way of learning and transmitting the people's culture to the younger generation. Learning by practical work is essential to learning and retention of what is learnt. According to Olaitan (1996) learning by doing or practical work is in conformity with the saying that "if i hear it, I forget, if I see it, I remember, but if I do it I know it." Practical work is very essential for the building of interest and the acquisition of skill needed for work but this has to go together with the required tools and equipments however this has not been the case in our basic schools. Aina (2000) pointed out that high failure rate in the main trade in the basic schools have been associated with inadequate teaching facilities required for the training of the students to acquire the skill for productive work.

This pathetic condition needs to be reverted in order to meet the goals of TVE as stipulated by the Federal republic of Nigeria (FRN) in the National Policy on Education of Nigeria (FRN, 2004). According to the policy, the goals of TVE; shall be to provide trained manpower in the applied sciences, technology and business particularly at the craft (equivalent of high schools), advanced craft and technical levels; provide the technical knowledge and vocational skills necessary for agricultural, commercial and economic development; to give training and impart the necessary skills to individuals who shall be self-reliant economically. These laudable objectives can only be achieved through a curriculum that is relevant and comprehensive and a well–equipped and standard workshop with relevant tools, equipment and other training facilities. Afeti (2007) stated that the quality of training in TVE institutions in Nigeria is low with undue emphasis on theory and certification rather than on skills acquisition and proficiency testing. Inadequate instructor training, obsolete training equipment and lack of instructional materials are some of the factors that combine to reduce the effectiveness of training in meeting the required knowledge and skill objectives. High quality skills training requires qualified instructors, appropriate workshop equipment, adequate supply of training materials and practice by the learners.

In a study conducted by Onyene, (2007) on the production of skill oriented graduates for the labour market the study revealed that the available physical and material resources used in teaching TVE is grossly inadequate. In the same vein Ayua (2006) in a study on consolidating and sustaining industrial performance of school product in TVE for national development revealed some findings on the availability of teaching equipment and material resources thus; there were no standard workshops with adequate facilities for carpentry and joinery in four out of five

Skill is the ability to do something well, usually gained through training or experience that is needed while acquisition is the act of getting new knowledge, skill that can be transferable on and to the job. This skill can be obtained through education, training or experience that will inculcate into the individual how to carry out or discharge effective responsibilities very well with the new knowledge. This is because any work carried out by skilled people cannot be compared with those tasks performed by unskilled people. Skill acquisition is getting new knowledge and the ability to apply it well to solve problems According to the Federal Government of Nigeria (2004), one of the goals of education is the acquisition of appropriate skills and the development of mental, physical, and social abilities and competencies as equipment for the individual to live and contribute to the development of his society. Ogundele (2010) submitted that; we need skilled personnel who will be enterprising and self-reliant. We need skilled people who can understand and adapts to changes in the increasing complexity of technology. We need people who can apply scientific knowledge to improve and proffer solution. The skill acquired by will prepare young people for any specific job with a lifelong opportunity for self-development. This is because there will be competency, interest and job satisfaction to the highly skilled person to effectively and efficiently carry out that job successfully for higher productivity. The acquisition of skills will prepare the individual to fit in readily to employment in all sectors of the economy to environmental challenges for the use and conveniences of man.

Technical colleges are set up to train students by their teachers using available facilities for training. Students are individuals studying at a school, college, or university. Microsoft (2008) described student as somebody who studies at a school, college, or university. A student according to Pearson (2007) is someone who is studying in school such as college and University. Electrical/Electronic students in technical colleges are learners admitted into technical colleges to study Electrical/Electronic courses and to acquire Electrical/Electronic trades after meeting entry requirements laid down by NBTE. Electrical/Electronic courses are compulsory core subjects taken by Electrical/Electronic students in their area of specialization through which they are expected to possess necessary skills in order to embark on self employment after graduation. In most cases Electrical/Electronic courses are taught theoretically without the use of machines, equipment, tools and other instructional materials. Most technical institutions involved in preparing students to become self-reliant, operate using damaged, obsolete tools, equipment and machineries

Statement of the Problem

Learning through practical or learning by doing with the right type of tool has been an age long traditional way of learning and transmitting the people's culture to the younger generation. Learning by practical work is essential to learning and retention of what is learnt. The teaching and learning of Electrical/Electronic subjects should be a dynamic activity-based and practically oriented through proper utilization of basic workshop facilities. In most cases Electrical/Electronic courses are taught theoretically without the use of machines, equipment, tools and other instructional materials. Most technical institutions involved in preparing students to become self-reliant, operate using damaged, obsolete tools, equipment and machineries coupled with inadequate qualified teachers. Therefore, this study is aimed at assessing workshop facilities for skill acquisition in Electrical/Electronic Courses in Technical College in Lagos State. This study sought to find out the:

1. Availability of workshop facilities for skill acquisition in Electrical/Electronic courses in technical college in Lagos State
2. Functionality of workshop facilities for skill acquisition in Electrical/Electronic courses in technical college in Lagos State
3. Teachers competence in the use of workshop facilities for skill acquisition in electrical/electronic courses in technical college in Lagos State

Research Questions

The following research questions guided the study:

1. To what extent are workshop facilities available for skill acquisition in Electrical/Electronic courses in technical college in Lagos state?
2. How functional are workshop facilities for skill acquisition in Electrical/Electronics courses in technical college in Lagos State?
3. How competent are Teachers in the use of workshop facilities for skill acquisition in Electrical/Electronic courses in technical college in Lagos state?

Method

Design of the Study

The study adopted survey research design. Ayoade (2013) described survey research design as type of design to get detailed information that describes the existing phenomena of identified problems which justifies current conditions and practices to determine what others are doing with similar problems or situations and benefit from the experience and to make future plans and decision. This design was suitable for this study since it's aimed at identifying Competence.

Area of the Study

This study was conducted in Lagos-State south-western Nigeria. There are 6 Technical colleges in Lagos-State offering electrical/electronic technology with qualified and experienced Teachers. Among the states in Nigeria,

Population for the Study

The population for the study was 120 Electrical/Electronic students in semi and final year in the six technical colleges in Lagos State. The population was manageable and therefore, the entire population constituted the sample.

Sample and Sampling Techniques

Since the population is small, the entire population was included in the study, therefore there was no sampling. This decision is in line with Nwana's (2007) suggestion that when the population of a study is of a manageable size, it is advisable to include the entire population

Instrument for Data Collection

Structured questionnaire was used as the instrument to collect data from the respondents. The questionnaire contained 38 items; structured in-line with research questions. The questionnaire was divided into five main sections. Section A was used to obtain personal information from respondents. this section covered items 1-3 with options and blank space to enable respondents to check or complete as appropriate. Section B of the instrument dealt with research question one, and also comprised of the item statements 1-10 to elicit information on workshop facilities availability for skill acquisition of Electrical/Electronic courses in technical college. Section C dealt with research question two, the section covered items 1-10 which was used to collect data on the functionality of workshop facilities for skill acquisition in Electrical/Electronics courses in technical colleges. Section D dealt with research question three, this section covered items 1- 7 to elicit information on Teachers competence in the use of workshop facilities for skill acquisition of Electrical/Electronic courses in technical colleges.

Validation of the Instrument

The instrument was subjected to- face validation by three experts from School of Technical Education, Federal College of Education Technical Akoka. Each validate was asked to vet the clarity, relevance and total coverage of the questionnaire items. Their suggestions were incorporated to the final draft of the questionnaire

Reliability of the Instrument

In order to determine the reliability of the instrument, 20 copies of the questionnaire were administered on electrical/electronic technology students in Ogun State, South West, Nigeria. The internal consistency of the instrument was computed using Cronbach alpha. The overall reliability coefficient of the instrument was 0.988. To ensure 100 percent accuracy, statistical package for social science (SPSS) was used. Since reliability coefficient of above 0.60 was obtained, the instrument was considered reliable for use in the present study. This is because, according to Ogbazi and Okpala (1994), if the correlation coefficient obtained on an instrument is up to 0.60 and above, the instrument should be considered good enough to be used for a study.

Method of Data Collection

One hundred and twenty copies of the questionnaire were administered to the respondents with the help of three trained Research Assistants who were conversant with the terrains of the study area. The respondents were allowed two weeks to fill the questionnaire and return the same to research assistants. The researcher then received the copies of the questionnaire from the research assistants and collated the data for proper coding and analysis. One hundred and twenty copies of the questionnaire administered were retrieved representing 100% return rate.

Method of Data Analysis

The data collected for the study were analyzed using mean, and standard deviation. The mean and standard deviation were used to answer three research questions. Any item with the mean value of 2.50 or above was considered as Available/functional/Agree while any item with the mean value of less than 2.50 was considered as Not Available/ Not functional / Disagree

Results

The results of the data analyses are presented below in accordance with the research questions.

Table 1: Mean Responses of the Respondents on the Availability of workshop facilities for skill acquisition of Electrical/Electronic courses in Technical College

S/N	Item statements	$\bar{X}$	SD	Decision
1	Hand tools such as hammer, screw driver, soldering iron, pliers.	2.56	0.80	Available
2	Electrical appliances such as radio, television, signal detector.	1.89	0.73	Unavailable
3	Measuring Instruments such as ammeter, multi-meter, voltmeter, ohmmeter.	3.07	0.55	Available
4	Machine tools such as drilling machine, cutting tools.	1.92	0.63	Unavailable
5	Equipment such as signal generator, Dc/Ac motors, oscilloscope	2.02	0.58	Unavailable
6	Working tables, benches and chairs	3.31	0.67	Available
7	Safety equipment like fire extinguisher, foot boots, hand gloves.	2.90	0.68	Available
8	Electrical models such as electronic circuit design, electricity generation, transmission and distribution chat among others	3.06	0.73	Available
9	Electronic components such as transistor, resistor, capacitor, diode and so on	3.20	0.60	Available
10	Electrical materials such as socket, cables, wires, plug, pipe, box, distribution board, circuit breaker and so on.	2.42	0.67	Unavailable

$X \geq 2.50$ Accept

In the table 1 above, Respondent's decisions on items 1,3,6,7, 8 and 9 are in agreement Hand tools such as hammer, screw driver, soldering iron, pliers, Measuring Instruments such as ammeter, multi-meter, voltmeter, ohmmeter., Working tables, benches and chairs, Safety equipment like fire extinguisher, foot boots, hand gloves, Electrical models such as electronic circuit design, electricity generation, transmission and distribution chat among others, Electronic components, and Electronic components such as transistor, resistor, capacitor, diode are available in their college workshops. The respondents however affirmed on the Unavailability of items 2, 4, 5 and 10 that is Electrical appliances such as radio, television, signal detector, Machine tools such as drilling machine, cutting tools, Equipment such as signal generator, Dc/Ac motors, oscilloscope, and Electrical materials such as socket, cables, wires, plug, pipe, box, distribution board, circuit breaker.

Table 2: Mean Responses of the Respondents on the functionality of workshop facilities for skill acquisition of Electrical/Electronic courses in technical college in Lagos state

S/N	Item statements	Mean	SD	Decision
1	Hand tools such as hammer, screw driver, soldering iron, pliers.	3.24	0.79	Functional
2	Electrical appliances such as radio, television, signal detector.	2.25	1.12	Nonfunctional

3	Measuring Instruments such as ammeter, multimeter, voltmeter ohmmeter in the workshop are in good condition.	1.99	0.77	Nonfunctional
4	Machine tools such as drilling machine tools, cutting tools	2.11	1.16	Nonfunctional
5	Equipment's such as signal generator, Dc/Ac motors, oscilloscope available in the workshop are in good condition.	2.03	1.19	Nonfunctional
6	Working tables, benches and chairs	2.12	0.81	Nonfunctional
7	Safety equipment like fire extinguisher, foot boots, hand gloves	2.58	0.82	Functional
8	Electrical models such as electronic circuit design, electricity generation, transmission and distribution chat among others	2.60	1.17	Functional
9	Electronic components such as transistor, resistor, capacitor, diode and so on	3.42	0.68	Functional
10	Electrical materials such as socket, cables, wires, plug, pipe, box, distribution board, circuit breaker and so on	2.37	0.77	Nonfunctional

X ≥ 2.50 Accept

In the table 2 above, Respondents were in agreement that items 2, 3,4,5,6, and 10.that is Electrical appliances such as radio, television, signal detector, Measuring Instruments such as ammeter, multi-meter, voltmeter ohmmeter, Machine tools such as drilling machine tools, cutting tools, Working tables, benches and chairs, and Electrical materials such as socket, cables, wires, plug, pipe, box, distribution board, circuit breaker and so on are none functional. The respondents decision revealed that items 1, 7, 8 and 9 were functional

Table 3: Response to Competence of Technical teachers in the effective use of workshop facilities for skill acquisition of Electrical/Electronic courses in technical colleges

S/N	Item statements	Mean	SD	Decision
1	Electrical/Electronic teachers are skilful in the use of Hand tools such as hammer, screw driver, soldering iron, pliers..	3.04	0.79	Accepted
2	Electrical/Electronic teachers can effectively use Electrical appliances such as radio, television, signal detector.	3.25	1.12	Accepted
3	Measuring Instruments such as ammeter, multimeter, voltmeter ohmmeter can be used by Electrical/Electronic Teachers.	2.99	0.77	Accepted
4	Electrical/Electronic teachers can operate Machine tools such as drilling machine tools, cutting tools	2.11	1.16	Rejected
5	Electrical/Electronic Teachers can operate Equipment such as signal generator, Dc/Ac motors, oscilloscope	2.43	1.19	Rejected
6	Electrical/Electronic Teachers can connect and solder Electronic components such as transistor, resistor, capacitor, diode and so on	2.21	0.68	Rejected
7	Electrical/Electronic Teachers can effectively connect Electrical materials such as socket, cables, wires, plug, pipe, box, distribution board, circuit breaker and so on	2.17	0.77	Rejected

In the table 3 above, Respondents agreed on items 1, 2, 3. that is Electrical/Electronic teachers are skilful in the use of Hand tools such as hammer, screw driver, Electrical/Electronic teachers can effectively use Electrical appliances such as radio, television, signal detector, Measuring Instruments such as ammeter, multi-meter, voltmeter ohmmeter can be used by Electrical/Electronic Teachers, However the respondents disagreed in items 4.5.6 and 7 that Electrical/Electronic teachers can operate Machine tools such as drilling machine tools, cutting tools, Electrical/Electronic Teachers can operate Equipment such as signal generator, Dc/Ac motors, oscilloscope, Electrical/Electronic Teachers can connect and solder Electronic components such as transistor, resistor, capacitor, diode and so on and Electrical materials such as socket, cables, wires, plug, pipe, box, distribution board, circuit breaker and Electrical/Electronic Teachers can effectively connect Electrical materials such as socket, cables, wires, plug, pipe, box, distribution board, circuit breaker and so on

Discussion

The finding of the revealed that Hand tools such as hammer, screw driver, soldering iron, pliers, Measuring Instruments such as ammeter, multimeter, voltmeter, ohmmeter., Working tables, benches and chairs, Safety equipment like fire extinguisher, foot boots, hand gloves, Electrical models such as electronic circuit design, electricity generation, transmission and distribution chat, Electronic components, and Electronic components such as transistor, resistor, capacitor, diode are available in the college workshops. And that Electrical appliances such as radio, television, signal detector, Machine tools such as drilling machine, cutting tools, Equipment such as signal generator, Dc/Ac motors, oscilloscope, and Electrical materials such as socket, cables, wires, plug, pipe, box, distribution board, circuit breaker, are not available. The findings also revealed that most of the available workshop facilities are not functioning. The finding further revealed that Electrical/Electronic teachers cannot operate and use most of the workshop facilities. The findings is in agreement with David and Nnoli (2013) who observed that most of the technical colleges in Nigeria have been forced to perform below standard due to non availability, poor management or utter neglect of the required facilities in the workshops for effective skills training. Earlier, Astsumbe (2002) observed that due to inadequate teaching, normal workshop practice which forms 60 percent (standard set by the National Board for Technical Education, NBTE of the technical college curriculum, is fast disappearing on vocational and technical colleges time tables. Normally, sufficient equipment and practical consumable materials are expected to be readily available in the workshops.

Conclusion

The desire to produce competent graduates of Electrical/Electronic of technical colleges cannot be achieved when the facilities in the College workshops are not sufficiently available, the few available ones are not functioning and Electrical/Electronic Teachers not properly trained to operate and use the facilities. Where these workshop facilities are not functioning or well equipped, the students' interest to learn and the teacher enthusiasm to teach will all be dampened. Learning by practical work is essential to learning and retention of what is learnt. Therefore concerted effort should be med by government and other stakeholders in order to achieve the aims and objectives of Technical Colleges.

Recommendations

Based on the above revelations from the findings of this study, the following recommendations are made.

- Special intervention funds should be set aside by government for procurement of workshop facilities to technical colleges, such channels should be named Technical Education Intervention Fund (TEIF)
- obsolete tools and equipment should be replaced with modern ones in these workshops
- bad tools and equipment in the workshops should be overhauled .
- Industries should be sought as partners in progress to assist in provision of facilities
- Electrical/Electronic Teachers should be trained and retrained on how to operate and use workshop facilities.

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CORE INDUSTRY BASED COMPETENCIES REQUIRED BY WOODWORK CRAFTSMEN FOR PERFORMANCE IN EFFECTIVE FURNITURE AND UPHOLSTERY MAKING INDUSTRIES

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Abstract
The study determined the core industry based competencies required by craftsmen of woodwork for effective performance in furniture and upholstery industries in Kogi State. Three research questions were answered while the null hypotheses formulated were tested at 0.05 level of significance. The population for the study was 96, which comprised of the 45 teachers of woodwork, 35 supervisors and 16 craftsmen of furniture and upholstery making. There was no sampling because of manageable size of the population. A structured questionnaire titled Upholstery and Furniture Making Questionnaire (UFMQ) was used for data collection for the study. The instrument was face validated by three experts. The internal consistency of questionnaire items was determined using Cronbach Alpha reliability method. The overall internal consistency index was obtained to be 0.82. Ninety six copies of UFMQ were administered on the respondents and they were properly completed. Mean was used for answering the research questions while analysis of covariance (ANCOVA) was employed for testing the null hypothesis at 0.05 level of significance. The findings of the study revealed 16 core industry-based competencies in preparing materials for furniture and upholstery making, 20 core industry-based competencies in construction and making of furniture and upholstery and 25 core industry-based competencies in using furniture and upholstery machines and equipment. The hypotheses tested revealed that there was a significant difference between the mean responses of teachers, craftsmen and supervisors on the core industry based competencies required by craftsmen of woodwork for effective performance in furniture and upholstery industries. Recommendations included that the identified competencies should be employed for re-training of craftsmen. It was also recommended that the core industry-based competencies should be integrated into curriculum of technical colleges in Nigeria.
Keywords: furniture, industry, supervisors, craftsmen, competency

Introduction

World has become the home of competencies, or skills, knowledge and attitudes. Anyone who does not competent or possess relevant skills, knowledge and attitudes will himself or herself out of good job. One of the best places to acquire relevant competencies or skills for example in furniture and upholstery making is technical college. National Board for Technical Education (NBTE) (2007) defined technical college post primary institution which provides students through training with the relevant and adequate knowledge, skills and attitudes for employment under the guidelines of a teacher in related trade. Okorie (2001) stated that technical college in Nigeria is established to prepare individuals to acquire practical skills and basic scientific knowledge. Alade, Ayodele and Ayodele (2010) described technical colleges as institutions where students are trained to acquire relevant knowledge and skills in different occupations for employment in the world of work. Okoro (1999) stated that technical colleges give full vocational training intended to prepare individuals for entry into various occupations. According to Federal Ministry of Education (2008), the goals of technical colleges in Nigeria are to provide trained manpower in the applied sciences, technology, and business particularly at craft, advanced and technician level; provide the technical knowledge and vocational skills necessary for agricultural, commercial, and economic development; and give training and impact the necessary skill to individual who shall be self reliant economically. According to Federal Ministry of Education (2012), technical colleges are the segment of technical and vocational education designed to produce craftsmen at the secondary school level and master craftsmen at the advanced craft. Upholstery and furniture making is one of the trades found in the curriculum of technical college

Upholstery and furniture making is one of the technical trades in the curriculum of technical colleges in Nigeria where students are expected to acquire knowledge, skills and attitudes for paid or self employment after graduation. Upholstery and furniture making, according to Nuffi (2018), is primarily concerned with the design, construction and repair of cabinets. It also involves techniques for creating appropriate joints with the use of tools such as routers to create decorative edgings. Upholstery and furniture making is primarily concerned with the design, construction and repair of cabinets. Furniture making involves techniques for creating appropriate joints with the use of tools such as routers to create decorative edgings. Indiana Department of Education (2010) stated that upholstery and furniture making prepares students in the assembly, production, and finishing of wood-work products used in commercial and residential settings. Craftsmen who specialized in upholstery and furniture making in Technical Colleges in Kogi State expected create employment for themselves and employ others

Graduates of technical colleges in Nigeria are called craftsmen. In Kogi State, craftsmen of woodwork or upholstery and furniture making seem not to acquire adequate skills that could fetch them employment or practice furniture making (Enemali, 2016). Most of the employers of labour who eventually employed the craftsmen in Kogi State complain about their low performance on the job. Although Malaki (2014) explained that mode of teaching and methods employed to teach upholstery and furniture making in technical colleges especially could be the major reason for low performance of the craftsmen on the job. Bakare (2009) also stated that learning outcomes of every student majorly depends on the type of teaching methods, strategies, and instructional techniques or approaches employed by the teacher. Sonola (2007) explained that traditional methods of teaching technical subject discourage creativity and disallow students from thinking beyond what is presented to them by their teachers. There is need to improve the present quality of upholstery and furniture making craftsmen who graduated from technical colleges. There service is essential for the development of the state and the nation at large. Nuffi (2018) stated upholstery and furniture making is vast in nature and has continued to experience changes and improvement from time to time. There is hardly any human activity where furniture making has not made impact. Some craftsmen are found in industries being supervised by supervisors. Supervisors according to Bakare (2014) are the experienced and high ranking personnel coordinating and supervising the activities of the subordinates in upholstery and furniture making industries.

Industry is a place where goods or products are manufactured for use. Ogilvie (2004) defined industry as economic activity concerned with the processing of raw materials and manufacture of goods in factories. Industry is the production of goods or related services within an economy (Krahn and Graham, 2018). The major source of revenue of a group or company is the indicator of its relevant industry. When a large group has multiple sources of revenue generation, it is considered to be working in different industries. Industry is the production of goods or related services within an economy. Industry, according to Olabode (2012), is an activity that many people are involved in, especially one that has become commercialized or standardized. Various tools and machines are useful in upholstery and furniture making industries. Upholstery and furniture making industries therefore are organized economic activity connected with the production, manufacture, or construction of upholstery and furniture or household articles such as cushion chairs, centre tables, bed, cabinets, ward ropes and sofas and two-seaters, upholstered transportation seating among others. Craftsmen of upholstery and furniture making need to be competent for effective performance in the upholstery and furniture industries

Competency is the combination of knowledge, skills and attitudes. Department of Mines, Industry Regulation and Safety (2018) defined competency as the capability to apply or use the set of related knowledge, skills, and abilities required to successfully perform 'critical work functions' or tasks in a defined work setting. Competencies often serve as the basis for skill standards that specify the level of knowledge, skills, and abilities required for success in the workplace as well as potential measurement criteria for assessing competency attainment. Competence is a measure of both proven skills and proven knowledge. Competencies are acquired through experience and training (Nwachukwu, Bakare and Jika, 2009). Craftsmen need to be competent before they can effectively make use of machines and other power tools for making furniture and other materials. Competent craftsmen can be persons who are appointed or designated by the employers to perform specified duties based on knowledge, training and experience. Industry based competencies in this study therefore are knowledge, skills and attitudes or intelligent tactics required by craftsmen for making upholstery and all kinds of furniture.

Statement of the Problem

Upholstery and furniture making is included into the curriculum of technical colleges to equip students with knowledge, skills and attitudes. But with the current reaction and complains from the employers of upholstery and furniture making craftsmen show that the laudable objective has not been achieved. Some of the reasons these craftsmen are deficient in industry based competencies is attributed to poor teaching, wrong teaching methods, lack of modern facilities for teaching skills and competencies, and lack of industry based competencies in the curriculum of technical colleges. The existing upholstery and furniture making module lack core competencies required to operate modern machines and equipment found in woodwork industries to make all kinds of furniture, upholstery and cabinets. This is an indication that most of the craftsmen of upholstery and furniture making are trained on old and obsolete modules and this is responsible for their deficiency in industry based competencies. This situation has not really allowed the craftsmen to create job for themselves or take up jobs in upholstery and furniture industries. The training offers in technical colleges in Nigeria do not guarantee the success of graduates in their occupational areas. Most of employers prefer road side technicians to the craftsmen/graduates of Technical Colleges.

Purpose of the Study

The general purpose of the study was to determine core industry based competencies required by craftsmen of woodwork for effective performance in furniture and upholstery industries. In line with general purpose, three specific objectives were derived.

Research Questions

The following research questions were developed to guide the study**:**

1. What are the core industry-based competencies required by craftsmen in preparing materials for furniture and upholstery making?
2. What are the core industry-based competencies required by craftsmen in construction and making of furniture and upholstery?
3. What are the core industry-based competencies required by craftsmen in using furniture and upholstery machines and equipment?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

1. There is no significant difference in the mean responses of teachers of woodwork, supervisors of woodwork in industries and craftsmen in the field on the core industry-based competencies required by graduates in preparing materials furniture and upholstery making
2. There is no significant difference in the mean responses of teachers of woodwork, supervisors of woodwork in industries and craftsmen in the field on the core industry-based competencies required by graduates in construction/making of furniture and upholsteries
3. There is no significant difference in the mean responses of teachers of woodwork, supervisors of woodwork in industries and craftsmen in the field on the core industry-based competencies required by graduates in using furniture and upholstery machines and equipment

METHOD

Design of the Study

The study adopted descriptive survey design. A survey research design, in the opinion of Ali (2006) is a descriptive study which uses sample of an investigation to document, describe and explain what is in existent or non-existent on the present status of phenomena being investigated. This design is suitable for the study since Ali stated that in survey, views and facts are collected through questionnaire, interviews among others, analyzed and used for answering research questions.

Area of the Study

The area of the study was Kogi State. Kogi State was chosen for this study because there are many furniture and upholstery industries where craftsmen could secure employment. Therefore there many experienced woodwork supervisors industries and teachers of furniture and upholstery in various technical colleges in the state who can react to competencies listed in the instrument.

Population for the Study

The population for the study was 96 which comprises of 45 teachers of woodwork in five technical colleges, 35 supervisors in registered woodwork industries and 16 woodwork craftsmen in the field. There was no sampling since the manageable size of the subjects

Instrument for Data Collection

The instrument for data collection was structured questionnaire. The questionnaire was made up of two parts: namely, Part 1 and 2. Part 1 solicited information on personal data of the respondents while part 2 has three sections A, B and C. Section A dwelt on the core industry based competencies required by craftsmen in preparing materials furniture and upholstery making, section B was on the core industry based competencies required by craftsmen in construction and making of furniture and upholstery while section C dwelt on the core industry based competencies required by craftsmen in using furniture and upholstery machines and equipment. The response option of the questionnaire was structured on five point Likert scale as follows: Highly Required, Required, Undecided, Not Required, Highly Not Required with value of 5, 4, 3, 2 and 1 assigned to them respectively.

Validation of the Instrument

The instrument for data collection was face validated by three experts in the Department of Industrial Technical Education, Faculty of Vocational and Technical Education, , University of Nigeria, Nsukka. These experts were asked to scrutinize each item of the questionnaire for clarity of statements. They examined the appropriateness and suitability of all items of the questionnaire in providing appropriate responses or data for answering each of the research questions. Their suggestions and recommendations were used in the final production of the questionnaire items.

Reliability of the Instrument

The internal consistency of the questionnaire items was determined by using Cronbach alpha (α) method. The choice of Cronbach alpha reliability was based on the fact that, the questionnaire is multiple response type. The copies of the instrument were administered on 10 teachers of woodwork, 10 supervisors and 10 furniture and upholstery craftsmen in Ekiti State, Nigeria. Their responses were computed using Statistical Package for Social Science (SPSS) 16 versions and the overall reliability coefficient for questionnaire items was 0.82.

Method of Data Collection

Ninety six copies of questionnaire were administered on teachers of woodwork, supervisors and furniture and upholstery craftsmen through personal contact and with the help of one research assistant. The research assistant was given instructions on proper ways to administer the questionnaire on the respondents at their various locations. The research assistant was assigned to administer copies of questionnaire to respondents in three technical colleges in the state while the researcher administered and coordinated the administration exercise. The copies of the questionnaire were collected after two weeks by the research assistant and the researcher. Hundred percent return rate was anticipated.

Method of Data Analysis

The three research questions were answered using Mean while Analysis of Variance (ANOVA) was used to test the null hypotheses at 0.05 level of significance and at relevant degree of freedom. Based on the five point Likert scales, items with Mean of 3.50 or above was regarded as required while items with Mean below 3.50 was regarded as not required. A null hypothesis was accepted when a t-calculated value is less than the table t-value. Also the null hypotheses were rejected when the table t-value was less than t-calculated value.

Results

Table 1: Mean Responses of the Respondents on the Core Industry Based Competencies required by Craftsmen in Preparing Materials for Furniture and Upholstery

S/N	Item statements	Mean	S.D.	P-values	Remarks
1.	Select appropriate tools and machines for the job	3.69	0.74	0.36	Required
2.	Identify good materials such as woods for the job	3.75	0.78	0.23	Required
3.	Observe the necessary precautionary measures that govern the work	3.71	0.86	0.25	Required
4	Select appropriate pattern for the job	3.52	0.72	0.12	Required
5.	Cut the wood or plank in useful sizes using relevant saw	3.63	0.76	0.32	Required
6	Place the cut plank on the table for planning	3.86	0.86	0.12	Required
7	Apply a planning tools or planning machine to smooth the materials correctly	3.50	0.80	0.42	Required
8.	Make the skeleton of the cushion chair using appropriate pattern	3.54	0.65	0.53	Required
9	Design cabinet based on choice of the cabinet makers	3.82	0.75	0.34	Required
10	Adapt design based on customer preference	3.80	0.85	0.56	Required
11	Interpret cabinet design	3.51	0.67	0.33	Required
12	Develop cabinet design and layout	3.82	0.84	0.24	Required
13	Select appropriate type of wood or sheet materials such as plywood and chipboard	3.72	0.77	0.16	Required
14	Cut wood or sheet materials into desirable pieces with cutting tools or machines	3.85	0.83	0.53	Required
15	Construct basic joints such as butt, bevel, dado, tongue and groove joints	3.87	0.73	0.42	Required
16	Select joints based on quality of the wood or physical stress expected on the final product	3.68	0.78	0.56	Required

Data in Table 1 reveal that all the items have their mean value ranged from 3.51 to 3.85 and this shows that the mean value of each item was above cutoff point of 3.50, indicating that the items are the core industry based competencies required by craftsmen in preparing materials for furniture and upholstery. Similarly, the standard deviation of these items ranged from .75 to .86 indicating that the respondents were close to one another in their opinion. The Table 1 also indicated that all the items had their P-values greater than 0.05. This indicated that there was no significant difference in the mean responses of teachers of woodwork, supervisors of woodwork in industries and craftsmen in the field on the core industry-based competencies required by craftsmen in preparing materials furniture and upholstery making. Therefore, the null hypothesis of no significant difference was upheld for all the 16 core industry-based competencies in preparing furniture and upholstery materials

Table 2: Mean responses of the respondents on the Core Industry Based Competencies required by Craftsmen in Construction and Making of Furniture and Upholstery

S/N	Item statements	Mean	S.D.	P-values	Remarks
1	Select appropriate nails to construct the furniture	3.61	0.99	0.32	Required
2	Use good hammers for making of the furniture	3.73	0.89	0.22	Required
3	Make the furniture using appropriate design and pattern	3.80	0.88	0.25	Required
4	Observe the necessary precautionary measures that govern the construction	3.82	0.81	0.12	Required
5	Construct based on the dimensions specified in the design	3.62	0.97	0.32	Required
6	Apply joinery techniques while making joints	3.62	0.75	0.11	Required
7	Consider characteristics of material while constructing	3.72	0.74	0.42	Required
8	Work out the overall dimensions, like the width of drawers on the left and right sides of the desk	3.80	0.91	0.53	Required
9	Decide whether the desk is on a plinth, or floor based, and what height it should be	3.96	1.08	0.34	Required
10	Work out the thickness of the top and decorative facings	3.73	0.81	0.56	Required
11	Flatten and fine tuning the castings and various components that make up any plane	3.71	0.74	0.33	Required
12	Grind the bevels using bench grinder, whetstone grinder and disc sander	3.72	0.80	0.24	Required
13	Grind or hone angles where appropriate	3.95	0.75	0.16	Required
14	Flatten the bench stones	3.90	0.86	0.53	Required
15	Prepare a face side and face edge rightly	3.79	0.81	0.53	Required
16	Set out using a square and marking, mortise and cutting gauges	3.73	0.72	0.34	Required
17	Plan edges and executing a traditional rub-joint	3.62	0.86	0.56	Required
18	Cut and plan timber to fine tolerances	3.64	0.81	0.33	Required
19	Cover the cushion chair with attractive cloth or leather	3.82	0.72	0.24	Required
20	Smooth the furniture with fine sand papers	3.74	0.78	0.11	Required

Data in Table 2 reveal that all the items have their mean value ranged from 3.61 to 3.96 and this shows that the mean value of each item was above cutoff point of 3.50, indicating that the items are the core industry based competencies required by craftsmen in construction and making of furniture and upholstery. Similarly, the standard deviation of these items ranged from 0.72 to 1.08 indicating that the respondents were close to one another in their opinion. Table 2 also indicated that all the items had their P-values greater than 0.05. This indicated that there was no significant difference in the mean responses of teachers of woodwork, supervisors of woodwork in industries and craftsmen in the field on the core industry-based competencies required by craftsmen in construction/making of furniture and upholsteries. Therefore, the null hypothesis of no significant difference was upheld for all the 20 core industry-based competencies

Table 3: Mean Responses of the Respondents on the Core Industry Based Competencies required by Craftsmen in using Furniture and Upholstery Machines and Equipment

S/N	Item statements	Mean	SD	P-values	Remarks
1	Observe necessary safety precaution when machining	3.96	1.08	0.16	Required
2	Select the proper size and type of tools for the job to be done	3.79	0.81	0.53	Required

3	Put on woodwork machines to be used	3.81	0.74	0.41	Required
4	Operate woodworking machines to perform various carpentry and joinery operations	3.72	0.80	0.56	Required
5	Adjust the cutting blade or edge before carrying out operations	3.95	1.15	0.34	Required
6	Mount piece of work on vice, clamp or special holder when working with chisels, saw among others	3.90	0.86	0.26	Required
7	Maintain a normal speed while working with tools to avoid injury	3.79	1.10	0.31	Required
8	Fix the guards, fences and other protective parts of machines before use	3.67	0.79	0.12	Required
9	Maintain a minimum distance of hand to a machine while operating it	3.98	0.86	0.32	Required
10	Use jigs and fixtures for projects correctly	3.71	0.70	0.11	Required
11	Follow the normal start up and shut-down procedure when operating a woodworking machine	3.73	0.62	0.42	Required
12	Keep the guard and anti-kick back device in position	3.62	0.66	0.53	Required
13	Carry-out routine service on woodworking machines as required by the manufacturer	3.64	0.81	0.34	Required
14	Apply portable electric hand tools to perform simple tasks in carpentry and joinery	3.82	0.72	0.56	Required
15	Inspect all portable electric powered machines for proper earthling and fusing before use	3.74	0.78	0.53	Required
16	Set cutter in planning machine before use	3.55	0.74	0.34	Required
17	Apply correct tools or machines to finish counter and kitchen shelves	3.70	0.77	0.56	Required
18	Use hand and machine tools to produce prefabricated timber components to given specifications	3.93	0.75	0.33	Required
19	Select hand tools to produce prefabricated timber components to given specifications	3.51	0.70	0.24	Required
20	Apply appropriate machines or tools for polishing or painting	3.50	0.55	0.16	Required
21	Adopt correct machine process to produce a casement window ready for installation	3.81	0.59	0.53	Required
22	Use machine tools to produce a dado wall panel	3.97	0.73	0.41	Required
23	Maintain a normal speed when working with tools and machine in the workshop	3.65	0.80	0.56	Required
24	Set up the machine for various band sawing operations	3.98	0.86	0.34	Required
25	Mount and dismantle the saw blade on the wheels correctly	3.96	1.08	0.16	Required

Data in Table 3 on research question 3 and hypothesis three reveal that all the items have their mean value ranged from 3.50 to 3.97 and this shows that the mean value of each item was above cutoff point of 3.50, indicating that the items are the core industry based competencies required by craftsmen in using furniture and upholstery machines and equipment. Similarly, the standard deviation of these items ranged from .64 to .81 indicating that the respondents were close to one another in their opinion. The Table 1 also indicated that all the items had their P-values greater than 0.05. This indicated that there was no significant difference in the mean responses of teachers of woodwork, supervisors of woodwork in industries and craftsmen in the field on the core industry-based competencies required by craftsmen in using furniture and upholstery machines and equipment. Therefore, the null hypothesis of no significant difference was upheld for all the 25 core industry based competencies

Discussion

The findings of this study revealed 16 core industry based competencies in preparing materials for furniture and upholstery, 20 core industry based competencies in construction and making of furniture and upholstery and 25 core industry based competencies in using furniture and upholstery machines and equipment. The findings of the study was in consonance with the finding of Ogbuanya and Bakare (2014) who carried out a study on mechatronics skills required for integration to electrical/electronic engineering technology programme in Polytechnics for sustainable employment of graduates in contemporary Nigeria and found out that skills in any training programme modifies the behaviour of students or the trainees. Also, the findings are in agreement with the study carried out by Omolola (2012) to identify supervisory skills in building construction required by building technology teachers in technical colleges in Ondo State. It was found out that skills are essential to train technical students for capacity building. The findings of this study also agreed with the findings of Amoyedo (2007) that skills are basic requirement for employment of graduates essential. Also, the findings agreed with the opinion of Ede, Miller and Bakare (2010) who stated that there is need to improve on work skills of technical college graduates for effective operations.

The findings of the study also agreed with the findings of Omeje and Okereke (2018) who developed 49 drainage-system maintenance contents for integration to building technology programme of Nigerian polytechnics. Furthermore, the results of hypotheses one to three showed that there were no significant differences in the mean responses of respondents on the core industry based competencies in preparing materials for furniture and upholstery, core industry based competencies in construction and making of furniture and upholstery and core industry based competencies in using furniture and upholstery machines and equipment

Conclusion

The following conclusions were drawn from the findings of the study:

The study determined core industry based competencies in upholstery and furniture making for effective performance of craftsmen in upholstery and furniture making industries.

Recommendations

Based on the findings of this study, the following recommendations were made:

4. The identified competencies should be employed for re-training of craftsmen of woodwork
5. The indentified core industry-based competencies should be integrated into curriculum of technical colleges in Nigeria.
6. The training facilities and resources should be provided by government and individuals with enabling abilities for effective training of woodwork students when the identified core industry based competencies are integrated to the curriculum of technical colleges

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DEVELOPMENT AND VALIDATION OF PRACTICAL TASKS ASSESSMENT INSTRUMENT IN BASIC ELECTRONICS FOR QUALITY ASSURANCE OF SENIOR SECONDARY SCHOOL LEAVERS

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Abstract

The study developed and validated practical tasks assessment instrument in basic electronics for quality assurance of senior secondary school leavers. Three research questions guided the study. The study adopted instrumentation design and was carried out in Lagos State. The population for the study was 252 subjects made up of 197 basic electronic students and all the 30 teachers in the 25 senior secondary schools that offered basic electronics. The purposive sampling technique was used to select 30 subjects which comprised of five teachers of basic electronics and 25 students in their year three in Federal Science and Technical College, Yaba, Lagos State. Basic electronic practical task questionnaire and rating scale were used as instruments for data collection for the study. The instrument were face validated by five experts while content validation was carried out using a table of specification prepared based on the Simpson's (1972) model of psychomotor domain in the area of measuring and testing, construction of electronic circuit and fault tracing operations. The draft instrument test was subjected to factorial analysis where six skill items in five tasks were discarded. Based on the result of the validation process basic electronics practical tasks assessment instrument of 32 tasks with corresponding process skills was developed. For reliability testing, five teachers of basic electronics were employed as raters for observing and rating the students as they carried out the given tasks. The internal consistency of the basic electronic practical tasks instrument was then determined using Cronbach alpha reliability method and reliability coefficient of 0.72 was obtained for measuring and testing operation, 0.75 for constructing electrical circuit operation and 0.69 for fault tracing operation with the overall reliability coefficient of 0.77. The inter-rater reliability coefficient of the developed instrument was 0.75 and there was a high degree of agreement among all the five raters used in the study. Recommendations include that relevant external examination bodies should integrate basic electronics practical task assessment instrument to their examination assessment process for certification of the students in basic electronics. Government should organize seminars and workshops for teachers of basic electronics on how to make use of the developed basic electronic practical process instrument. Teachers should be encouraged to make use of the developed assessment instrument.

Keywords: Assessment, instrument, factorial validation, quality assurance, rating scale

Introduction

Occupation and trade subjects are developed to be offered in secondary schools such as technical colleges and conventional secondary schools. The idea is to equip students with knowledge, technical skills and attitudes for employment or further studies. Quality must be assured in the process of teaching and learning of these trade subjects in order to realise the stated objective. There must be quality assurance in the process of teaching and learning of basic electronic for example. Quality must be assured in students, skill acquisition process and quality assurance must be ensured when grading students for certification or graduation to avoid mismatch or wrong judgement about students' maturity for graduation. Considering quality assurance in teaching and learning basic electronic will also ensure quality assurance of secondary school leavers.

Basic electronics is one of the technology or vocational subjects taught in senior secondary schools. Adesina (2002) described electronics as a field of study that is both science and technology oriented. It is concerned with the way in which the movement of electrons through space is controlled and manipulated. In electronics, students study the behavior of electrons and the practical uses to which such study can be applied (Knight, 1994). College-Board (2012) explained that students of electronics learn the basic skills needed to operate, maintain, install and repair electrical and electronic equipment. Specifically, the objectives of basic electronics in senior secondary schools in Nigeria according to Nigerian Educational Research and Development Council (2008) are: to develop a further understanding of the basic concepts and principles of electronics, to build and test simple electronics devices, to develop skills in fault-tracing and repairs, to apply simple electronic devices in the construction of electronic systems, and to prepare adequately for further work in electronics. The basic electronics curriculum has twelve themes to include: electrical quantities, electronic components and circuits, basic electrical theory, thermionic devices, semiconductor devices, power supply, measuring instruments and tools, transducers and sensors, digital basics, communication system, control system, and entrepreneurship in electronics (NERDC, 2008). Students are expected to acquire both the knowledge and technical skills in all these themes for employment or further studies. Audu (2008) described students as some persons undergoing a course of study in any learning environment. In this study, students are learners that are at the third year of senior secondary school offering basic electronics. Students need to be assessed on all these aspects of the basic electronics curriculum in order to measure their level of achievement or goal attainment. Having quality assessment instrument for measuring students' skills in basic electronic results to quality assurance of senior secondary school leavers

Assessment is the process of making judgment or forming an opinion after careful consideration. In the classroom setting, assessment is the process of gathering, analyzing, interpreting and using information about students' progress and achievements to improve teaching and learning (New Zealand Ministry of Education, 2011). According to Aggarwal (2007), assessment is a process of making judgments that are to be used for further planning. It is used in improving the product, the process and even the goals themselves. In the words of Baehr (2011) assessment provides feedback on knowledge, skills, attitudes, and work products for the purpose of elevating future performance and learning outcomes". Assessment therefore is the process of making judgments about the performance of senior secondary students in carrying out the practical tasks in basic electronics, with a view to improve or determine performance. Students are assessed based on learning experiences they are exposed to as contained in the curriculum.

Test with process skill rating is appropriate procedure for finding out the extent to which basic electronic has attained its stated objectives. Bukar (2006) stated that any evaluation instrument with process rating is suitable for assessing technical skills possessed by students in vocational and technical education. Effiong (2006) and Ombugus (2013) stressed the need for observing and rating step by step procedures in assessing process or manipulative skills in vocational and technology education programmes. Oranu (2000) explained that the most appropriate test for assessing technical education students for psychomotor skills is test of competence on the skills they have acquired. Unfortunately, instruments for assessing psychomotor skills in technical and vocational education are very few (Oranu 2000). The reason is that most technical teachers lack the knowledge and skills in instrument development. Many teachers do not possess the knowledge and skills needed for developing reliable and valid assessments instruments (Odu, 2001). Such teachers often assess practical work by merely taking a cursory look at the work, and assigning any grade they think each student deserves (Yallams, 2001). Others adopt the pattern used by the examining bodies in the assessment of practical work in basic electronics – a pattern that is not suitable for teaching and learning. The practical paper in the senior school certificate examination conducted by the notable examining bodies features only two practical questions that do not cover comprehensively the tasks and competencies in the curriculum. Secondly, what is usually assessed is the end result of a process rather than the process itself. Students are not observed and rated while carrying out the practical tasks or displaying their psychomotor skills. It is common knowledge that a student can estimate values for circuit parameters, use the estimated values to plot graphs, and calculate the slopes without necessarily being able to connect the circuit components in the proper way. For proper assessment of practical tasks or psychomotor skills in basic electronic, a relevant, dependable and accurate assessment instrument must be used.

The approach of notable examining bodies in Nigeria in assessing learning outcomes in basic electronic is not dependable and full of misjudgments. These bodies use either assessment in a cumulative form with little or no evidence to the process of psychomotor skill assessment; invariably some important processes in psychomotor skill acquisition that were ought to be assessed is not assessed. This is invariably let to the examiner discriminate to award the marks. Therefore, this situation has a negative effect on student psychomotor skills on the long run. The score sheet or marking scheme checklist used by the examining bodies do not portray clear indication of the extent of psychomotor skills acquired by the students. Okoro (2002) considered this approach subjective and prone to abuse by the evaluators and even the students. Ombugus (2013) stated that to determine whether a student has achieved a desired skill, one may look at the process students went through, the final product that the student produced or perhaps both sometimes, following the correct process is all important. What teachers are currently doing now in secondary is product assessment which is ineffective in revealing actual amount of skills possessed by basic electronic students

In most cases, teachers see process assessment as time waste and a difficult task to execute. Simply because process assessment involves observation and grading of the learners in the entire task skills or step by step followed as students perform the given tasks. Agu (2004) advised that the best way to assess skills in schools and colleges should be based on step by step of performing tasks. Odu 2001 and Agu 2004 emphasized that, with process rating assessment, certain attributes of the learners such as the ability to complete task at given time, safety skills, the competencies and procedures in the use and care of tools and equipment could be systematically observed objectively and comprehensively assessed. However, teachers at classroom or workshop level also embark on product assessment. They lack knowledge in developing instrument that can be used to assess process or psychomotor skills of students in basic electronic. It is also observed that most of the teachers of basic electronic often neglect the assessment of the process involved in the production of practical projects by students in favour of the completed work alone (Ombugus, 2013). Teachers of basic electronic in particular do not take time to observe their students closely as they observed assigned tasks in the workshop. The invited external examiners merely look and rate the finished electrical and electronic projects produced by students instead of judging the production process skills/psychomotor skills by students. The practice of teachers and external examiners give room for students to purchase already made article from market and present for assessment in the school. These students sometimes contract the given tasks or practical projects to fellow students whom they think can do it better in quest for high grades. In a vocational and technical education programme, it is pertinent that teachers become increasingly knowledgeable about various methods of assessment that can be best employed to ensure objectivity and fair judgment. Use of invalid and unreliable instrument always gives wrong judgment about students' psychomotor skill development. The only way to redirect these orientations is to make available valid and reliable instrument for assessing psychomotor skill acquired by students.

Purpose of the Study

The general purpose of this study was to develop and validation practical tasks assessment instrument in basic electronics for quality assurance of senior secondary school leavers. Specifically, the study determined:

1. determine the practical tasks suitable for inclusion in the basic electronics practical process skills instrument.
2. determine the validity of the basic electronic practical process skills scale for senior secondary 3 students
3. establish the reliability of the basic electronics practical process skills scale for senior secondary III students

Research Questions

The following research questions guided the study:

1. What practical tasks are suitable for inclusion in the basic electronics practical process skills instrument for senior secondary III students?
2. What is the validity of the basic electronics practical process skills instrument for senior secondary 3 students?
3. What is the reliability of the basic electronics practical process skills instrument for senior secondary III students?

METHOD

Design of the Study

The study adopted instrumentation design. Ali and Ndomi (2000) described instrumentation research, as a design that deals with the process of developing an instrument for assessing performance of students or obtaining data for decision making. Ali (2006) stated that a study belongs to instrumentation research if the purpose of the study is to produce a new instrument or material for educational practices. The instrumentation design is suitable for this study because it aimed at developing and validating a process skills instrument for assessing students' performance in practical basic electronics in senior secondary schools.

Area of the Study

The area of the study was Lagos State of Nigeria. The state is located in the south western Nigeria. South-west Lagos is the industrial and economic hub of the country. The city of Lagos, located within the state of Lagos was the political capital of Nigeria until it was moved to Abuja. The choice of the area was informed by the appreciable increase in the demand for repairs and maintenance of electronic appliances. This was partly due to the influx of people into Lagos State from all parts of Nigeria. The resultant huge cosmopolitan population has made electronic servicing and repairs more lucrative. In Lagos state, there were 25 schools that offered basic electronics up to senior secondary three (SS 3) level.

Population for the Study

The population for this study consisted of 252 subjects made up of 197 basic electronics students in senior secondary III and all the 30 teachers teaching basic electronics in the 25 senior secondary schools in Lagos State that offered basic electronics as a subject up to senior secondary three. The choice of senior secondary III students of basic electronics was based on the premise that they had received instructions for three years following the basic electronics curriculum.

Sample and Sampling Technique

The sample size for the study was 30 which comprised of five teachers that taught basic electronics and 25 students that offered basic electronics in Federal Science and Technical College (FSTC), Yaba, Lagos State. Purposive sampling technique was used to select FSTC, Yaba, Lagos State from the 25 schools that taught basic electronics up to SS3. This choice was made because the school had a well equipped basic electronics laboratory, all the teachers were qualified and experienced when compared to other schools, and the school was easily assessable for test administration purposes.

Instrument for Data Collection

Basic electronics practical task questionnaire and rating scale were used as instrument for data collection. The development of the practical tasks questionnaire consisting of operations, tasks, process skill items and a rating scale involved the following stages: isolation of objectives of assessment from the curriculum, identification of psychomotor skills areas in the basic electronics curriculum, development of table of specifications, generation of tasks and process skill items, content validation of the draft assessment instrument, development of rating scale for the process skills assessment instrument, trial testing of instrument to determine validity and reliability and final selection of process skill items

Task analysis was used to generate process skill items from the identified operations and tasks. The practical tasks and their corresponding skill items in the questionnaire and rating scale were written to carry four point scale of very important, averagely important, slightly important and not important with numerical values of 4, 3, 2 and 1

Validation of the Instrument

To determine their importance for inclusion in the final instrument, the skill items were subjected to factor analysis, using 0.50 in factor loading at 10% overlapping variance (Ashley et al, 2007). A table of specifications was developed based on the curriculum content giving due consideration to the six levels of Simpson's model of psychomotor domain. This helped in ensuring that the process skill items were adequately distributed across the levels of the domain. The table of specifications, the draft process skills instrument and the basic electronics curriculum for senior secondary schools were submitted for validation to a total of six experts: two of the experts who specialized in technical education were lecturers in tertiary institutions, two experts in basic electronics were teaching at the secondary level of education, while the remaining two were experts in measurement and evaluation in Nigerian universities. The experts assessed the instrument for proper wording, consistency, and representativeness. Suggestions and corrections made by them were utilized to improve the instrument.

Reliability of the Instrument

The internal consistency of the basic electronics practical process skill instrument that contains three operational clusters was determined using Cronbach alpha reliability method. 25 students of S- Truimph International School Ojo, were randomly selected to take part in pilot testing the instrument. The result of the 25 students involved in the pilot test was computed using statistical package for social science (SPSS) 16 versions. The reliability coefficients of the instruments were expressed according to the three operations (measuring and testing, circuit constructing and fault tracing) that make up the basic electronics practical process skill scale; 0.82, 0.86 and 0.81 for the three operations respectively. The scores of these students were analyzed using Kendall coefficient of concordance (Tau) and the inter-rater reliability coefficient of the process skill instrument was determined to be 0.89

Method of Data Collection

All the five research assistants used the basic electronics practical process skills scale to assess the performance of the students. The instrument was administered on basic electronic students in the SS 3 class under examination condition. Within each practical contact period a minimum of one and a maximum of three tasks were assessed. The students were briefed on how to undergo the assessment. Thereafter, each student was assigned to a work station and instructed to carry out the tasks starting with task one. Each task was given a specified time of between 20minutes and 1 hour. The raters rated the students and submitted the rated instrument to the principal of the school. The researcher was going to Federal Science and Technical College, Yaba weekly to retrieve the used copies of the basic electronics practical process skills scale from the Principal of the college. The ratings of the students were used as data for answering the research questions and for testing the hypotheses.

Method of Data Analysis

To answer research question 1 and 2, the identified tasks and process skill items were subjected to factor analysis. In answering research question 3, content validity was ensured through the use of a task of specification that was based on Simpson's taxonomy of the psychomotor domain in generating the items. In addition, comments of experts in technical education, in electronics and in measurement and evaluation were used to ensure face and intent validity of the skill items. To answer research question 4, Cronbach alpha coefficient was used to determine the reliability coefficient of the basic electronics practical process skills scale. Mean and standard deviation were used to answer research question 5 in order to determine the ability levels of the senior secondary 3 students of basic electronics. Analysis of variance (ANOVA) was employed to test the three null hypotheses formulated for the study at 0.05 level of significance.

For selecting the tasks and process skill item that are suitable for inclusion in the Basic Electronics Practical task assessment instrument, 0.50 was utilized as factor loading at 10% overlapping. Task and process skill item with factor loading of 0.50 and above were considered suitable for inclusion in the instrument, while task item and process skill item with factor loading less than 0.50 were considered not suitable for inclusion in instrument.

Results

Research Question 1

What practical tasks are suitable for inclusion in the Basic Electronics Practical Process Skill scale?

The outcome of the factor analysis is shown in Table 1.

Table 1
Factor Analysis of the Basic Electronics Practical Tasks for their suitability and Inclusion in the Instrument

S/N	Basic Electronics Practical Tasks	Factor loading at 0.05	Remarks
1	Measuring current using ammeter	0.841	Required
2	Measuring voltage with voltmeter	0.810	Required
3	Measuring resistance with ohmmeter	0.913	Required
4	Measuring power using single phase wattmeter	0.910	Required
5	Measuring power using three phase wattmeter	0.824	Required
6	Using multimeter to measure DC Voltage (DC,V)	0.844	Required
7	Using multimeter to measure AC Voltage (AC,V)	0.888	Required
8	Using multimeter to measure DC Current (DC, A)	0.913	Required
9	Using multimeter to measure AC Current (AC,A)	0.900	Required
10	Measuring resistance using multimeter	0.824	Required
11	Using multimeter to measure voltage of a battery	0.854	Required
12	Using multimeter for continuity test	0.888	Required
13	Using oscilloscope to measure electrical quantities e.g amplitude, frequency, period	0.863	Required
14	Determining waveform shapes of electronic components using oscilloscope	0.904	Required
15	Maintaining electronic measuring instrument	0.901	Required
16	Performing simple experiments such as ohm’s law		
17	Constructing step down transformer	0.765	Required
18	Constructing simple circuits using semi conductor devices such as diode, transistor, resistor etc.	0.787	Required
19	Constructing electric bell	0.782	Required
20	Constructing half wave rectifier	0.608	Required
21	Constructing full wave rectifier	0.778	Required
22	Constructing simple analogue ohmmeter	0.63	Required
23	Carrying out forward biasing of a diode	0.741	Required
24	Carrying out reverse biasing of a diode	0.810	Required
25	Carrying out wiring of electrical circuit	0.700	Required
26	Constructing a simple common emitter transistor amplifier	0.824	Required
27	Dismantling of electrical/electronic circuit or unit	0.813	Required
28	Identifying bad components/faults in the circuit	0.842	Required
29	Removing bad components from the circuit	0.808	Required

30	Fixing in good electronic components in the circuit	0.652	Required
31	Coupling the maintained circuit/unit	0.904	Required
32	Testing the unit or equipment for functionality	0.901	Required

Data in Table 1 reveal that 32 basic electronic practical tasks had their factor loading ranged from 0.608 to 0.913 and were all greater than factor loading of 0.50 at 10% over lapping variance with three component matrix. This indicated that all the 32 basic electronics practical tasks satisfied the criteria for inclusion in the final copy of instrument for secondary school students of basic electronics.

Research Question 2

What is the validity of the basic electronics practical tasks assessment instrument?

The data for answering research question two are presented in Table 2

Table 2

Validated Tasks and Practical Process Skill Items in Measuring and Testing, Construction of Electrical/Electronic Circuit and Faults Tracing and Repair Operations

S/N	Basic Electronics Practical Tasks	No of items	Remarks
A	Measuring and testing operation	119	Valid
1	Measuring current using ammeter	12	Valid
2	Measuring voltage with voltmeter	11	Valid
3	Measuring resistance with ohmmeter	12	Valid
4	Measuring power using single phase wattmeter	5	Valid
5	Measuring power using three phase wattmeter	5	Valid
6	Using multimeter to measure DC Voltage	4	Valid
7	Using multimeter to measure AC Voltage	3	Valid
8	Using multimeter to measure DC Current	4	Valid
9	Using multimeter to measure AC Current	3	Valid
10	Measuring resistance using multimeter	6	Valid
11	Using multimeter to measure voltage of a battery	4	Valid
12	Using multimeter for continuity test	3	Valid
13	Using oscilloscope to measure electrical quantities e.g amplitude, frequency, period	16	Valid
14	Determining waveform shapes of electronic components using oscilloscope	11	Valid
15	Maintaining electronic measuring instrument	12	Valid
16	Performing simple experiments such as ohm's law	6	Valid
B	Constructing Electrical/Electronic Circuit operator	81	Valid
17	Constructing step down transformer	11	Valid
18	Constructing simple circuits using semi conductor devices such as diode, transistor, resistor etc.	9	Valid
19	Constructing electric bell	9	Valid
20	Constructing half wave rectifier	8	Valid
21	Constructing full wave rectifier	4	Valid
22	Constructing simple analogue ohmmeter	10	Valid
23	Carrying out forward biasing of a diode	6	Valid
24	Carrying out reverse biasing of a diode	6	Valid
25	Carrying out wiring of electrical circuit	8	Valid
26	Constructing a simple common emitter transistor amplifier	8	Valid
C	Fault Tracing and Repair Operation	42	Valid
27	Dismantling of electrical/electronic circuit or unit	12	Valid
28	Identifying bad components/faults in the circuit	5	Valid
29	Removing bad components from the circuit	8	Valid

30	Fixing in good electronic components in the circuit	9	Valid
31	Coupling the maintained circuit/unit	7	Valid
32	Testing the unit or equipment for functionality	4	Valid

The table of specifications constructed based on Simpson's (1972) model of psychomotor domain revealed that out of 245 process skill items, 8.57% comprising 2 process skill items were assessing the perception level; 8.16% comprising 20 process skill items were assessing the set level; 24.5% comprising 60 process skill items were assessing the guided response level, 23.26% comprising 57 process skill items were assessing the mechanism level; 26.5% comprising 69 process skill items were assessing the complex overt response level and 7.34% comprising 18 process skill items were assessing the adaptation level. The origination level of Simpson's model was not involved in the study because it was not in the senior secondary school curriculum. These results show that six levels of the domain were adequately covered in the assessment used. This means that all the 245 process skill items were valid for inclusion in the basic electronics process skill instrument.

The draft copies of the instrument were subjected to face and contact validation carried out by six experts: two of the experts who specialized in technical education are lecturers in tertiary institutions, two experts in electronics are teaching at the secondary level of education, while the remaining two are experts in measurement and evaluation in Nigerian Universities. The experts were to review reword and advice on the appropriateness and clarity of the tasks, add other tasks which were suitable but had not been included in the draft instrument and remove other tasks which were considered not suitable, ambiguous or redundant. On the whole, as shown in Table 2, there were still 32 tasks with 245 corresponding process practical skill items to be included in the basic electronics process skill instrument.

Research Question 3

What is the reliability of the basic electronics practical task assessment instrument?

The data for answering research question four are presented in Table 3

Table 3
Reliability Estimates for Basic Electronic Practical tasks for Assessing Students in Senior Secondary Schools

S/N	Basic Electronics Practical Tasks	Cronbach alpha coefficient	No of items	Remarks
1	Measuring current using ammeter	0.83	14	Highly Reliable
2	Measuring voltage with voltmeter	0.81	11	Highly Reliable
3	Measuring resistance with ohmmeter	0.88	12	Highly Reliable
4	Measuring power using single phase wattmeter	0.78	6	Highly Reliable
5	Measuring power using three phase wattmeter	0.77	5	Highly Reliable
6	Using multi-meter to measure DC Voltage (DC,V)	0.72	4	Highly Reliable
7	Using multi-meter to measure AC Voltage (AC,V)	0.76	3	Highly Reliable
8	Using multimeter to measure DC Current (DC, A)	0.67	4	Highly Reliable
9	Using multimeter to measure AC Current (AC,A)	0.68	3	Highly Reliable
10	Measuring resistance using multimeter	0.88	6	Highly Reliable
11	Using multimeter to measure voltage of a battery	0.78	4	Highly Reliable
12	Using multimeter for continuity test	0.73	3	Highly Reliable
13	Using oscilloscope to measure electrical quantities e.g amplitude, frequency, period	0.89	18	Highly Reliable
14	Determining waveform shapes of electronic components using oscilloscope	0.69	12	Highly Reliable
15	Maintaining electronic measuring instrument	0.81	12	Highly Reliable
16	Performing simple experiments such as ohm's law	0.72	6	Highly Reliable
17	Constructing step down transformer	0.81	11	Highly Reliable

18	Constructing simple circuits using semi conductor devices such as diode, transistor, resistor etc.	0.68	9	Highly Reliable
19	Constructing electric bell	0.79	9	Highly Reliable
20	Constructing half wave rectifier	0.82	8	Highly Reliable
21	Constructing full wave rectifier	0.74	4	Highly Reliable
22	Constructing simple analogue ohmmeter	0.79	14	Highly Reliable
23	Carrying out forward biasing of a diode	0.81	6	Highly Reliable
24	Carrying out reverse biasing of a diode	0.68	6	Highly Reliable
25	Carrying out wiring of electrical circuit	0.88	8	Highly Reliable
26	Constructing a simple common emitter transistor amplifier	0.79	8	Highly Reliable
27	Dismantling of electrical/electronic circuit or unit	0.83	12	Highly Reliable
28	Identifying bad components/faults in the circuit	0.84	5	Highly Reliable
29	Removing bad components from the circuit	0.81	8	Highly Reliable
30	Fixing in good electronic components in the circuit	0.74	9	Highly Reliable
31	Coupling the maintained circuit/unit	0.77	7	Highly Reliable
32	Testing the unit or equipment for functionality	0.64	4	Highly Reliable
	Entire reliability coefficient	0.77		Highly Reliable

Analysis in Table 3 reveals that each of the 32 basic electronic tasks contained in the instrument had a high reliability coefficient ranging from 0.64-0.88. Also, the reliability coefficient of the entire test was computed to be 0.77 which indicated that the assessment instrument was a refined test in consonance with the recommendation of Uzoagulu (2011) which stated that acceptable reliability of test used in education is generally in the range of 0.50 to 0.95. Therefore given the high reliability coefficients for various tasks in the instrument, the answer to research question about the reliability of the tests would be in the affirmative. Thus, the items in the instrument for assessing the practical process skills of students in basic electronics at the senior secondary level were reliable. In order to establish the inter-rater reliability in the process skill items, a field testing was conducted using 25 SS3 students of basic electronic and five teachers as raters. Data obtained from the field testing was analysed using Kendall coefficient of concordance, Tau to find out if there is significant relationship between the five raters scoring in the basic electronic practical process skill assessment instrument. The degree of agreement or coefficient of concordance among the raters on the scoring was therefore computed. The inter rater reliability of the five raters were found to be 0.781, 0.701, 0.861 and 0.706 for ratters 1and 2, 2 and 3, 3 and 4, 4 and 5 respectively. Consequently, the interrater reliability for the five raters is 0.75. These values were in agreement with the recommendation by Cohen, Manion and Marrison (2011) that a coefficient ranging from 0.51 to 1.00 indicate high degree of agreement between 2 or more examiners.

Discussion of findings

The findings that 32 tasks were relevant to be performed by senior secondary school three in basic electronics was supported by the opinion of Ombugus (2013), Okoro (2003), Olaitan (2003) and Garba (1993). The authors noted that items that satisfied all psychometric properties with high loading factors are relevant and worthy for inclusion in the assessment instruments. All the tasks were found relevant to be performed by students offering basic electronic in SS3 classes and were found relevant enough to be included in the assessment instrument. Some of the major tasks in the three different operations of basic electronics include measuring current using ammeter, measuring voltage with voltmeter, measuring resistance with ohmmeter, measuring power using single phase wattmeter, measuring power using three phase wattmeter, using multimeter to measure DC Voltage (DC,V, using multimeter to measure AC Voltage (AC,V), using multimeter to measure DC Current (DC, A), using multimeter to measure AC Current (AC,A), measuring resistance using multimeter, using multimeter to measure voltage of a battery and using multimeter for continuity test. That is, all the 32 tasks in three major operations were relevant and satisfied all the psychometric properties of a good items and therefore worthy for inclusion in the basic electronic practical process skill instrument. Inclusion of relevant tasks in assessment instrument helps in measuring the stated objectives adequately. Psychomotor domains are objectives two and four of basic electronic are measurable through Simpson's taxonomy classified into: Perception, Set, Guided response, Complex overt response, Mechanism, Adaptation and Origination, Simpson in Olaitan (2003). According to Ogwo and Oranu (2006), a combination of these three domains - cognitive, affective and psychomotor in any assessment instrument would reveal observable results for the achievement of the entire objectives of basic electronics. This could improve students' interest in electronic occupations and careers for a competence - based vocational education programme like the basic electronics. Williams (2009) noted that individual manipulative skills need assessment with appropriate test.

Findings of the study reveal valid 32 tasks and 242 process skill items. This was ascertained by involving five experts from the Departments of Vocational Teacher Education and science education of the University of Nigeria, Nsukka. These experts were given the copies of the instrument to vet and indicate how relevant the skill items were for assessing the students in carrying out practical activities in basic electronic. This is called face validation and is the first stage of instrument development process, and this is in agreement with the opinion of Bakare (2014) who stated that in face validity or validation, the experts are hired to vet, remove, reword and replace any irrelevant item(s) of the instrument with useful ones. The finding was agreed with opinion of Olaitan (2003) that face validity of psychomotor learning activity could be pursued by submitting the list of skill items drawn up for use to experts for review so as to yield compromise or consensual agreement on the importance of the items and such was the case in this study.

To ascertain the content validity of basic electronic practical process skill instrument, a table of specification was constructed based on the six levels of psychomotor domain of Simpson (1972) and this showed that out of 242 skills, 8% comprising 20 skill items were psychomotor domain, 8% comprising 20 practical skill items were assessing the perception level; 8% comprising 20 practical skill items were assessing the set level; 25% comprising 61 practical skill items were assessing the guided response level, 25% comprising 61 practical skill items were assessing the mechanism level; 26.5% comprising 65 practical skill items were assessing the complex overt response level and 8% comprising 20 practical skill items were assessing the adaptation level.

The findings are in agreement with the finding of Amuka (2002) who established content validity from detailed and comprehensive table of specification and comments of some experts in vocational education at the University of Nigeria, Nsukka. Also, the finding of the study was in consonance with the finding of Ombugus (2013) who developed and validated workshop based process skill tests in mechanical engineering craft for assessing students in technical colleges in Nassarawa State and found out 40 tasks and 305 skill items valid by using table of specification. Okeme (2011) who developed and validated psycho productive skill multiple choice items for students in agricultural science in secondary schools, achieved content validity by carrying out task analysis related to the area of study and getting experts in agricultural education to comment on how relevant the items were for use in the developed instrument. Garba (1993) added that job/task analysis helps in building validity in an instrument.

In addition to face and content validation of the basic electronic practical process skill instrument, factorial validity test was conducted using factor analysis where 32 tasks and 242 skill items were found valid enough for inclusion in the basic electronic practical process skill instrument. The findings agreed with the findings of Bakare (2014) who employed factor analysis in his study and found 140 out of 143 tasks valid for the development of cell phone maintenance training modules for national diploma students. The finding of the study was supported by the conclusions of Balogun and Mustapha (2014) and Ugbalu

(2012). In their various studies, the authors concluded that test items that have high factor loading and satisfy other psychometric properties are important for selection.

It was found out that 32 tasks and 242 corresponding practical process skill items had their internal consistency ranged from 0.64 to 0.88 while the entire item had reliability coefficient value of 0.77. This means that all the tasks and their process skill items are reliable enough to be included in the basic electronics practical process skill instrument. These findings are in agreement with the findings of Ombugus (2013) in a study on development and validation of workshop-based process skill test in mechanical engineering craft practice for assessing students in technical Colleges where it was ascertained that the reliability of the WBPST is 0.76. The inter-rater reliability coefficient of the WBPST was 0.57. Also these findings agreed the findings of Bukar (2006) who conducted a study on development and validation of laboratory based tests for assessing practical skills of higher national diploma students in electronic maintenance and repairs where it was found out the reliability coefficient values of the tests on measuring instrument and testing, fault finding and repairs and alignment are 0.71, 0.55 and 0.47 respectively.

Conclusion

Basic electronics is one of the practically oriented subjects found in the curriculum of senior secondary schools in Nigeria. The subject is to, among other things, equip students with knowledge and skills in measuring and testing, construction of simple circuits and fault finding. The teachers of basic electronics have not been adequately assessing the practical skills acquired by their students due to lack of process skills assessment instruments. The present curriculum for secondary school does not provide assessment tools for use and there is a dearth of valid and reliable instruments for assessing the practical skills acquired by the students. Technical and Vocational teachers often neglect the assessment of the processes involved in students' practical work in favour of assessment of the completed work alone. The present emphasis on product assessment in the psychomotor domain to the detriment of process assessment will not enable us produce individuals with the necessary practical skills. Some graduates of the basic electronics course have been adjudged to have little or no practical work skills. The situation necessitated the development and validation of a basic electronics practical process skills scale. All procedures needed for the development of a valid and reliable instrument were followed to ensure that the gap created by lack of such instruments was properly filled.

Recommendations

The study recommended the following for implementation:

1. The external examination bodies (WAEC and NECO) should integrate basic electronics practical process skills in their examination for certification of the students in basic electronics.

2. Government should organize seminars and workshops for teachers of basic

electronics on how to make use of the developed basic electronics practical process skills instrument

3. Teachers of basic electronic should be encouraged to make use of the developed

basic electronic practical process skills instrument for assessing students in basic electronics

4. Functional materials and facilities that will make the use of basic electronics practical instrument possible in secondary schools should be provided by government and parents' teachers' associations.

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EFFECTIVE UTILIZATION OF BLENDED LEARNING MODELS FOR TEACHING AND LEARNING OF HOME ECONOMICS IN SECONDARY SCHOOLS IN ENUGU STATE

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Abstract
The use of blended learning models as a tool in refocusing TVET instructional delivery in Nigeria Schools in the digital era cannot be over emphasized. This paper examined effective utilization of blended learning models for teaching and learning of home economics in secondary schools in Enugu State. It acknowledges the improvement of skill with combination of face- to face learning instruction to reduce skill mismatch in the field of work. The concepts and importance of secondary school home economics were dealt with. Mode of teaching of home economics in secondary schools, traditional methods of teaching and concept of globalization were examined. The study also dealt with the use of blended learning strategy for teaching of home economics in schools and colleges, need for teaching home economics, various blended learning models and their strengths. It highlighted perception of teachers and students on blended learning as a method of teaching Home Economics / problems hindering effective utilization of blended learning. Based on these reviews, the paper concluded that the main essence of blended learning model in teaching and learning of home economics is for human resource development. Human resources imply the personal characteristics, capability, talent, skill, traits and physical of people in an organization. Therefore, it is recommended that the government at all levels should formulate critical TVET-policies for effective implementation of home economics and other vocational education subjects. Well qualified and competent teachers should be employed by government and proprietors for teaching home economics in schools and colleges
Keywords: Home Economics, Blended Learning, Models, Teaching and Learning, Curriculum, Teachers

Introduction

One way in which a training institution can train students for quality education and acquisition of skills and right attitudes is by providing reached curriculum in various areas of interest. Area of interest could be home economic or other subjects. Home economics (HE) for example is one of the vocational subjects in secondary schools where students are trained to acquire basic skills and knowledge about family living, the welfare of individuals and society. It prepares students to participate effectively in a changing world. The objective of home economics according to Olaitan and Agusiobo (1981) and Mba, (1986) is geared towards educating youths for family living. This is also in line with the ultimate goal of International Federation for Home Economics (IFHE) (2008) which is the improvement of quality of everyday life for individuals. Home Economics is both a body of theoretical knowledge based on exact Sciences and humanities and forms of practice backed up by appropriate technology (IFHE, 2008). As a subject that focuses on theoretical knowledge and practice, Home Economics is expected to contribute meaningfully to the solution of the problems of the society such as changing realities of globalization and competiveness.

The central focus of home economics education is the wellbeing of people within the context of their personal, family, community and work roles. Home economics education is about becoming independent, connecting with others and taking action towards preferred futures that support individual and family wellbeing (Home Economics Institute of Australia, 2016). Through home economics education in schools and colleges, students become empowered, active and informed members of society. Home economics education has the potential to play a major role in supporting young people to participate effectively in changing social, cultural and economic times. In order to capitalise on this potential, teachers and curriculum leaders must connect with students' worlds, use contemporary educational research as a guide to planning and develop practices that are empowering. The teaching of home economic as one of the vocational subjects in the curriculum of secondary schools is in the hands of teachers who qualify to teach it (Home Economics Institute of Australia, 2016). To achieve the purpose of home economics in secondary schools, the capacity of teacher must be built in the area of implementation or teaching. Teaching or implementation of school subjects is seen as a crucial aspect of education. The acquisition of relevant knowledge and skills by students of home economics for example depends on the capacity of teachers and type of teaching methods or strategies selected for implementing it. Teachers are therefore expected to select appropriate modern teaching methods or strategies for teaching knowledge and skills in home economics to students of secondary schools. One of such modern teaching strategies is blended learning. Bower, Dalgarno, Kennedy, and Mark (2015) described blended learning as a teaching and learning method where remote students participate in such as videoconference, web conferencing or virtual worlds.

Concepts and Importance of Secondary School Home Economics

Secondary school is a place where secondary education is given to children between the age of 10 and 16 years. In secondary schools in Nigeria, various vocational subjects are offered and one of them is home economics. Home economics is a field of study that deals with the economics and management of the home and community. Home economics is divided into three major areas namely; food and nutrition, clothing and textile and home management. According to Goldstein (2012), home economics deals with the relationship between individuals, families, communities, and the environment in which they live. Home Economics Education according to Nwabunwanne (2006) is a meaningful programme of studies that aims at promoting personal growth. Home Economics focuses on meeting the need of the family, the community and society at large, which is the nation. Thus the main concern of Home Economic Education as explained by Anyakoha (1995) is to help individuals live a purposeful, meaningful and satisfying life through wise use and management of their human and available material resources. Skill acquisition is a major way of developing human resources. Skills in the three areas of home economics are taught to students of secondary schools. Home economics equips secondary school students with knowledge and skills in clothing and textiles, foods and nutrition and home management (Josh, 2015). It is always taught in classrooms and laboratories. Besides verbal instruction given to students in home economics, practicals are vital for equipping students sufficiently with professional skills that will enable them to be productive and to reduce skill mismatch in the world of work. Home economics education is so importance to human beings and their environment. There is no area of human life where home economics education has not made impact (Elias, 2006). The study of home economics has been around for over a century, and started as basic outreach programs that taught about food, textile and family sciences to rural communities (Josh, 2015). As the demand for home economics increased, this is where we saw the beginning of and growth in home economics, the basic skills for life, because home economics focuses on the health of the individual, family, and the community. Home economics according to Tucker (2017) is a valuable addition to a secondary school curriculum because it teaches students practical skills for daily living. In the process of transitioning from childhood to adulthood, secondary school students need training in practices such as nutrition, financial responsibility, home management and child development so they can live safe and productive lives.

Secondary school students learn about safety and risk-avoidance principles in home economics classes. For example, they learn about dangers associated with leaving a stove unattended, mixing hot grease with water, leaving wounds untreated, forgetting to monitor young children, preventing household fires, working with raw meat and living in an unsanitary environment (Josh, 2015). For students who do not learn safety practices at home, knowledge and skills acquired in home economics classes may help prevent serious illness or injury. Students also learn about health risks and medical concerns associated with poor nutrition, lack of exercise and unhealthy eating habits often leading to obesity. For example, the goal of the home economics is to teach students about healthy food choices, food preparation, food groups, care of kitchen appliances, healthy food buying strategies and nutrition. Students learn how to plan and prepare tasty, nutritious meals, helping them develop healthy long-term eating habits. Home economics also teach students how to balance a check book, apply and interview for a job, live on a budget, pay bills and exercise fiscal responsibility (Bix, 2002). They also teach constructive career content such as workplace issues, career growth, conflict resolution, and communication strategies. Life skills courses also encourage personal development, decision-making skills and interpersonal behaviors that help both at home and in the workplace. After secondary school graduation, students often live in society. Home economics prepare them to contribute to such a community living environment, teaching them how to share responsibilities such as cooking, cleaning, organizing and shopping. Not all secondary school students become parents later in life, but many do. Home economics teach students effective, responsible parenting skills so they are equipped to take care of a child's basic needs. Teachers of home economics in secondary schools in Nigeria also teach skills related to nutrition, infant care, car safety and home safety. Home economics helps students discover themselves and the reasons and importance of home economics are also taught by teachers. According to Olaitan (2002), during practical in home economics individual are taught skills that are immediately relevant to a special occupation or group of occupation. Thus, it increases the mastery of knowledge acquired and enables students to develop imaginative thinking that can enhance their creative potentials in home economics. Home Economics exposes students to a wide variety of equipment and processes and utilizing them to meet development needs of the nation. In the face of current global competition, steps have to be taken to keep a float and absent of the global challenges. Thus there is need for teaching home economics especially to Secondary Schools Students who are the future leaders of tomorrow. Since home economics in an important subject in the curriculum of secondary schools, it must be taught by using emerging technologies and modern strategies.

Teaching of Home Economics in Secondary Schools, Traditional Methods of Teaching and Globalization

Globalization has reached the farthest corners of the planet and the world is said to have become a big global village. The knowledge brought about by globalization through increased human, technical and social now-how is being greatly shared thus allowing for learning and transfer of successful policies and programmes. In the view of Okorie (2005), the emergence of globalization has been possible to create more economic social, educational and political empowerment for individuals. Also, Anyakoha (2002) noted that globalization is transforming the world as people’s actions and way of life are affecting lives of others living thousands of kilometers apart. Educational providers globally are adopting online education, either with fully online education, either with fully online taught courses that replace face-to-face instruction or blended learning. Corroborating this view, Graham (2009) noted that traditional instruction is enhanced with online content. According to Davis (2008) preparing students for learning in the 21st century enables them to become autonomous lifelong learners and being proficient learners, as many information sources will be accessed digitally. For this reason, schools have professional responsibility to expose students of home economics to e-learning particularly in secondary schools. As school students have different needs and characteristics, further research is needed to inform practices and blended modes of education in schools. In their submission of Cavanaug, Barbaur & Clark (2009), it is useful to note that practical subjects such as home economics include particular challenges and opportunities for blended learning; for example case studies for IOWA learning online learning include an award winning approach to Home Economics with a chef youth apprenticeship programme. Although the body of literature on blended learning models is limited; it is clear that this mode of school education is developing fast (Condie, 2011). In Nigeria, the face-to-face instructional methodology has been the traditional method of classroom delivery. However, in this digital era where convergent technologies and other emerging technologies have become the most critical element in achieving a competitive advantage, blended learning can now aim to reach its full potential. It therefore becomes imperative to expose secondary school students to online courses. Hence, the government and other enabling individuals in society shall provide appropriate facilities to support online courses in the educational system. Teachers of home economics and other vocational education courses in modern society rely on electronic technology for effective implementation of school subjects. Electronics technology has become a major instrument in the implementation of almost all subjects and areas of life (Bakare, 2009). This is due to the effect of information and communication technology and globalization. According to Bakare (2009) both agents of transformation depend solely on electronics technology. Acknowledging the importance of home economics in the development of any society, United Nations Educational, Scientific and Cultural Organization (UNESCO) and International Labour Organization (ILO) (2002), recommended that all technical and vocational education (TVE) system in the 21st century should be geared towards lifelong learning. Poisson (2000) explained that schools should, in addition to academic skills, inculcate workplace skills such as creativity; problem solving; collaborative skills and higher order thinking skills, in order to increase the students' flexibility and job mobility. Bakare (2009) stated that, this will make them acceptable to the present and envisaged changes. These challenges, therefore, necessitate a shift from traditional methods of teaching to modern teaching methods of which the blended learning is one of them

Teaching of Home Economics by Using Blended Learning Strategy

Teaching is the art of inculcating knowledge and skills to students in a classroom setting. Teachers use different teaching strategies/methods to implement school subjects. Some teaching methods or strategies are appropriate or efficacious than another in teaching a particular subject. Some modern teaching methods enable students to acquire maximum skills and knowledge required for success in a particular occupation or area. One of such modern teaching methods or strategies is blended learning. Blended learning, hybrid Learning, technology-mediated instruction, web enhanced instruction, and mixed-mode instruction are often used interchangeably. Blended learning (BL or b-learning) is an instructional methodology, a teaching and learning approach that combines face-to-face classroom methods with computer mediated activities to deliver instruction. Norm (2012) suggested that, blended learning designated the range of possibilities presented by combining internet and digital media with established classroom forms that require the physical co-presence of technology-based training emerged as an alternative to instructor-led training in the 1960's on mainframes and mini-computers. Blended learning mostly involves combining internet and digital media with established classroom forms that require the physical co-presence of the teacher and students (Friesen, 2012). It is a teaching and learning method where remote students participate in such as videoconference, web conferencing or virtual worlds (Bower, Dalgarno, Kennedy, & Mark, 2015). Furthermore, b-learning otherwise called hybrid learning is a combination of e-learning and the traditional f2f learning or instructor-led training (ILT) with coaching, assignments and projects provided as a support and reinforcement tool when necessary (Chui & Manjit, 2006). According to Garrison and Vaughan (2008), b-learning is seen as the thoughtful fusion of traditional f2f and online learning experiences. The basic principle of b-learning is that f2f oral communication and online written communication are optimally integrated such that the strengths of each are blended into a unique learning experience congruent with the context and intended educational purpose. According to Diaz and Diniz (2014), b-learning meets multiple and differentiated instructional online activities thus have the potential for accommodating students with distinct learning needs. Additionally, effective b-learning environment enable users to participate in the creation of knowledge through social and technological affordances, and in the process promote skills and competencies (Redecker, Ala-Mutka, Bacigalupo, Ferrari, & Punie, 2009; Diaz & Diniz, 2014).

Furthermore, b-learning models are known to be flexible and adaptable; hence, they are used by teachers to create instructional activities and assignments that give students the opportunity to work collaboratively, tapping their interest and abilities in social learning. Blended synchronous learning can provide students with greater educational access and, in many ways, offer more inclusive and equitable learning experiences to those who are geographically isolated or cannot be in classes (Cunningham, 2014; Norberg, 2012). In addition, project-based and experiential learning have also been identified to be facilitated through blended models, giving students the opportunity to conduct research online, participate in group work and then develop multimedia projects that showcase their learning processes and outcomes (Blackboard, 2009). B-learning models, according to Eduviews (2009), are extensively used at all levels of education throughout America and Europe. For example, at Albuquerque Public Schools, NewMexico, b-learning is used in teaching English as a Second Language to students. In Henrico County Schools, Virginia, b-learning is helping students fulfill physical education, mathematics, and English requirements and helping teachers meet professional development requirements.

This is high time for teachers to adopt blended learning for teaching home economics in secondary schools. The adoption of blended learning in teaching Home Economics will go a long way in preparing students for life learning. Home Economics is a practical oriented course therefore blended learning approaches can help students to increase their independent learning skills, with the support of an outside facilitator. Students also become confident to interact online and benefit from the extended communication and collaboration opportunities. Learning is facilitated when many sense organs are activated. For the effective teaching-learning process, the teacher should endeavour to create and sustain an adequate learning environment. This then calls for the use of blended models which reinforces and strengthens the progress of the learner. Also, the utilization of blended models in teaching Home Economics will sustain student's interest and encourage their active participation other than the use of verbal medium.

Blended Learning Models and their Strengths

Model is the representation of reality. Blended learning is a formal education program in which students learns at least in part through online learning, with some element of student control over time place, path, and/or Pace. It is also a modality along each student's learning path within a course or subject and are connected to provide an integrated learning experience. According to Michael (2014) blended learning is a combination of online learning and supervised brick and mortar location away from home According to Michael (2014) blended learning programs have four models: Rotation, Lab Rotation, Flipped Classroom and individual Rotation model. Howard (2015) stated that blended learning is a big concept with four models namely; Flipped classroom station rotation model, lab rotation model and flex rotation model. The rotation model includes four sub-models; station rotation, lab rotation, flipped classroom and individual rotation. Blended learning in this paper is classified into four broad models namely; rotation, flex, A La Carte and enriched virtual models. The strengths of blended learning is its combination of both face-to-face and online teaching methods into one integrated instructional approach.

Rotation model is a course in which Students rotate in a fixed schedule or at the teacher's discretion between learning modalities at least one of which is online learning. Other modalities might include activities such as Pencil-and Paper assignments. The students learn mostly on the brick-and-mortar campus except for any homework assignments. Station Rotation is a sub-model of a rotation model. It is a course in which students experience the rotation model within a contained classroom or group of classrooms (Pope, 2010). The Station Rotation Model differs from the individual Rotation Model because students rotate through all of the stations, not only those on their custom schedules.

Lab rotation is a course in which students rotate to a computer laboratory for the online-learning station. The classroom is reserved for other learning activities. Howard (2015) stated that the difference between lab rotation and station rotation model is that in station rotation model, students are rotating within a given classroom, whereas in the Lab model, they are actually rotating out to a learning in which they do their online learning. Flipped classroom according to Chui and Manjit (2006) is a course or subject in which students participate in online learning off-site in place of traditional homework and then attend the brick-and-mortar school to face-to-face, teacher-guided practice or projects. The primary delivery of contents and instruction is online, which differentiates a flipped classroom from students who are merely doing homework practice online at night. If in the past, classroom time is spent at lecturing to students, now in a flipped model, this time is utilized to encourage individuals learning and improve student-teacher interaction. While the instructional or teachable contents available in class, however this content is mainly designed in such a way to be accessed outside class which is na great way for struggling students to learn at their own pace (Garrison and Vaughan, 2008). Individual rotation is a subject or course in which each student has an individualized playlist and does not necessarily rotate to each available station or modality an algorithm or teacher(s) sets individual student schedules.

In the flex model, online learning forms the backbone of a students learning, even if it directs students to offline activities at times (Bower, Dalgarno, Kennedy, & Mark, 2015). It is able to move flexibly through different learning modalities with the goal of optimizing their learning experiences for students in essence has a customized fluid scheduled among learning modalities. The teacher of record is on-site, and students learn mostly on the brick and mortar campus, except for any home work assignments. The teacher of record or other adults provide face-to-face support on a flexible and adaptive as-needed basis through activities such as small-group instruction, group projects and individual tutoring. Some implementations have substantial face-to-face support, whereas others have minimal support. A La Carte model is a course that a student takes entirely online to accompany other experiences that the student is having at a brick-and-mortar school (Cunningham, 2014). The teacher of record for the A La Carte course is the online teacher this differs from online learning because it is not a whole-school experience.

Enriched virtual model is a course or subject in which students have required face-to-face learning sessions with their teacher of record and then are free to complete their remaining coursework remote from the face-to-face teacher. Online learning is the backbone of student learning when the students are located remotely. According to Michael (2014), many enriched virtual programs began as full-time online schools and then developed blended programs to provide students with brick-and-mortar school experiences. Diaz and Diniz, (2014) stated that the enriched virtual model differs from flipped classroom because in enriched virtual programs, students seldom meet face-to-face with their teachers every weekday it differs from a fully online course because face-to-face learning sessions are more than optimal office hours or social events; they are required.

Need for Teaching Home Economics

Blended learning method is more effective that purely face-face classes. Kanuka (2004) noted that blended learning methods can result in high levels of student achievement more effective than face-face learning. By using a combination of digital instruction and one-

one face time, student can work on their own with new concepts which frees teachers up to circulate and support individual students who may need individualized attention. The use of Information and Communication Technology has been found to improve student attitude toward learning. Blended learning can lower costs by putting classrooms in the online space and it essentially replace pricesly textbooks with electronic devices that students often bring themselves to class. E-textbooks, which can be accessed digitally, may also help to drive down textbook budgets. Blended learning allows students to work at their own pace, making sure they fully understand new concepts before moving on (Mustafa, 2015). Some online institutions connect students with instructors via web conference technology to form a digital classroom. Therefore, it is not out of place to say that blended learning models can be utilized in teaching and learning of Home Economics in Secondary Schools in Enugu State. Summarily, blended learning, communicates ideas effectively, demonstrate an interest in learning, organize effectively, show respect for student and assess progress fairly.

Home Economics Teachers and Students' Perception of Blended Learning in Secondary Schools

The utilization of blended learning in teaching Home Economics depends greatly on teachers because they are implementers of the curriculum. According to Ejiofor in Ugwuoke (2011), the teachers are implementers of curriculum, innovation and custodians of knowledge. It is obvious that there is high level of perception by Home Economics teachers and students on blended learning for teaching and learning. They all perceive blended learning as a modern and efficient approach or strategy that capable of improving students' knowledge, achievement, performance and skills. BL makes the source of knowledge changes from single to multiple. This also enhances creative teaching and learning. Furthermore, searching for Home Economics materials will easier because it involves the use of online learning in combination with face to face learning. Emesini (2011) contended that the perception of teachers and students among others include: providing diverse teaching and learning resources, enhancing thoughtful conversation, creating new options that make teaching subjects utilizable, strengthens the bond between teachers and students, promoting the achievement of barrier autonomy and lastly leading to the development of greater commitment.

Problems hindering the Use of Blended Learning Models in Teaching and Learning of Home Economics in Secondary Schools

Many problems hinder the use of blended models for teaching and learning of home economics. First and foremost is the shortage of skilled teachers and instructors. According to Igbo (1995), a qualified Home Economics teacher must be competent in skills required for teaching the three broad areas of Home Economics. The insignificant nature of TVET in the Nigerian educational system posses a great challenge to use of blended learning model (Michael, 2014). The low perception of vocational and technical education in Nigeria is another challenge. High cost of acquisition blended learning materials, lack of maintenance personnel for internet facilities, incessant power failure and other technical supports are also challenging the use of blended learning for teaching home economics. Ugwuoke (2011) noted that barriers to effective utilization of ICT include; shortage of skilled lecturers and instructors, high cost of acquisition and maintenance of ICT facilities and inadequate funding of programme.

Conclusion

Practical subject such as Home Economics provides both additional opportunities and challenges. The use of blended learning models in teaching and learning Home Economics is a major way of curbing such challenges. The traditional instructional delivery approach of face to face instruction is being overtaken in this digital era of convergent technologies.

Recommendations

Therefore, this study recommends that:

1. The government at all levels should formulate critical TVET-policies for effective implementation of home

economics and other vocational education subjects
2. Well qualified and competent teachers should be employed by government and proprietors for teaching home economics in schools and colleges
3. Teachers and instructors be equipped with adequate skills required for blended learning through workshops or seminars.
4. Government should monitor through quality assurance or set standards to ensure that home economics is well implemented
5. Blended learning should be encouraged among home economics in secondary schools
6. Government at all levels should create conducive environment for the implementation of blended learning.

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IMPROVING MAINTENANCE PRACTICES IN TECHNICAL COLLEGES FOR EFFECTIVE PERFORMANCE

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Abstract
The study investigated ways for improving maintenance practices among craftsmen in Technical Colleges in Kogi State. Two research questions guided the study while null hypothesis formulated was tested at 0.05 level of significance. The study adopted descriptive survey design. The population for the study was 32 subjects, comprising19 teachers and 13 instructors in technical colleges in Kogi State. There was no sampling because of manageable size of the population. A structured questionnaire was used as instrument for data collection. The instrument was validated by three experts in the Department of Industrial Technical Education, University of Nigeria, Nsukka. The reliability coefficient stood at 0.87 using Cronbach Alpha reliability method. Data collected were analysed using Mean to answer research questions while the null hypothesis was tested using t-test at 0.05 level of significance. The study revealed that Craftsmen need to acquire skills in e-maintenance system, problem identification using computer detective devise among others as part of ways to have improved maintenance practice. Recommendations involving continuous training of craftsmen on regular basis through workshops, seminars were made towards the implementation of the findings of the study.

Keywords: Improvement, Maintenance, Technical College and Performance

Introduction

The productivity level of any organization, as well as the effectiveness of tools and equipment in performing its function optimally, depends to a large extent on the maintenance measures adopted. Maintenance is a systematic care and attention required to keep tools and equipment in good working condition. It is a process of taking appropriate precautionary measures and steps to ensure that tools and equipment remain functional in its possible life span. According to Jorge and Fernanda (2015) maintenance is a service that can be described as a combination of all technical, administrative and managerial actions during the lifecycle of an item, intended to retain it in, or restore it to, a state in which it can perform the required function.

In order to avoid ineffective performance and total breakdown of tools and equipment during any production process, regular maintenance must be carefully planned and religiously carried out. Maintenance of the available tools and equipment pose a big challenge as maintenance personnel are not readily available to effect repair and necessary installation works when required. Anaele (2008) observed that most tools and equipment in technical institutions have broken down due to poor management and maintenance culture. To keep tools and equipment in a functional and standard condition, it is important to consider regular predictive, preventive and corrective maintenance operations.

Predictive maintenance is the action taking to forestall breaking down of equipment or facility when danger signals are observed.

These unusual signals may come inform of noise, unexpected change in performance and showing of danger light indicators. Preventive maintenance is an act or practice that involves regular cleaning, testing, lubricating and inspection of facility or equipment used in the laboratory or workshop. The purpose of this is to ensure the delay in the breaking down of equipment and also minimize the severity of damages. Corrective maintenance repairs or replacement work done when equipment has already broken down. It is a maintenance operation which is carried out to correct malfunctioning component that has led equipment to break down.

Nigeria has long accepted the value attached to development through education. Since the purpose of education in Nigerian society is to acquaint people with the nature of the culture and the role in it. However, the main aim of the technical college is to train craftsmen. According to Akpan (2003), Technical Colleges are designed to prepare an individual to acquire practical skills, basic scientific knowledge and attitude required as craftsmen and technician at sub-professional levels. In the view of Okoro (2006) technical colleges are regarded as a principal vocational institution in Nigeria. They give full training intended to prepare students for entry into various occupations.

It is expected of craftsmen who are workers of Technical Colleges to imbibe maintenance culture or habits, as this may go a long way in assisting them to be successful in their place of work. The skills acquired by these technicians in the area of maintenance and repair of tools, facility, infrastructures and equipment can be a great sustenance of their livelihood. Despite all efforts by the government to ensure qualitative education at the technical colleges and bring about high competent craftsmen for the purpose of employment, it has been observed that maintenance habits or culture by the craftsmen which would have served better in this regard and thereby increase productivity as well as saving the life span of tools and equipment is inadequate or rather lacking. Okoro (2001) confirmed that the standard of performance of Nigeria technicians, in general, is at the moment very low thereby retarding the overall productivity of the Nigeria economy. Therefore, there is need to carry out this study. The general purpose of the study was to determine the maintenance practices required by craftsmen in Kogi Technical Colleges. Specifically, the study sought to determine the;

1. ways of improving maintenance practices of craftsmen to effectively carry out maintenance work in technical colleges in Kogi State.
2. relevance of maintenance practices to technical colleges in Kogi State.

Research Questions

The following research questions guided the study:

1. What are the ways of improving maintenance practice of craftsmen to effectively carry out maintenance works in technical colleges in Kogi State?
2. What is the relevance of maintenance practice to technical colleges in Kogi State?

Hypothesis

A null hypothesis was formulated and tested at 0.05% level of significance:

1. The mean ratings of teachers and instructors on the ways of improving maintenance practice of craftsmen to effectively carry out maintenance practices in technical colleges in Kogi State does not differ significantly.

Method

The study adopted descriptive survey research design. A descriptive survey design, in the opinion of Ali (2006) is a descriptive study which uses sample of an investigation to document, describe and explain what is in existent or nonexistent on the present status of phenomena being investigated. In survey study, views and facts are collected through questionnaire, interviews among others, analyzed and used for answering research questions. The design was considered appropriate for this study because opinions of teachers and instructors on improving maintenance practice required by craftsmen in Kogi Technical Colleges were obtained. The study was carried out in Kogi State, Nigeria. The population for this study was 32 comprising 19 teachers and 13 technical instructors. No sampling was done to select respondents as the population was of manageable size. The instrument used for the study was a structured questionnaire developed by the researcher with two sections A and B. Section A elicited demographic information of the respondents while Section B had 14 items statements that sought information to answer research questions 1 and 2. The response options in section B were designed based on four point scale. The response options were: Strongly Agree (SA) = 4; Agree (A) = 3; Strongly Disagree (D) = 2 and Disagree (SD) = 1 respectively. The questionnaire was face validated by three experts in the Department of Vocational and Technical Education, Adekunle Ajasin University, Akungba-Akoko, Ondo State. The reliability coefficient stood at 0.87. The research questions were answered using mean while the null hypothesis was tested using t-test at 0.05 level of significance. The data was analyzed using IBM Statistical Package for Social Sciences (SPSS). In answering the research questions, any item with the Mean of 2.50 or above was considered agreed while any item with the Mean of less than 2.50 was regarded disagreed. For the hypotheses, any item where calculated significant (2-tailed) value is greater than 0.05, hypotheses of no significant difference was upheld at 0.05 level; but where the calculated significant (2-tailed) value is less or equal to 0.05, hypotheses of no significant difference was rejected at .05 level of significance.

Results

In answering this question, the responses to the respondents to 14 items questionnaire were scored and the mean and standard deviation were computed. The results are presented in table 1 and 2.

Table 1
Mean Response of the Respondents on the Ways of improving Maintenance Practices of Craftsmen to effectively carry out Maintenance Works in Technical Colleges in Kogi State

S/N	Item Statements	X	SD	Remarks
1	training to acquire e- maintenance system skills	3.39	0.73	Required
2	training to acquire skills in problem identification using computer detective devise	3.35	0.68	Required
3	training to acquire skills in handling of emergency	3.32	0.76	Required
4	training to acquire skills in maintaining production report	3.11	0.92	Required
5	training to acquire skills in management or estimating time	3.20	0.63	Required
6	training to acquire skills in estimating cost and procurement techniques	3.08	0.74	Required
7	training to acquire skills in work plan or scheduling work order using appropriate methods	3.04	0.75	Required

The data presented in Table 1 revealed that 7 items have their mean value ranged from 3.04 to 3.39. This showed that the mean value of each item was above the cut-off point of 2.50, indicating that all 7 maintenance training were required by craftsmen in Kogi State technical colleges. The table also showed that the standard deviations of the items are within the range of 0.63 to 0.92. This indicated that the mean values of the respondents were not far from one another in their responses.

Table 2
Mean response of the respondents on the relevance of maintenance practice to technical colleges in Kogi State

S/N	Item Statements	X	SD	Remarks
1	Maintenance employees empowerment	3.03	0.79	Agree
2	To increase safety	3.18	0.80	Agree
3	Downtime reduction	2.93	0.83	Agree
4	Waste reduction	3.04	0.75	Agree
5	To reduce cost	3.18	0.80	Agree
6	Maximizing equipment efficiency and effectiveness	3.21	0.63	Agree
7	Promotion of autonomous maintenance culture	2.90	0.74	Agree

The data presented in Table 2 revealed that 7 items have their mean value ranged from 2.90 to 3.21. This showed that the mean value of each item was above the cut-off point of 2.50, indicating that all 7 items are regarded as maintenance relevance in Kogi State technical colleges. The table also showed that the standard deviations of the items are within the range of 0.63 to 0.83. This indicated that the mean values of the respondents were not far from one another in their responses.

Test of Hypotheses

The mean ratings of teachers and instructors on the ways of improving maintenance practice of craftsmen to effectively carry out maintenance practices in technical colleges in Kogi State does not differ significantly.

Table 3

The t-test Analysis of the Mean Responses of Respondents on the ways of improving maintenance practice of craftsmen in Technical Colleges in Kogi State (${N_1}$=19, ${N_2}$=13)

S/N	Items Statements	X_1	$S.D_1$	X_2	$S.D_2$	t-cal	Sig.	Decision
1.	training to acquire e- maintenance system skills	3.97	.18	3.82	.57	1.47	.14	NS
2.	training to acquire skills in problem identification using computer detective devise	3.39	.50	3.38	.81	.04	.97	NS
3.	training to acquire skills in handling of emergency	3.71	.53	3.47	.81	1.59	.11	NS
4.	training to acquire skills in maintaining production report	3.68	.60	3.49	.87	1.17	.25	NS
5.	training to acquire skills in management or estimating time	3.83	.37	3.41	.78	2.98	.06	NS
6.	training to acquire skills in estimating cost and procurement techniques	3.77	.43	3.43	.85	2.16	.08	NS
7	training to acquire skills in work plan or scheduling work order using appropriate methods	3.77	.42	3.53	.81	1.66	.10	NS

Key: *N_1 = Total Number of Teachers, N_2 = Total Number of Instructors; X_1= Mean of Teachers, X_2 = Mean of Instructors; SD_1= Standard Deviation of Teachers, SD_2= Standard Deviation of Instructors; df = degree of freedom (25), Sig = Significance Level (2 tailed); t-cal. = calculated values of t-test on SPSS; S = significant, NS = Not Significant*

Table 3 presents the t-test analysis of the responses of teachers and instructors in technical colleges in Kogi State on the ways of improving maintenance practice of craftsmen in technical colleges in Kogi State. The data revealed that all the items had significant values ranging from .06 to .10 which are higher than the probability value of 0.05. This indicated that, the null hypothesis of no significant difference in the mean responses of building technology teachers and employers in building construction industries on the personal-attribute skills needed by building technology students for sustainable employment in building construction industry is accepted for the items.

Discussion

The study showed that 7 items on the ways of improving maintenance practice of craftsmen were all required. The result indicated that maintenance training contained in research question one were agreed by the respondents. The finding revealed that possession of the competencies was very important for the empowerment of maintenance employees. This result agreed with the findings of (Abhay et al. 3013) who found that workers should be trained properly as human assets are invaluable. This implies that the acquisition of maintenance practice skills is important for efficiency. The findings also revealed that maintenance practice in Kogi State technical colleges was relevant as shown in the 7 items answered by research question two. Therefore maintenance employees needed more training to enable them to acquire necessary skills needed for updating. This implies that improvement of maintenance practice can be achieved in terms of efficiency if necessary and adequate training are giving to the maintenance employees at regular interval.

Furthermore, the hypothesis of no significant difference was upheld as the respondents do not differ in their responses on the ways maintenance practice of craftsmen can be improved.

Conclusion

Maintenance is one of the prominent areas of activities in any technical workshop setting. The development of good attitudinal consciousness of maintenance towards tools and equipment in the working environment will not only be limited to keeping them functional optimally but will in no less measure useful for the purpose of productivity. Technicians' enhancement or improvement in maintenance practice is, therefore, paramount and basic as a means of ensuring effective performance of tools and equipment. Aneke (2015) described enhancement as a strategy to improve in knowledge, skill, and attitude of an individual to equip and make him proficient in a particular task. Workers should be trained properly as human assets are invaluable (Abhay et al. 2013).

Recommendations

Based on the findings of this study, the following recommendations were made;

- Government and other concerned agencies should provide adequate and continuous training for craftsmen on regular basis through workshops, seminars.
- All necessary working apparatus or tools meant for maintenance service should be made available for the craftsmen.
- Proper supervision of maintenance practice and enforcement should be carried out in all workshops or workplace by appropriate authorities.

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ASSESSMENT OF FACILITIES FOR IMPROVING INSTRUCTIONAL DELIVERY OF BLOCKLAYING AND CONCRETING PROGRAMME IN TECHNICAL COLLEGES IN EBONYI STATE

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Abstract
This study assessed the adequacy of facilities for improving instructional delivery of blocklaying and concreting programme in technical colleges in Ebonyi State.This study adopted a descriptive survey research design and was conducted in the three Government Technical Colleges, namely; GTC Abakaliki, Ehugbo Technical College Afikpo, and Girls' Technical College Agba, all in Ebonyi State. The population of the study was 45 respondents, which consisted of 13 instructors and 32 technical teachers in National Board for Technical Education (NBTE) accredited Technical Colleges offering Block-laying and Concreting programme. No sampling was done as the population was manageable. A structured questionnaire titled: Block-laying and Concreting Instructional Facilities' Questionnaire (BCIFQ) was used for data collection. The questionnairewas designed based on 5-point likert scale. The questionnaire was face validated by three experts in Industrial Technical Education, University of Nigeria, Nsukka.Cronbach Alpha method was used to determine the internal consistency of the instrument. The data collected were analyzed, using Mean for answering the three research questions while the null hypotheses was testedat 0.05 level of significance, with the use of Statistical Package for Social Sciences (SPSS). In answering each research question, any item with the mean of 3.50 and above was considered as agree, while any item with mean less than 3.50 was regarded as disagree. Findings revealed that Building Infrastructures such as; Class rooms, Workshop space and office space in Technical Colleges in Ebonyi State were grossly inadequate. Also, the equipment, tools, and machines available for Block-laying and Concreting programmein the technical colleges were not adequate to cater for increasing population of students. Furthermore, Instructional materials were inadequate for effective instructional delivery ofBlock-laying and Concreting programme. The study recommended among others that the Federal and State-owned Technical Colleges should be provided with adequate Building Infrastructures; equipment, tools, machines, and instructional materials to cater for the increasing needs of students' practical skills acquisition in Block-laying and Concreting programmeand improve the overall instructional programme delivery in technical collegesin Ebonyi State technical colleges.
Keywords: *Assessment, Facilities, Instructional Delivery, Blocklaying and Concreting.*

Introduction

Education is a basic force for the socio-economic and political transformation of any society. Imogie (2010) noted that no nation can develop to its fullest and keep pace with modern societal trends in science and technology without an effective educational system. As such, every child has a right to quality education and each learner learns best when given the opportunity to link what they are learning with real world experiences in an atmosphere that is safe, stimulating and challenging. The yearning for an improved instructional programme delivery was re-echoed in the National Policy on Education (FRN, 2013:14, sub-section 6e) thus: that education should empower its recipients with development of appropriate skills, physical and social abilities and competences to live as acceptable adults and contribute positively to the society; hence the need for improving the quality of Instructional Programme Delivery in Technical Colleges in Ebonyi State is an urgent one. This is because Technical Vocational Education and Training (TVET) holds the key to training the skilled manpower required for changing the technological workforce (Afeti, 2010).

Technical Education refer to those aspects of the educational process involving in addition to general education, the study of technologies and related sciences, and the acquisition of practical skill, attitudes and knowledge relating to occupations in various sectors of economic and social life (UNESCO, 2002). Hence, TVET have numerous goals which vary from countries to countries. Federal Government of Nigeria (FGN 2013), therefore stipulated the goals of technical education for the nation as follows: to provide trained manpower in applied sciences, technology and business at craft, advanced craft and technical levels; to provide technical knowledge and vocational skills necessary for agricultural, commercial and economic development; give training and impact the necessary skills to individuals for self-reliance economically. In Nigeria, Technical education is part of the formal education system incorporated in the three levels of education; primary, secondary and tertiary institutions. At the secondary school level, the technical colleges are positioned to drive TVET programmes.

Technical colleges are trade based vocational institutions with cluster of occupations, designed to provide technical skills required to enter directly into the workforce as craftsmen. Udogu, (2015) opined that Technical College are post primary technical institutions, where students are given full vocational training that will enable them acquire relevant knowledge, skills and attitude for paid or self-employment in various occupations in the world of work. Ede and Olaitan (2010) further revealed that the establishment of occupational trades in Technical Colleges is geared towards imparting basic knowledge as well as training skills leading to the production of skilled craftsmen who will be enterprising, self-reliant and sufficiently competent to meet the demands in the world of work. Technical college trade courses are usually a three-year program, leading to the award of National Technical Certificate (NTC) and National Business Certificate (NBC). The available trade areas in technical colleges are: Electrical installation and maintenance, Mechanical craft and motor-vehicle mechanics, Fabrication and welding, Carpentry and Joinery, Plumbing and pipe-fitting, Graphic arts, Painting and decoration, Catering-services, Business studies as well as Block-laying and concreting (NBTE, 2011).

Block-laying and Concreting trade is an integral part of building construction at technical college education. NBTE (2007) in her National Vocational Certificate Curriculum and Course Specifications for Block-Laying and Concreting opined that the goal of the occupational programme is aimed at producing skilled and self-reliant craftsmen that can execute and coordinate block-laying and concreting work in a construction project. The board further stated that on completion of the programme, the trainee craftsmen should be able to: read and interpret building construction drawings; apply basic safety principles of construction procedures; identify block laying and concreting materials and their uses; produce sound reinforced and mass concrete structures; state the materials used for finishing and their applications in construction works; supervise simple construction projects; set up subcontract business in block-laying and concreting works; demonstrate basic principles of site organization among others. However, an effective Block-laying and concreting programme in Technical Colleges requires adequacy of instructional facilities for the execution of industry related practical requirements of the programme. Brickman, (2007)stated that basic facilities frequently used for quality instructional delivery in Block-laying and concreting programme in Technical Colleges include and not limited to the following: brick trowels, pointing trowels, plastering trowels, spirit levels/plumb bulbs, builders squares, chisels, chip hammers, sledge hammers, lines corner, block floats, wooden hawks, straight edges spot boards, head pans, shovels, spades, pix axes, tape measures (30 x 26 meter) steel rules, tilting mixer, block and brick moulds, leveling instruments (dump level and engineering precision level), leveling staff mechanical vibrators, site square, block and brick making machine, terrazzo floor washing machine, slump cones, club hammers, ranging poles buckets wheel barrows diggers watering cans.Brick/block laying and concreting programme in technical colleges are practical oriented, consequently, requiring assessment of the adequacy of facilities for improved instructional delivery.

Assessment can be seen as the systematic process of judging the worth, desirability, effectiveness or adequacy of programme, according to a given criteria. Lawan, (2011) viewed assessment as the process of examining performances of individuals in programmes in order to ascertain the strength and weaknesses of the programme. Assessment in any educational programme determines the learning outcomes in terms of knowledge, skills attitudes, ability and facilities required for effective delivery of instructional program objectives.Chauhan, (2013)added that the primary criteria for determining the success or effectiveness of an instructional program are the measures of changes in the selected group of learners which resides in the relationship between the instructional facilities and the teaching methods.However, Federal Ministry of Education, Science and Technology in 1985 decided to enhance the academic performance of students in different institution by equipping the schools with infrastructural facilities.

Facilities generally refer to all infrastructure, material resources and organizational structures needed for the successful running of an institution (Bakare, 2009). Ezeji, (2004) opined that facilities in schools comprises of the entire school plant which school administrators, teachers and students harness, allocate and utilize for the smooth and efficient management of any educational institution and academic activities. Instructional facilities therefore facilitate effective teaching and learning, thereby making the process meaningful and purposeful. At all levels of the nation's educational system and for all known and existing school types, instructional facilities are indispensable factor in the attainment of educational goals (Mkpa, 2001). Similarly, Onwuagboke and Ranjit (2015) referred to instructional delivery as many methods and strategies adopted by the teacher in teaching and learning situation to achieve the desired objectives of classroom instruction. Thus, the efficiency of any instructional activities is a function of the availability of necessary educational facilities. As a result, an effective instructional programme provides opportunities for learners to acquire not just knowledge, but real-life application of skills as well as deep experiences related to the world around them (Hassan & Hassan, 2010). Similarly, the availability and utilization of instructional facilities is essential in meeting the learning needs of individual learners and enhances teachers' professional development (Audu, Umar & Idris, 2013). There is therefore the need to improve instructional programme delivery of technical colleges in Nigeria to enhance skill acquisition among learners, as lack of instructional facilities in Block-laying and Concreting trade has been the missing link in our technical college programmes.

Statement of the Problem

All nations in the world are faced with the challenge of improving the capacity of their workforce to respond to their own national development needs and the demands of a rapidly changing global competitive world of work. One major setback to educational processes in different institutions of learning today is the issue of the poor state of school facilities and methods of instructional delivery; making students more deficient in the area of skills acquisition. Thus, inadequate workshop facilities in technical colleges results in production of highly unskilled craftsmen, who are unemployable and unproductive, as well as general decline in the quality of technical education and skill development in Nigeria. Although, increased interest in technical education has caused enrolment into government owned technical colleges, there is no corresponding increase in facilities to cater for the population of students, causing poor instructional delivery and skill acquisition.

The school condition has led to high levels of unemployment, crime rate and poverty as well as wastage in human and natural resources that abound in Nigeria. Graduates of BBC in technical college are half-baked having gone through the programme with less than the minimum standard requirements of instructional materials with overpopulated enrolments compounding the matter. To position technical colleges in Ebonyi State to cater for the BBC student enrolment, there is need to assess the instructional delivery facilities of the programme for adequacy and improved performance of the institutions.

Purpose of the Study

The general purpose of the study was to assess the adequacy of facilities for improved instructional delivery of block-laying and concreting programme in technical colleges in Ebonyi State. Specifically, the study was designed to determine the:

1. adequacy of building infrastructural facilities for effective instructional delivery of Block-laying and Concreting Programme in technical colleges in Ebonyi State.
2. adequacy of teaching materials for effective instruction deliveryof Block-Laying and Concreting programme in technical colleges in Ebonyi State.
3. adequacy of tools and machines for effective instruction delivery of Block-Laying and Concreting programme in technical college workshop in Ebonyi State.

Method

The study adopted a descriptive survey research design. According to Gall, Gall and Borg (2007) survey research method uses questionnaire or interview to collect data from a sample that has been selected to represent a population to which the findings of the study can be generalized. Survey research design was considered appropriate for the study as it sought opinions of technical teachers and instructors of Block-laying and Concreting trade in the three government technical colleges in Ebonyi State of Nigeria.

The area of the study was Ebonyi State, Nigeria. The population of the study was 45 respondents, which consisted of 13 instructors and 32 technical teachers in National Board for Technical Education (NBTE) accredited Technical Colleges offering Block-laying and Concreting programme. No sampling was done as the population was a manageable size.A structured questionnaire titled: Block-laying and Concreting Programme Instructional Delivery Facilities' Questionnaire (BCPIFQ) was usedfor data collection. The questionnaire was designed based on 5-point Likert scaleand consisted of 32facility items for instructional delivery, developed from reviewed literature. The questionnaire was face validated by three experts in Industrial Technical Education, University of Nigeria, Nsukka for clarity and suitability of all items of the statements in providing appropriate responses or data for answering each of the research questions. Cronbach Alpha method was used to determine the internal consistency of the instrument and 0.82 was obtained. Forty-five (45) copies of the questionnaire were administered to the respondents by the researcher and with the aid of three research assistants. The completed copies of the questionnaire were retrieved within the interval of two weeks respectively. The data collected were analyzed, using Mean for answering the three research questions while the null hypotheses was tested at 0.05 level of significance, with the use of Statistical Package for Social Sciences (SPSS). In answering each research question, any item with the mean value of 3.50 and above was accepted and considered agree, while any item with mean less than 3.50 was rejected and regarded as disagree. Findings were drawn from the analysis and based on the findings, conclusion and recommendations were made.

Results

The results of the data analysis were presented in tables according to research questions.

Research Question 1

How adequate are building infrastructures for effective instructional delivery of block-laying and concreting programme in technical colleges in Ebonyi State? Data for answering the research question was presented in Table 1

Table 1: Mean responses of Technical teachers and Instructors on the Adequacy of building infrastructural facilities for effective instruction delivery of Block laying and Concreting programme in technical colleges.

S/N	Item Statements	Mean	SD	Decision
1	Adequacy of classrooms in the technical colleges for quality instructional delivery of Block laying and Concreting programme	4.61	.566	Adequate
2	Adequacy of workshop instructional areas for Block laying and Concreting programme in technical colleges workshops	4.20	.657	Adequate

3	Adequacy of office spaces for instructors of Block laying and Concreting programme in the technical colleges	2.34	.706	Not Adequate
4	Adequacy of auxiliary spaces for Block laying and Concreting programme in the technical college workshops	3.06	.502	Not Adequate
5	Adequacy of brick/block-work laboratory in the technical colleges	2.22	.508	Not Adequate
6	Adequacy of storage facilities for Block laying and Concreting tools and equipment in the technical college workshops	4.49	.644	Adequate
7	Adequacy of project storage room for Block laying and Concreting programme in technical colleges workshops	2.36	.728	Not Adequate
8	Adequacy of libraries facilities for Block laying and Concreting programme in technical colleges	3.49	.503	Not Adequate

Key: SD = Standard Deviation

Table 1 shows the mean, standard deviation and decision on adequacy. The result shows that there are adequacy of classrooms, workshops and storage facilities for instructional delivery in technical colleges in Ebonyi State. The result also reveals that technical colleges in Ebonyi State have in adequate office and auxiliary spaces, brick/block work laboratory, project storage room and libraries facilities. This implies that building infrastructures are inadequate for effective instructional delivery of block-laying and concreting programme in technical colleges in Ebonyi State.

Research Question 2

How adequate are teaching materials for effective instructional delivery of Blocklaying and Concreting Programme in technical colleges in Ebonyi State? The data for answering the research question is presented in Table 2.

Table 2: Mean responses of Technical teachers and Instructors on the adequacy of teaching materials for effective Instruction Delivery of Block laying and Concreting Programme in technical Colleges

S/N	Item statements	Mean	SD	Decision
9	Adequacy of syllabus and text books for effective instruction deliveryof block-laying and concreting program in the technical colleges	4.06	.600	Adequate
10	Adequacy of electricity power supply for effective delivery of workshop practical in block-laying and concreting program in the technical colleges	2.38	.714	Not Adequate
11	Adequacy of interactive white/black boardsfor effective instruction delivery of block-laying and concreting courses in the technical colleges	4.61	.490	Adequate
12	Adequacy of chalks and markers for effective instruction delivery of block-laying and concreting program in the technical colleges	4.49	.644	Adequate
13	Adequacy of ICT tools and other computer aided facilities for effective instruction delivery Adequacy of chalks and markers for effective instruction delivery of block-laying and concreting program in the technical colleges	2.46	.643	Not Adequate
14	Adequacy of consumable in the technical college workshop for effective instruction delivery of block-laying and concreting program.	3.49	.503	Not Adequate
15	Adequacy of Assistive Technologies (Turnitin-check, Google-play, Kahoot, Google Earth etc.) for effective instruction delivery of block-laying and concreting program in technical colleges	1.70	.673	Not Adequate

Key: SD = Standard Deviation

Table 2 shows that three items with mean values above 3.50 indicating adequate syllabus and textbooks, interactive white/black boards, chalks and markers for effective instructional delivery of block-laying and concreting program in technical colleges. The result also reveals that technical colleges in Ebonyi State have inadequate ICT tools and other computer aided facilities, consumable materials, electricity power supply and Assistive Technologies for effective instructional delivery of block-laying and concreting program in technical colleges with mean value ranging from1.70 - 3.49.

Research Question 3

How adequate are tools, equipment and machines for effective instruction delivery of blocklaying and concretingprogrammein technical colleges in Ebonyi State?

Table 3: Mean responses of technical teachers and instructors on adequacy of tools, equipment and machines for effective instructional delivery of blocklaying and concreting in technical colleges

S/N	Item statements	Mean	SD	Decision
16	Brick, Pointing and Plastering trowels	4.61	.566	Adequate
17	Spirit levels/Plumb bulbs	4.38	.542	Adequate
18	Builders squares	4.17	.578	Adequate
19	Leveling instruments and Mechanical vibrators	2.38	.714	Not Adequate
20	Block and Brick making machine	2.34	.706	Not Adequate
21	Manual Block and brick moulds	4.58	.617	Adequate
22	Concrete mixer	2.64	.607	Not Adequate
23	Terrazzo floor washing machine	3.29	.458	Not Adequate
24	Wheel barrows	4.21	.642	Adequate
25	Head pans	4.25	.594	Adequate
26	Shovels	4.61	.490	Adequate
27	Measuring tapes	4.49	.644	Adequate
28	Builders squares	4.38	.566	Adequate
29	Watering cans	4.06	.600	Adequate
30	Ranging poles	4.65	.479	Adequate
31	Jointing board and straight edge	2.46	.643	Not Adequate
32	Chip, Sledge and club hammers	4.52	.600	Adequate

Key: SD = Standard Deviation

Table 3 shows adequacy of tools, equipment and machines such as: brick, pointing and plastering trowels, spirit levels/plumb bulbs, builders squares, manual block and brick moulds, wheel barrows, head pan, shovels, measuring tapes, building square, ranging pole, watering can, chip, sledge and club hammers in workshops for effective instructional delivery of block-laying and concreting programme in the technical colleges in Ebonyi State. The table also shows that the technical colleges in Ebonyi State have inadequate leveling instruments and mechanical vibrators, block and brick making machine, concrete mixer, terrazzo floor washing machine and chip, sledge and club hammers.

Discussion

The findings related to the research Question one presented in Table 1 found that Technical Colleges in Ebonyi State have inadequate building infrastructures for effective instruction delivery of Blocklaying and Concreting Programme, compelling students to carry out practical activities on pseudo and inconvenient learning environment. Thus, the inadequacy of building infrastructural facilities had negative effects on skill acquisition and effective instructional delivery among teachers and instructors in technical colleges. The findings of this study are in agreement with the findings of Ogbonaya and Okoli, (2014), who noted that most technology courses are thought without adequate workshops space and facilities. The findings also supported that of Puyate (2007), who observed that in some schools, workshop equipment is not spaced enough to accommodate students and hence the students are either overcrowd together or have to be outside the workshop during practical work and this resulted to lack of acquisition of skills.

The findings relating to research question two of the study as shown in Table 2 revealed that syllabus and textbooks, interactive white/black boards as well as chalk and markers were relatively adequate. While electricity power supply, ICT tools and computer aided Instruction, assistive technologies and consumable for effective instructional delivery were inadequate. This finding further revealed that instructional programme cannot be effectively delivered as a result of inadequacy of teaching materials which facilitates the practical skills acquisition of the students in technical colleges. The findings agree with the findings of Owoeye and Yara, (2011), who posited that availability and adequacy of instructional facilities promote effective teaching and learning activities in schools while their inadequacy or unavailability may affect the academic performance of the learner negatively. Furthermore, the findings agree with the findings of Oghuvbu, (2009) who submitted that the quality of education and learning achievement of students depends on the facilities available in schools. Hence, the availability or non-availability of instructional facilities in technical colleges affects the academic performance of students.

The findings relating to research question three of the study as shown in Table 3 revealed that tools, equipment and machines were relatively adequate for effective instruction delivery of Blocklaying and Concreting Programme in the Technical Colleges in Ebonyi State. This finding further revealed that, practical class can be effectively carried out when there is full supply of tools, equipment and machines for practical skills acquisition of block-laying and concreting trade in technical colleges.These findings agree with the assertions of Aina (2000), who stated that adequacy of equipment enhances the ability to skillfully train the Technical College Students as designed in Technical Education Curriculum in Nigeria. Similarly, Amoor (2008) has indicated that adequacy of equipment is a pre-requisite for effective skill acquisition in technical colleges.

Conclusion

To improve instructional delivery of block-laying and concreting programme in technical colleges, adequate provision of facilities should be made to improve instructional delivery ofblock-laying and concreting programme and enhance students' academic performance and the acquisition of practical skills for gainful employment in industries or self-reliance as to contribute to the socioeconomic development of the nation. Based on the findings of the study, the following conclusions were drawn: The study has found that there is inadequacy of building infrastructural facilities, teaching materials as well as tools, equipment and machines.

Recommendations

Based on the findings of this study, the following recommendations were made:

1. Improving and maintaining physical facilities in technical colleges should not be limited to government alone, instructors, workshop attendants, and the school managers should take good care of the facilities for better performance.
2. National Board for Technical Education (NABTEB) in charge of evaluating Technical Colleges in Nigeria should take issue of facility development very serious in order to achieve the objectives of the programme.
3. Federal and state-owned technical colleges should be provided with adequate workshop and training facilities to meet the challenges of the worldof work in the area of science and technology.
4. Communities, industries, religious organizations, labor unions, Non-Governmental Organizations (NGOs), wealthy individuals should support in the funding of technical colleges.

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STRATEGIES FOR ACTUALIZING THE STIPULATED TVET GOALS BY TVET TEACHERS IN NSUKKA LOCAL GOVERNMENT AREA OF ENUGU STATE

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Abstract
This study determined the strategies for actualizing the stipulated TVET goals by TVET teachers in Nsukka LGA of Enugu State, Nigeria. Three research questions were developed. A descriptive survey design was used for the study. The population for the study was 153 participants randomly selected from lecturers and instructors in the Faculty of Vocational and Technical Education, University of Nigeria, and technical and vocational teachers in Government Technical College, Nsukka. The instrument for data collection was non structured questionnaire. Three experts validated the instrument for data collection. Internal consistency of the questionnaire items was determined using Cronbach alpha reliability method and 0.89 reliability coefficient value was obtained. The data collected were analyzed using mean to answer the research questions. Results revealed that: improving the image of TVET, increasing enrolment, ensuring the employment of skilled competent teachers, integrating entrepreneurship education among others are strategies needed to actualize TVET goals. The study recommended further sensitization of the public on what TVET offers, improvement of teacher education through in-service trainings and establishment of production units in school for proper linkage of TVET programmes to industry skill-demands and inculcation of entrepreneurial and venturing skills needed for the emergence of self-reliant graduates.
Keywords: TVET goals, strategies, manpower, self-reliance, entrepreneurship Education

Introduction

Unemployment still persists among graduates of all levels of education in Nigeria. Agbulu (2016) observed that majority of young graduates are unemployed in spite of the daily needs of skilled workers for economic sustenance. Graduates of Technical Vocational Education and Training (TVET) are expected to be distinct and standout on this. The distinct experience expected of TVET graduates borders on the ability of the programme to impart skills, technical knowledge and attitude needed for employment. TVET is globally known as education for work, occupation based education, education geared towards the needs of the industries and workforce (Audu, Kamin & Balash, 2013), therefore the inability of TVET graduates to neither gain employment nor establish self-reliant ventures questions the potency and indicates unrealized goals.

Technical Vocational Education and Training (TVET) refer to an educational system for inculcation of knowledge, skills and attitudes necessary for employment and adequate for self-reliance. Guskey in Akpomudjere (2015) defined TVET as an education designed to develop skills, abilities, understanding, attitudes, work habits and appreciation encompassing knowledge and information needed by workers to enter and make progress in employment on a useful and production basis. According to Federal Government of Nigeria (FGN, 2013) TVET is used as comprehensive term referring to those aspects of the educational process involving, in addition to general education, the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life. Deductively, every definition of TVET contains the expected goals. These goals as outlined in the National Policy on Education (NPE) include: provision of trained manpower in the applied sciences, technology and business, particularly at craft, advanced craft and technical levels; provision of the technical knowledge and vocational skills necessary for agricultural, commercial and economic development; and impartation of the necessary skills to individuals for self-reliance economically (FGN, 2013).

Actualizing TVET goals means attainment of the expected deliverables of TVET as pertains to manpower supply, skilled-drivers for agricultural, commercial and economic development, and the graduates' ability to create self-reliant ventures. It equally refers enhancing the recipients' standard of living where they are not only employable but are happy, self-reliant and functional citizens, able to apply their ingenuity in different chosen fields for national development. Momoh (2005) stated that actualized goals raise the development and dignity of people irrespective of their deferring degrees of educability by helping them to enter and find rewarding places in the world of work; enabling them to advance economically and socially by virtue of their capability, enhanced sense of individual adequacy through release and exercise of creative impulses latent in them. There is therefore an urgent need for redirected efforts towards self-reliance and sustainable means of livelihood which is the hub of TVET programme (Asogwa & Diogu, 2007). When goals are set, there is need for specific strategies towards the actualization.

Strategies refer to repertoire of tools, methods and plans required to achieve set goals/objectives. Strategy is a comprehensive way of setting and achieving goals through actions and resource mobilization towards executing the actions (Freedman, 2015). Every goal set is mostly followed by tactics and plans for its actualization. In the same other, TVET goals of manpower, technical knowledge and vocational skills provision, as well as self reliance empowerment need strategies that when executed should lead to the actualization. For instance, Germany has long outgrown poor image attributed to TVET through its dual system (combining apprenticeship with formal schooling) which ensures ceaseless manpower supply directly from school to employment (Remington, 2018). Germans ability to maintain below 10% level of unemployment is a function of developed workforce with technical knowledge and vocational skills relevant in the advancing technological industries (Remington, 2018).

Self reliance on the other hand, connotes the ability to be independent of both the public and private sectors in relation to fending for oneself after graduation. Fonchingong and Fonjong (2003) defined self-reliance as mindset of dependence on one's mental and material resources for realizing personal objectives. Self-reliance is prerequisite for sustenance in this modern world and connotes ability of the individual to meet basic and local needs, with minimized dependence on external sources. Personal dependence on the acquired or developed mental and material resources for sustenance demonstrates self-reliance. The overarching goal of TVET is to equip recipients with self-reliant capabilities to cope with or without employment and it is the responsibility of the TVET teachers to actualize this expectation.

The strength of a nation is directly related to her available manpower. No nation develops beyond her human resources (Ibeneme, 2009). Manpower is the basic resources; it is the indispensible means of converting other resources to mankind's use and benefit (Enemali, 2006). It is manpower that determines the wealth, prosperity and advancement of a nation, the industrialization and technological development (Rashtriya, 2005; Ukuma, Ochedikwu & Deke, 2013; Musa & Okorieocha, 2012). There is no doubt that TVET has the capacity to supply the manpower needs with appropriate strategies put in place. Development of manpower means exposing individuals or group of individuals to those experiences that will enable them to be intellectually matured to acquire skills that will enhance their abilities in solving their personal and financial problems. Manpower development also relates to the trainings and improvement of a nation's human resources to achieve the highest productivity and most efficient interaction with other factors of production (Musa and Okorieocha, 2012). Provision of manpower entails supply of adequately trained manpower into the society's diversified areas of needs for development such as in technology and agriculture, for effective and efficient dispensation of duties and maximum productivity. Therefore, providing manpower in TVET could be achieved through strategies involving: perceptual change for increase in enrolment of students (Olubadewo, 2007; Okolocha, 2012), planning and adopting effective curriculum and policy implementation (Okafor, 2011; Nwagwu, 2006; Emuku & Emuku, 2000); eradicating vocational education wastages through brain drain/manpower attrition so as to keep the best performed in the system (Usen, Udofia & Offiong, 2012; Akpan, 2001; Okpara, 2006; Inemikabo, 2006). Manpower development and supply will go a long way to ensure: boost in enrolment of students in TVET, address the issue of curriculum mismatch and poor industrial linkages, achieve the relevancy and utilitarianism associated with TVET programme, and accelerate the acquisition of ICT related skills among graduates of TVET.

Furthermore, TVET programme is a veritable means of inculcating technical knowledge and skills in both the young and advanced populace. Technical knowledge and skills entail specialized and deep understanding of materials, machines and their utilization in production or services. TVET as an aspect of education is vital in unlocking the door of modernization but the teachers have the key to the door (Usen *et al*, 2012). The assertion that the learners would be as good as those who teach them makes it necessary to reinforce the antiquated knowledge of the TVET teachers in science and technology through retraining and up-skilling. Teachers' retraining is necessary in ameliorating poor preparation and out-of-date laboratory exercises, detached school and industries practices under which the teachers learnt (Umunadi, 2012; Usen *et al*, 2012). Repositioning teacher education to encourage spirit of enquiry and creativity, produce highly motivated, conscientious and efficient teachers with adaptable skills necessary for the dynamic workforce (Umunadi, 2012). Inculcating technical knowledge and skills also require quality infrastructure for teaching and learning. TVET training requires that learners learn in workshops and environment that is a replica of the actual working environment (Umunadi, 2007). Improving on the quantities of equipment, machines, tools and instructional materials among others are requirements for effective skill training (Osuala, 2004). However, it has been observed by Onazi (2007) that infrastructure shortfalls in TVET majorly depicts poor funding which results to ill-equipped workshops, laboratories, studios and classrooms, lack of consumables and general lack of conducive environment in TVET schools. There is need for public private partnership (Okpor & Hassan, 2012; Perkmann & Walsh, 2007) which will link school to industries; provides industrial and workplace exposures, ensuring demand-driven trainings among others. In addition, more time is needed for practical to enable TVET recipients practice towards mastery (Nwogu and Nwanoruo, 2011).

The bottom line of any TVET programme cannot be deviant from self-sustenance of the graduates. Nwogu and Nwanoruo (2011) defined TVET as an educational programme technically and systematically designed to accommodate both the trainer and the trainee in order to enable most importantly the trainee acquire the basic knowledge, skills, understanding and attitudes needed for one's efficient performance in his/her chosen occupational career for self-reliance and economic development. Self-reliant endeavors stimulate changes in the structure of an economy including emphasis on developing manufacturing industries, movement of labour from rural to urban industrial areas, less reliance on imported goods in preference to home made goods. To empower TVET recipients for self-reliance, FGN (2013) in National Policy on Education mandated every school to establish production units – where hands on training, services and repair, customer relationship attitudes will be learnt under the control of a teacher or instructor (Ogumbe, 2015). There is also need to emphasize the development and manufacturing of training tools and equipment in schools (Badawi, 2013), frequent exhibition and talent shows organized to encourage creativity. Self-reliant venturing beckons on entrepreneurship education (European Commission, 2012) as a fostering strategy while Government and other philanthropists are needed to provide soft loans to graduates for take-off capital.

TVET teachers play vital role in realizing the goals of TVET. According to Bukit (2012), TVET teachers are the determinants of the quality of learners, learners' skills and concisely the quality of future workers. The teachers comprise of all those in trade or occupational related courses in technical colleges and higher institutions. Among the trade courses are: auto body repair and spray painting, auto electrical and mechanical work, air conditioning and refrigeration, radio, TV and electronic servicing; welding and fabrication, block laying, brick laying and concrete work; plumbing and pipe fitting; carpentry and joinery, data processing, book keeping etc (FGN, 2013). Since teachers of these trade/occupational courses are indispensible in the success of the school and students, the need to seek their opinions is vital in determining what ways or strategies to be employed towards achieving the goals of TVET, especially as pertains to Nsukka Local Government Area.

Nsukka is the home of the University of Nigeria. The University likewise is at the forefront in matters regarding TVET in Nigeria. The vocational and technical education inclination dates back in the 1960s and has produced many graduates who are notable in TVET teaching and learning across the nation. There is hardly a TVET practitioner without a link to TVET in University of Nigeria, Nsukka. It is on record that every environment prides itself with certain identity of productions and services derivable from the craftsmanship of its people (Innovation in TVET Research Group, n.d). It is expected that the glory of TVET is felt more in its base being Nsukka. Hence, the evidence of actualized TVET goals should therefore saturate the take-off environment. Thus, strategies for actualizing the stipulated TVET goals could be sourced from the root, leveraging on the experiences and challenges of the programme encountered by the pioneering lecturers and teachers.

Statement of the problem

The major goals of TVET in Nigeria border on providing manpower for all sectors of the economy by inculcating technical knowledge, attitude and skills for employment as well as empower individuals for self-reliance. With the aim of providing the graduates of TVET with knowledge, attitudes and employable skills for: work in industries, becoming functional citizens, self-reliance venturing and employment creation, reducing unemployment, curbing youthful vices among other, TVET is ultimately education for work. It is seen as having the potency to transform the economy of any nation when properly harnessed.

But, the goals of TVET have not been realized. The graduates of TVET still cue in search of 'non-existing' employment, with lack of salable skills for job creation. There is equally no zeal or experience for self-reliance venturing. The state of TVET graduates makes a mockery of the highly reputed programme and questions the potency of TVET in helping the nation's skilled manpower needs for all sectors development. Although the unwelcomed scenarios have been blamed on lots of challenges such as mismatch in trainings and labour-market skills demand, lack of competent and qualified teachers/instructors, lack of drive towards entrepreneurial self-reliant ventures among others (Okolocha, 2012), there is need to ascertain the opinions of those who have been saddled with the primary responsibility of achieving the goals of TVET by making it actionable with the learners. Because TVET teachers have seen and perceived TVET practices and quality of their graduates, this paper is aimed at identifying the strategies for actualizing the NPE stipulated TVET goals in Nsukka LGA of Enugu State. In line with the goals of TVET, three research questions were formulated: what are the strategies for providing trained manpower? What are the strategies for inculcating technical knowledge and vocational skills in individuals? And, what are the strategies for empowering individuals for self-reliance?

Method

The study adopted survey research design to ascertain the opinions of Lecturers, Instructors and Teachers on the strategies for actualizing stipulated TVET goals. The area of the study was Nsukka Local Government Area of Enugu State. The local government has one National Board for Technical Colleges (NBTE) accredited Government Technical College and has a Faculty of Vocational and Technical Education, domiciled in University of Nigeria, Nsukka where TVET lecturers, teachers and instructors are found.

The population for the study was 153 randomly drawn from Lecturers, Instructors and Teachers who teach TVET courses in both institutions. Questionnaire was used as instrument for data collection. The questionnaire has two sections; A and B. Section A elicited personal information of the respondents while section B had 40-items that sought to answer three research questions. The responses in section B were designed based on 5-point Likert scale of Strongly Agree, SA; Agree, A; Undecided, U; Disagree, D; and Strongly Disagree, SD with corresponding values of 5, 4, 3, 2 and 1. Face validation of the instrument was done by three Experts in the Faculty of Vocational and Technical Education, University of Nigeria, Nsukka. Internal consistency of the questionnaire items was determined using Cronbach alpha reliability method in which 0.89 reliability coefficient value was obtained. The researchers administered the copies of questionnaire directly on the respondents and retrieved 146 copies, representing 95 percent return, after one week.

Mean was used to answer the research questions while standard deviation showed the variability in the responses. Based on five point Likert Scale, used, any item with mean value of 3.50 or above was regarded as agree while items with Mean values below 3.50 were considered as not Disagreed. Statistical Package for Social Science (SPSS) version 20 was used to analyze the data.

Results

Table 1: Mean responses and Standard Deviation of Teachers on the Strategies for Providing Manpower in Vocational Technical Education

S/N	Item statements	MEAN	S.D	DECISION
1.	Improve the image of TVET programme by sensitizing the public on the place of Vocational Technical Education using exhibitions, handicrafts, indigenous technologies etc.	4.48	0.72	Agreed
2.	Vocationalize educational reforms to awaken interests in vocational education	4.11	0.74	Agreed
3.	Increase the enrolment of students in TVET institutions	4.24	0.99	Agreed
4.	Provide formal and non-formal linkages for integrating skilled artisans into the TVET programme	4.26	0.80	Agreed
5.	Enhance smooth transition and linkage to and fro traditional vocational programme for continual education	3.85	0.79	Agreed
6.	Ensure maximum exposure to the essential knowledge required for vocational excellence	4.39	0.80	Agreed
7.	Inculcate the right attitudes for entry and progress in the workforce	4.17	0.89	Agreed
8.	Ensure the impartation of necessary skills for employment and self-reliance	4.33	0.76	Agreed
9.	Integrate public-private sectors in formulating the curriculum and course contents of TVET for relevance	4.08	1.07	Agreed
10.	Update and adopt flexible TVET curriculum in line with current employment requirements	4.48	0.81	Agreed
11.	Incorporate ICT/Computer in TVET to accelerate, enrich and deepen technical &vocational skills in graduates for competitive delivery	4.43	0.58	Agreed
12.	Advance the current system of instruction to enforce and inculcate competency in practical skills	4.13	0.96	Agreed
13.	Effective implementation of Vocational Education policy decisions at all levels of government	4.46	0.66	Agreed
14.	Ensure continuation in governments' policy implementations in successions	4.22	0.63	Agreed

15.	Enhance teaching conditions to attract and retain competent technical teachers in the system	4.59	0.69	Agreed
16.	Motivating teachers through equitable remuneration packages and incentive schemes	4.54	0.69	Agreed

Number of Respondents, *N* = 146

Table 1 reveals that all the 16 strategies required to produce manpower in TVET had their Mean and Standard Deviation values ranged from 3.85 – 4.59 which were above the cutoff point of 3.50. This simply indicates that the 16 strategies are necessary in providing Manpower in TVET. Table 1 also shows that the standard deviation for the items ranged from 0.58 to 1.07 which indicates that the respondents were not far different in their responses.

Table 2: Mean Responses and Standard Deviation of the Teachers on the Strategies for inculcating Technical Knowledge and Vocational Skills in Individuals

S/N	Item statements	MEAN	STD. DEVIATION	DECISION
1.	Ensure the employment of qualified skilled and competent teachers	4.72	0.46	Agreed
2.	Train and retrain the teachers through in-service trainings, seminars, workshops etc. for up-to-date mastery and delivery of needed skills	4.70	0.47	Agreed
3.	Link the Teacher training institutions and departments to business and industrial sectors	4.15	0.89	Agreed
4.	Reintroduce Federal Technical Teachers Training Programme to enhance the quality of technical education teachers	4.46	0.78	Agreed
5.	Ensuring that efficient vocational based programmes start early in pre-school to enhance advancement	4.28	0.69	Agreed
6.	Enforce knowledge and skill acquisition in various vocational courses in the students	4.28	0.75	Agreed
7.	Provide laboratories and workshops for practices	4.76	0.43	Agreed
8.	Equip laboratories and workshops with state of the art equipment and tools	4.41	0.58	Agreed
9.	Make the training environment a replica of the world of work	4.35	0.87	Agreed
10.	Allocate quality time for vocational skill courses in schools	4.30	0.92	Agreed
11.	Share the responsibilities of funding TVET institutions amongst Government and public -private partners	3.93	0.88	Agreed
12.	Partner with the industries for training and exposure of students through SIWES and other training attachment options	4.46	0.62	Agreed
13.	Ensure that trainees are enrolled in the appropriate works relevant to area of study or occupation	4.35	0.82	Agreed
14.	Ensure that trainings are demand-driven and linked to the demands of the labour market	4.20	0.65	Agreed

Number of Respondents, *N* = 146

Data in Table 2 show that all the 14 items have their Mean values ranged from 3.93 – 4.76 which are above cutoff point of 3.50. this shows that all are the strategies for inculcating technical knowledge and vocational skills in individuals. Table 1 also shows that the standard deviation for the items ranged from 0.43 to 0.92 which indicates that the respondents were not far different in their responses.

Table 3: Mean Responses and Standard Deviation of the Teachers on the Strategies for Empowering Individuals for Self Reliance

S/N	Item statements	MEAN	STD. DEVIATION	DECISION
1.	Every section/unit of VTE should set up production units to enhance self-reliance	4.35	0.71	Agreed
2.	Emphasize development of training tools and equipment in TVET institutions	4.13	0.69	Agreed
3.	Foster the manufacturing of training tools and equipment in TVET institutions	3.96	0.79	Agreed
4.	Encourage less reliance on the imported machines with preference to the home-made for technological advancement	3.87	1.09	Agreed
5.	Encourage the practice and establishment of SMEs after graduation from TVET programme as a viable employment alternative	4.22	0.66	Agreed
6.	Integrate Entrepreneurship Education as a core course in TVET curriculum to improve perception and image of TVET	4.28	0.66	Agreed
7.	Instigate innovative and creative thinking to enhance productivity and employability skills	4.28	0.69	Agreed
8.	Create a sustainable skill exhibition platform where students creativity are properly harnessed for profitability	4.26	0.74	Agreed
9.	Ensuring the continual development of business plans in relevant areas for easier establishment upon graduation	4.13	0.83	Agreed
10.	Providing venture capital funds to young graduates by Government and other funding agencies such as African Development Bank	4.48	0.81	Agreed

Number of Respondents, *N* = 146

Table 3 reveals that all the 10 strategies for empowering individuals for self reliance had their Mean and Standard Deviation values ranged from 3.87 to 4.48 which were above the cutoff point of 3.50. This simply indicates that the 10 items are strategies for empowering individuals for self-reliance. Table 1 also shows that the standard deviation for the items ranged from 0.66 to 1.07 which indicates that the respondents were not far different in their responses.

Discussion

The findings of the study revealed pertinent strategies for providing manpower in TVET. The respondents agreed that improving the image of TVET programme through sensitization is necessary in order to attract more persons and increase manpower supply for national development. The poor perception has been attributed to negligence on the part of the masses and the government. In accordance, Okoye and Okwelle (2013a & 2013b) found that the poor manpower in TVET is attributed to low societal estimation – where its professional practice is not seen as a substitute to gaining employment in other better remunerating sectors. There is also poor system of instruction – which does not inculcate practicable skills. Consequently, improving the image of TVET through exhibitions, handcrafts, indigenous technologies, formulating relevant curriculum by both private and public sectors using ICT in TVET trainings are necessary requirements to draw the interest of the masses to TVET. The findings of the study are equally consistent with Bamidele (2011) who lamented that governments have only paid lip-service to the TVET programme and have not accorded the programme its deserving place in Nigeria hence the abandonment and non-implementation of policies, poor teaching conditions among others. In the light of the above bottlenecks to manpower provision, ensuring successive implementation and continuation of policies, motivating teachers through equitable remuneration packages among other occurred strategies are vital in providing manpower in TVET.

This study has shown that inculcating technical knowledge and skills in individuals require a couple of realizable strategies. The strategies must be able to overcome the challenges of poor quality academic staff, lack of in-service trainings, seminars and workshops, lack of training facilities, poor quality time allocated to vocational skill courses, irrelevant trainings and gross inadequate funding etc. These challenges according to Osam (2013) have a number of important implications. First, it is unlikely that students will find themselves successfully self-employed at the end of their studies. Second, the obsolete skills that student acquire will not assist them in what work they do find in the labour market. Thirdly, these challenges mean that graduates will have limited employment prospects given that the programmes produce graduates poorly matched to job opportunities.

Given the limitation which faces this TVET goal, there is need to: ensure the employment of qualified skilled and competent teachers; train and retrain teachers, link teacher training institutions to business and industrial sectors, allocate quality time to vocational skill courses, ensure trainings are demand-driven and in no small measure share the responsibilities of funding TVET amongst government and public-private partners hence Osam (2013) observed that the success of any TVET programme in yielding the desired results depends on adequate funds provided for the proper functioning of the programme.

This study further reveals that strategies for empowering individuals for self-reliance. Based on the findings, the effective actualization of a self-reliant nation should begin with self-reliant individuals and graduates which could best be instigated only when the institutions of training become or to extent practice self-reliance. This buttresses the importance of first empowering TVET schools with production units in accordance to the skills at its dispensation. This finding is in accordance with Igwe (1997) who advocated self-reliance for every individual to contribute his or her quota to national development. It was further discovered that emphasis on development and manufacturing of training tools/equipment, less reliance on imported goods, integrating entrepreneurship education, and showcasing, encouraging, and empowering graduates to establish SMEs are part of the strategies to empower individuals for self-reliance and thus contribute to national development.

Conclusion

This study showed extensive strategies for actualizing the stipulated TVET goals. It showed that poor perception and governments neglect have marred interest and enrolment in vocational and technical education courses. It barricades the linkages and transition between formal and non-formal vocational programmes. More so is the engagement of unqualified staff and lack of quality and adequate facilities which has led to poor quality TVET, resulting to negative and unpleasant effect on students' learning outcomes. Consequently, TVET programmes produce graduates who are ill-equipped and lack relevant knowledge and practical skills. By implications, achieving the TVET goals and producing self-reliant graduates has not been actualized. It therefore beacons an awakening of consciousness and interest in government, teachers and learners to understand the place of TVET in the development of a nation and imbibe strategies to foster the actualization of the stipulated goals.

Recommendations

The following recommendations were made:

1. **Improve teacher education and in-service trainings:** the education of teachers should be relevant and engender competency theoretically and practically. Government should link teacher training institutions to industries, to encourage experts in the fields to organize in-training programmes, seminars and workshops to keep teacher abreast of the dynamism in world of work – as such the teachers likewise are able to inculcate relevant technical knowledge and skills.
2. **Establishing production units:** TVET institution should look inwards to discover ways of generating funds through setting up of production units in its area(s) of specialty. This will not only showcase the possibility of entrepreneurial venturing to the students but shall go a long way in imparting the self-reliance consciousness in learners and as well become a practical and demonstration laboratory while providing funds to the institutions

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WORKPLACE SAFETY SKILLS REQUIRED OF WORKSHOP PERSONNEL FOR EFFECTIVE MANAGEMENT OF TECHNICAL AND VOCATIONAL EDUCATION WORKSHOPS IN TERTIARY INSTITUTIONS IN ENUGU STATE, NIGERIA

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Abstract
The study found out the workplace safety skills required of workshop personnel for effective management of technical education workshops in tertiary institutions in Enugu State, Nigeria. Four research questions guided the study. The design was a descriptive survey and the instrument used was a structured questionnaire. The population for the study was one hundred and five technical education lecturers drawn from three tertiary institutions in Enugu State that offer technical and vocational education programme; University (University of Nigeria, Nsukka - 52, Enugu State University of Science and Technology, Enugu - 30 and Enugu State College of Education, (Technical) Enugu - 23. The instrument was validated by three experts and Cronbach alpha reliability method was adopted to determine the internal consistency of the questionnaire items while 0.84 was obtained. The data collected were analyzed using Mean. The findings revealed amongst other things, that the caliber of workshop technologists/technicians available in tertiary institutions today does not apply the desired safety skills in managing the Technical Education Workshops. Among the recommendations made was that workshop technologists/technicians and Craftsmen should be involved in routine retraining workshops, and seminars should be organized from time to time to help them acquire the required skills and also keep them abreast with the importance of safety skills in effective management of Technical Education Workshops.
Keywords: Workplace Safety, Safety skill, Technologists, Technicians, Safety management system.

Introduction

Safety is the prime requisite in all the workplaces. Workplace safety affects everyone in school workshop environment, including staff, students, and visitors. A safe and healthy working atmosphere is a basic necessity and has to be ensured in the technical education workshop without fail. A simple mistake may lead to severe hazards. Hazard is something with the potential to cause harm. This can include substances (both hazardous and dangerous), materials, work processes or other aspects of the work environment. Risk on the other hand, is the likelihood that a harmful consequence (death, injury or illness) might result when exposed to the hazard. Risk can be quantified as a function of the likelihood of occurrence of the potential harm arising from the hazard and the severity of consequences measured by the value of the damage the harm could cause.

The amount of risk in a workplace is affected by the likelihood of the occurrence (event) and the severity of the consequence that may occur and may even lead to irrecoverable damage to human lives, equipments and machineries. Strict adherence to safety rules, practices and precautions can facilitate and ensure a safe on-site working environment. Safety is not a complex matter that can only be understood by trained specialists or that needs a significant financial commitment to make improvements (Achilike, 2013). It can be integrated into existing school programmes and processes. Commitment from school leaders, consulting with staff and identifying, prioritizing and acting on key issues are the way to do to make real improvements in workplace safety in school workshops and Laboratories. Necessary charts, posters and pictures emphasizing the importance of safety, precautions to be taken, first aid methods etc, shall be displayed in the laboratories and workshops in addition to necessary instructions and training programs.

The critical importance of safety to the technical education workshop makes compliance with safety-related rules a key concern. Despite the emphases on safety in the workshop, one major accident stemming from rule noncompliance can call into question the safety of the entire work environment. While emphasizing workshop safety rules and regulations in the curriculum of technical education programmes at all levels in Nigeria and adoption of a voluntary standard for rule compliance is an important step, more remains to be done. Of particular concern are safety-related rules that are designed to prevent high-consequence events, especially those where the public is affected or where there may be harm to staff and students.

Safety-related rules apply to employees involved in the operation and maintenance of the work environment, tools, materials and equipment. This includes instructors, workshop technicians, craftsmen, machine operators, cleaners, and other operations personnel, as well as students. Achieving safety-related rule compliance requires more than monitoring for noncompliance and responding to it when it occurs (OHS, 2011). It requires preventive actions designed to encourage compliant behavior. This can only be achieved by identifying those safety skills desired of workshop technologists, technicians and craftsmen for effective management of school workshop environment. This document suggests best practices for all of the elements of a comprehensive approach to safety-related rules compliance. The scope of this paper is primarily on safety-related rules desired of technologists/technicians, craftsmen in technical education workshops that could be designed to prevent high consequence events, especially those where the public is affected or where there may be harm to staff and students.

Safety culture assessments usually involve characterizing the makeup and functionality of an organization's safety system. Elements of a safety system include a safety management system (SMS), the presence and hierarchical position of safety officials, safety committees, policies, and equipment. Fernández-Muñiz, Montes-Peón, and Vásquez-Ordás (2007) defined an SMS as "a set of policies and practices aimed at positively impacting on the employees' attitudes and behaviors with regard to risk." The aim of an SMS (Hruz, 2008) is to intervene on the circumstances that result in risks and accidents. This involves identifying and analyzing both latent and visible hazards.

Many safety systems include a programme for rewarding safe work practices as a means to encourage safe behavior. Behavior-based safety (BBS) programs focus on the interaction between people and their working environment. A vital, but neglected, part in such programme role in technical education is played by workshop personnel namely: technologists, technicians and craftsmen. A technologist is an expert in a particular field of technology, a person employed to look after technical equipment or do practical work in a laboratory (laboratory technologist or workshop technologist). A technician on the other hand is a person employed to look after technical equipment or do practical work in a laboratory, an expert in the practical application of a science, a person skilled in the technique of an art or craft. Technicians are skilled workers that work with complex systems or perform highly technical mechanical or diagnostic tests (Lewis & Angel, 2011). Depending on the field, technicians may work independently or under the direction of a professional. Technicians can work indoors or might spend most of their time outside.

The workshop technologists, technicians and or craftsmen work closely with faculty, teaching personnel and students in supporting teaching, research and practical instructional activities of the School of technical education. The primary responsibility of the workshop technologists is to assist with meeting the instructional and practical needs of the Department of Industrial technical Education. This includes managing the workshop and Fabrication facility and related support facilities and equipment of the technical education workshop/Laboratory.

Through a combination of teaching experience in a relevant field and hands-on expertise in the use of Workshop techniques, the technologists/technicians creates and supports educational experiences for the design community within the School. Such technologists/technicians' duties include: the construction, maintenance and operation of the equipment involved in workshop/laboratory activities; the preparation of the samples that constitute the raw material for experiments; the running of those experiments; and the recording, presentation and – on occasions – some of the analysis and interpretation of the data that is produced. In undertaking these tasks, workshop technicians/assistants work closely with academic researchers and make an indispensable contribution to the production of practical skill and scientific knowledge. Through formal and, in particular, informal contributions to the teaching of practical skills, they help to educate students.

Notwithstanding the importance of technicians' contribution to practical skill acquisition and teaching, studies of their skills and training are conspicuous by their absence both from the academic literature and from government documents. For, while there exist a handful of ethnographic studies of technicians, they focus mostly on questions of occupational identity, authority, and hierarchy, paying only limited attention to the issues of skills they posses or desired, training, and recruitment (Toner, 2010). Similarly, recent policy documents outlining the government's science and innovation policy neglect the importance of skilled workshop technicians (DIUS, 2009). The omission is significant because recent reports from universities suggest that a shortage of technicians is hampering the work of researchers in university science and engineering departments (THES, 2009). It is the lack of detailed research on the topic of the workplace safety skills desired of workshop technologists/technicians that this paper seeks to remedy, by addressing the sets of key questions: what are safety skills (personal, safety of others, tools/equipment and workshop environment) required of workshop technicians/assistants for effective management of technical college workshop?

Statement of the Problem

Schools are facing increasing expectations and pressures, many of which need to be addressed immediately. However, there are good reasons to treat workplace safety as a core issue for schools, especially technical education programmes. If it is an integral part of school planning, and addressed as part of other school processes, it contributes to the school's goal of providing effective educational and safe outcomes for students and staff.

A student's performance, especially in skill acquisition no doubt is likely to be influenced by the level of morale and motivation of staff members and this is a function of the level of safety existing at their school workshop. Putting effort into workplace safety on the other hand, demonstrates to staff and students that the leadership team cares about their wellbeing. Poor workshop safety needs and non rule compliance in technical education workshops nowadays, generally results in high occurrence of injuries, low job satisfaction, reduced motivation for workers and students, poor industrial relations, low retention of staff and poor student performance. School communities expect that school leaders will ensure that people who come into the school will go home at the end of the day as healthy as they arrived. Schools also have a responsibility to model healthy and safe workplaces for their students, who are the employers and workers of the future.

Improving a school's workplace safety performance no doubt, has a direct impact on the budget. Lower sick leave rates reduce the need to engage casual relief workers (CRW), and better staff retention lowers recruitment and replacement costs. Also, good workplace safety performance: reduces the risk of public liability claims; has the potential to reduce workers' compensation premiums where it exists and may influence student enrolment numbers, which could affect annual funding.

It is obvious from the foregoing that there is need for safety consciousness in all nooks and cranny of the society, especially the school workshops and laboratories. The technologists, technicians and craftsmen deserve to be protected as well as other staff members. The care of all tools and equipment as well as the supervisor/boss and neighbors are worthy of consideration. The spates of hazards, injuries, and other forms of accidents and premeditated loss of lives have created the need for the issue of safety to be taken more seriously and accommodate zero tolerance for safety rule non-compliance. The need for workplace safety skills to be imparted to students from the technical education workshop to workplace level therefore becomes very important.

Purpose of the study

The main purpose of the study therefore was to determine the workplace safety skills required by technologists, Technicians and Craftsmen for effective management of technical education workshops/laboratories. Specifically, the study sought to determine the;

1. Workplace Safety skills in protecting oneself
2. Workshop Safety skills for protecting tools and equipment
3. Workshop Safety skills required for protecting others.
4. Workshop Safety skills for protecting the workshop environment

Research Questions

The following research questions guided the study:

1. What are the workplace safety skills required by workshop technologists/technicians to protect themselves in the workshop setting?
2. What are the workshop safety skills required by technologists /technicians to protect tools and equipment in the workshop?
3. What are the workshop safety skills required by the technologists technicians to protect colleagues and others around from harm and injuries?
4. What necessary workplace safety skills are required to be exhibited by the technologists /technicians in order to protect the workshop environment?

Method

The study adopted a descriptive survey design. The area of the study is Enugu State Nigeria. The population for the study was 105 technical education lecturers selected from three tertiary institutions in Enugu State, namely – University of Nigeria Nsukka, Enugu State University of Science and Technology and Enugu State College of Education (Technical), Enugu. There was no sampling because the population was relatively small and manageable. The instrument was a 40 item questionnaire structured to elicit responses from the respondents. Three experts in the Department of Industrial Technical Education, University of Nigeria, Nsukka validated the instrument. The questionnaire items were organized into four (4) sections. Section 1 contains Skills items for protecting oneself; section 2 on Skills items for protecting tools and equipment; section 3was on Skills items for protecting others, while section 4 was on Skills items for protecting the workshop environments.

The questionnaire is a Likert-type 5-point scale assigned numerical values of Very Highly Required -VHR (5 points), Highly Required - HR (4 points), Moderately Required - MR (3 points), Not Required - NR (2 points) and Highly Not Required - HNR (1 point). The questionnaire was distributed to the lecturers of technical education in the institutions under study and there was 100% return rate.

Mean was used to analyze the data collected. Decision was that 3.50 mean rating and above were regarded as acceptable in terms of the workplace safety skills required for workshop technologists/technicians to possess; while any rating(s) below 3.50 mean was regarded as not important and therefore, rejected.

Results

In line with research questions which guided the study, the results of the data analysis were presented in the tables below.

Table 1: Mean responses of the respondents on the importance of workplace safety skills for protecting oneself as required of workshop technologists/technicians

S/N	Item Statements	(x)	S.D	Remarks
1	Ability to dress properly in workshop outfit	3.60	.62	Agree
2	Ability to exhibit caution and tact	3.87	.22	Agree
3	Ability to sense danger	3.81	.30	Agree

4	Ability to respond to emergency	3.59	.76	Agree
5	Ability to exhibit adaptability skill	3.71	.44	Agree
6	Ability to work with past experience	3.21	1.32	Disagree
7	Ability to protect oneself from avoidable danger	3.86	.24	Agree
8	Ability to arrange work area as to avoid danger	3.67	.56	Agree
9	Ability to use warning symbols or signs where and when necessary	3.67	.56	Agree
10	problem solving skills, for identifying hazards in the workplace	3.58	.78	Agree

The above table indicates that the respondents in considering safety for oneself rated item 2 “Ability to exhibit caution and tact” (3.87) as highest in ranking, followed by “Protecting oneself from avoidable danger” item 3 (3.81) was rated 3rd while item 5 (3.71) “exhibiting adaptability skill” was rated 4th. However, all the other safety skills were highly rated as necessary for workshop technicians to possess, except item 6 “Ability to work with past experience” which fell to rank up to 3.50.

Table 2: Mean responses of the respondents on the importance of workplace safety skills for protecting others as required of workshop technologists /technicians

S/N	Item Statements	(x)	S.D.	Remarks
11	Active hands on approach with students	3.66	.54	Agree
12	Ability to allow subject matter experts give the information and simply facilitate	3.30	1.07	Agree
13	Ability to ensure that students dress properly to the workshop	3.86	.24	Agree
14	Ability to instruct users on the proper and safe use of equipment appropriate to the task at hand	3.87	.22	Agree
15	Ability to work as the ‘front line’ in troubleshooting user problems	3.67	.56	Agree
16	Attention to details	3.21	1.32	Disagree
17	Decisiveness in emergencies	3.63	.60	Agree
18	Ability to be flexible and adaptable in any situations	3.59	.76	Agree
19	Competency in allocated position	3.60	.62	Agree
20	Lateral thinking skills	3.34	1.14	Disagree

Ability to instruct users on the proper and safe use of equipment appropriate to the task at hand (3.87) was ranked highest followed by “Ability to ensure that students dress properly to the workshop (3.86) and then 3rd in ranking (3.67) was “Ability to work as the ‘front line’ in troubleshooting user problems” where 4th rankings (3.66) was for “Active hands on approach with students”. Items 12, 16 and 20 attracted low response from the respondents and were therefore rejected, while others were also ranked highly as being important skills for effective management of school workshops.

Table 3: Mean Responses of the Respondents on the Importance of Safety Skills for Protecting Tools and Equipment as Required of Workshop Technologists /Technicians

S/N	Item Statements	(x)	SD	Remarks
21	Ability to maintain equipment and manage inventory of equipment, spare parts and consumable materials	3.59	.76	Agree
22	Ability to make workshop store assessable to technical teachers and students	3.34	1.4	Disgree
23	Ability to monitor facilities and address any indentified or pending problems	3.63	.60	Agree
24	Ability to repair tools/equipment with minor problems	3.30	1.0	Disagree
25	Ability to recommend equipment purchase and replacement as needed	3.38	.98	Disagree
26	Ability to use initiative	3.85	.23	Agree
27	Hazard identification, risk control ability	3.87	.22	Agree
28	Ability to learn constantly	3.56	.87	Agree
29	Ability to establish file of faculty, staff and students who are authorized to use Lab facilities and specific equipment.	3.38	.98	Disagree
30	Ability to make decisions and stick to them	3.68	.52	Agree

In order to protect tools and equipment (as revealed in the above table), respondents indicated “Hazard identification, risk control ability” as highest, hence item 27(3.87) is ranked 1st. second in ranking is “Ability to use initiative” item 26 (3.85), “Ability to make decisions and stick to them” item 30(3.68) was rated 3rd and “Ability to monitor facilities and address any indentified or pending problems" item 23 (3.63) was rated 4th. Items 22, 24, 25 and 29 were not accepted by the respondents as important safety skills for effective workshop management. Other items were rated highly and so accepted as important safety skills desired of workshop technicians.

Table 4: Mean responses of the respondents on the importance of safety skills for protecting the workshop environment as required of workshop technologists /technicians

S/N	Variables	(x)	SD	Remarks
31	Ability to Maintain a safe, clean and well organized working environment	3.87	.22	Agree
32	Ability to use stock record book(s)	3.30	1.07	Disagree
33	Ability to serve as a technology consultant for Lab users with technical questions or needs	2.98	1.08	Disagree
34	Willingness to accept and drive change	3.81	.30	Agree
35	Organizational behaviour / management skills			Agree
36	Ability to monitor and identify existing or potential workshop related problems	3.56	.87	Agree
37	Auditing skills	3.38	.98	Disagree
38	Ability to ensure that students clean their work area after every practical before leaving	3.86	.24	Agree
39	Ability to record damages and breakages properly	3.66	.54	Agree
40	Ability to ensure careful disposal of workshop wastes	3.86	.24	Agree

From the above table 4, the respondents ranked item 31as 1st i.e. "Ability to Maintain a safe, clean and well organized working environment" (3.87) while item 38 and 40 "Ability to ensure that students clean their work area after every practical before leaving" (3.86) and "Ability to ensure careful disposal of workshop wastes" (3.86) ranked 2nd. Item 34 "Willingness to accept and drive change" (3.81) was ranked 3rd in rating and item 36 "Ability to monitor and identify existing or potential workshop related problems" (3.56) was ranked 4th. Apart from three items 32, 33 and 37, "Ability to use stock record book(s)", "Ability to serve as a technology consultant for Lab users with technical questions or needs", and "Auditing skills respectively which was ranked low, and subsequently rejected because their rating fell below the acceptable 3.50; all the other items were rated well above the acceptable 3.50.

Discussion

Protecting oneself was perceived by respondents as very important in all aspects of workplace safety hence, the highest rating given to ability to exhibit caution and tact. It then appears surprising that the caliber of technicians available in our schools today do not apply this important safety skill in managing the school shop. The incessant occurrence of injuries and accident in most workshops to both students and workshop assistants bear credible testimonies of their poor work habits. This agree with the affirmations of Achilike (2011) that the need to protecting oneself from avoidable danger and exhibiting adaptability skill are necessary ingredients for not only protecting oneself but also protecting others, tools and equipment. Hence, the respondents agreed with this in their high rating as they considered them very necessary as safety skills for workshop technicians/assistants.

Safety of tools and equipment were equally perceived by the respondents as important for effective management of school shop. The highest rating under protecting of tools and equipment as listed by the respondents are hazard identification, risk control ability, ability to use initiative, ability to make decisions and stick to them and ability to monitor facilities and address any indentified or pending problems. This is in tandem with the saying that the problem identified is problem solved. To be able to avert impending danger, risk and hazards, the workshop assistants should always be on the alert. This agrees with the assertions of Nut (2013) that training for skills in fault finding is a prerequisite for the workshop technician.

In protecting others, the respondents rated ability to instruct users on the proper and safe use of equipment appropriate to the task at hand was ranked highest. This is in line with Hruz (2008) assertion that for effective laboratory management that is involving, the lab technician should encourage and allow all lab members to contribute to research plans, organization issues and goals. Other essential skills include the ability to ensure that students dress properly to the workshop and then ability to work as the ‘front line’ in troubleshooting user problems. Also an active hand on approach with students is rated high by the respondents because idle mind they say is the devil’s workshop. Attention to details was amongst the least in rank and as such was rejected as an important skill for the workshop technicians.

The Ability to maintain a safe, clean and well organized working environment is rated highest by the respondents. This in line with the workplace health and safety act (2009) stipulations, that the best way to manage exposure to risks is to eliminate the hazard or prevent the risk. Other skills that are rated highly include the ability to ensure careful disposal of workshop wastes, willingness to accept and drive change and ability to monitor and identify existing or potential workshop related problems. Ability to serve as a technology consultant for Lab users with technical questions or needs was amongst the skills ranked least because the duty of the workshop technician should be more of a facilitator. However, the technician should be able to help students understand their strengths and weaknesses, so they're able to deal with issues as they arise during the day-to-day inner workings of the lab. A good workshop assistant should also understand that growth and continuing education are essential to keeping focused, which is why he or she should be encouraged to keep abreast of technological and scientific developments by subscribing to pertinent lectures or workshops and seminars.

Conclusion

The study has revealed the fact that safety in the workshop is everybody’s business indeed because all and everything including the workshop technicians/assistants, teachers, students, tools, materials and equipment suffer in the face of unsafe work conditions. Workplace safety in this regard should be from external and internal forces in form of risks to life, tools and equipment and the workshop environment. The need for workshop technicians and indeed teachers to acquire safety skills was established; especially in the face of rampant occurrence of accidents and other avoidable hazards in the school workshops. When the workshop technicians consciously and unconsciously protect themselves, others, tools, equipment and the environment, the job of teaching and learning no doubt, will be a pleasurable one.

Recommendations

From the findings of this study, the following recommendations were made:

1. Strict measure should be employed to ensure that workshop technologists/technicians employed to manage technical education workshops are those trained for the job.
2. Workshop technologists/technicians should be involved in routine retraining, workshops and seminars to help them acquire the skills as well as to keep them abreast with the important innovative safety skills for effective workshop management.
3. Workshop supervisors or heads of department should be visiting the workshops more often to check for the technologists’/technician’s application of safety management skills and to advise them on their importance for science and technological growth.
4. Obsolete and faulty equipment which could constitute treat to safety should be replaced, repaired or serviced as the case warrant.
5. Workshop rules and regulations especially as it borders on machine and human safety must be emphasized.

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HUMAN AND MATERIAL RESOURCES MANAGEMENT CHALLENGES AS IMPEDIMENT FOR EFFECTIVE IMPLEMENTATION OF (TVET) PROGRAMMES

By

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Abstract

Technical, Vocational Education Training (TVET) deals with the training of technical personnel for the purposes of initiating, facilitating and implementing the technological programmes and development of a nation and also to create awareness of technological literacy to youths. The training of technical personnel has witnessed formidable challenges ranging from inadequate funding, inadequate facilities both quantitatively and qualitatively. Non-availability of adequate human capacity, brain drain and poor staff training and retention. Others include, Apathy of Political office holders/law makers, Nigeria value system, and defective curriculum of technical education, poorly equipped laboratories and inadequate ICT environment. This paper intends to critically examine some of the issues, human and material resources management challenges as impediment for effective implementation of TVET Programmes and suggest ways of enhancing the teaching and learning of technical education programmes in Nigeria.

Introduction

No matter how great Technical personnel or an institution and the range of its assets, it can only achieve its objectives through the medium of human effort. Its human resources is therefore as important to the institution if not more important than its other resources Achunine (2004). The author added that, in Technical, Vocational Education and Training (TVET) human resources comprises the combined contributions in the form of efforts, skills or capability of the people it employs (its personnel or workforce) which enable them to perform and to continue its productivity or operation and indeed to exist. In order wards, it is the activities of the specialist who are responsible for carrying out different works, operations for implementing the objective of TVET. Penson et al (2004), added that human resources are the services provided by labourers and management to the production of goods and services. They also pointed out that the skills of the labourers (staffs) and other employers often determine the success or failure of certain workshops or enterprises and so required proper management.

Naturally, the definition of human resource management would be incomplete without further explaining what the terms 'human resources' and 'management' are first and foremost, people in work organizations, endowed with a range of abilities, talents and attitudes, influence productivity, quality and profitability. People set overall strategies and goals, design work systems, produce good services, monitor quality, allocate financial resources, and market the products and services. Individuals, therefore, become 'human resources' by virtue of the roles they assume in the work organization. Employment roles are defined and described in a manner designed to maximize particular employees' contributions to achieving organizational objectives. Management therefore, is a process of doing things in an organization and the process is basically the combination and utilization of organizational resources towards the achievement of the common or organizational objectives. Eshenake (2007) defined management as a process of combining and utilizing or of allocating an organization's inputs (men, materials and money) by planning, organizing, directing and controlling for the purpose of producing output desired by customers so that the organizational objectives are accomplished. Obviously, this could be achieved through Technical and Vocational Education and Training (TVET).

Technical and Vocational Education and Training (TVET) Programmes

Indeed, various contemporary definitions of the term "Technical, Vocational Education and Training" (TVET) are evolving to reflect the fundamental changes in the scope of the programmes worldwide. The United Nations Educational, Scientific and Cultural Organisation (UNESCO) viewed (TVET) as learning, aims at developing skills in the practice of certain trades, as well as learning, aims at preparing students for entry into the labour market in general (UNESCO,2009). TVET could also be define as those aspects of the educational process involving, in addition to general education, the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupation in various sectors of economic life (UNESCO,2012);(FGN,2013). FRN, (2013) defined TVET as a comprehensive term referring to those aspects of educational process involving, the study of technologies and related sciences, the acquisition of practical skills, attitudes, understanding, and knowledge relating to occupations in various sectors of economic and social life in addition to general education. TVET is defined by UNESCO as "those aspects of the educational process involving, in addition to general education, the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupation in various sectors of economic life". TVET thus equips people not only with vocational skills, but with a broad range of knowledge and attitudes that are now recognized as indispensable for meaningful participation in work and life. Examples of the benefits include self-awareness and self-esteem, and strengthened interpersonal, citizenship, communication and entrepreneurial skills. TVET encompasses programmes that provide participants with skills, knowledge and attitudes that enable them to engage in productive work, adapt to rapidly changes in the labour markets and economies, and participate as responsible citizens in their respective societies. FRN (2013) listed the goals of (TVET) to include among others: provision of trained manpower in the areas of applied sciences, technology, business, advanced craft as well as providing training and related skills for self reliance and employment. Indeed, (TVET) is a potent means for fast-tracking technological progress, citizens' capacities, economic growth and national development (Akhuemonkhan & Raimi, 2013). According to Uwaifo (2009), TVET is the training of technically oriented personnel who are to be the initiators, facilitators and implementers of technologically development of a nation. The author maintained that, the training of its citizens on the need to be technologically literate would eventually lead to self reliance and sustainability; the author observed that technical education more than any other profession has direct impact on the development of the country.

Management of Human and Material Resources in (TVET)

Management in the submission of Atsumbe, (2009) is a creative and systemic flow of knowledge that is applied to produce result by using human and other resources in an effective way. Hendry (2001) described management as the process of designing and maintaining an environment in which individual working together in group can effectively accomplishes selected aims. Penson, Capps, Rossom and Woodward (2010), described management as the organisation and mobilization of all human and material resources in a particular system to get things done in a accordance with identified objectives. . The author went further to explain that management is a mental process that focus on the ability of man to plan, organise, implement, co-ordinate and accept responsibility for a decision being made. Kiu (2008) noted that these principles help in proper utilization of material resources. Material management in the submission of Penson et al (2010) involves planning, procuring, storing and providing the appropriate quality and quantity of material at right place in right time so as to co-ordinate and schedule the production activity in an integrative way for an industrial or a workshop undertaking. The author emphasizes that this will help workers or instructors to attain her stated goals. This can be achieved through human resources management. Time management in the view of (Achunine,2004) is the effective and efficient utilization of a workshops or an administrators corporate time to achieve organizational and personal goals. The author stated that it involve doing the right thing at the right time .He further stressed that if activities are carried out at the appropriate time that certain factors such as stress and frustration which result to failure would be minimized .It is necessary to note that when resources are harnessed very well, it could enhanced good production.

Resources management is the effective and efficient development of organization's resources when they are needed (Adetoro, 2009). Olagboye (2004) describes resources management as the prudent utilization and maintenance of the human, material, financial and other available scarce resources for the optimal achievement of a set of educational goals. It is the effective acquisition, utilization and maintenance of the supplies needed in the educational system (Banjoko, 2002). In the context of this study resources management is conceptualized as the process which encompasses activities designed to procure materials, co-ordinate (human) and utilize educational resources for the explicit purpose of attaining the objectives and goals of every technical education institutions. Management of educational resources in any technical education institution needs effective and dynamic leadership. The administrator should have the ability and the requisite skills to intelligently manage the available resources for successful accomplishment of the institutional goals and objectives. Adetoro (2009) classifies educational resources into human, physical and financial resources. These are potential inputs of the institution that enable the institution to achieve its objectives both in practical and in practice if they are effectively managed. They are the pre-conditions for successful implementation of school programmes and whenever this condition is not fulfilled, the ability of the teaching staff to perform his task will be greatly hampered. It is on this note that the researcher was motivated to find out human and material resources management challenges as impediment for effective implementation of programmes in technical, vocational education and training TVET.

Human resource management therefore deals with the establishment of procedures for the employment and payment of workers or staff. It is the arrangement of conditions which make possible greater self direction by staff in the performance of their duties. It is, therefore, an important function in the general context of all administrative responsibility of managing staff. It should also be remembered that the major premise of staff or human resource management in schools is that the end results of the educational process will be determined by the effectiveness of the school teachers.

Challenges in Managing Resources for Effective Implementation of TVET Programmes

Technical and Vocational Education and Training cannot contribute greatly to the reduction of abject poverty, hunger and unemployment because it is handicapped by numerous challenges (Eze, 2013). Oranu (2004) observed that the good intentions of successive Nigerian governments about TVET programmes are still fraught with a lot of challenges. The challenges which hinder the implementation of TVET programmes in Nigeria include:

Inadequate funding of Technical and Vocational Education: No doubt, Technical Vocational Education and Training has made some notable impacts on the Nigerian society, especially in respect to the products of the training programme who are contributing their quota to the economic growth and development of the nation through various educational and industrial establishments (Odu, 2013). Inadequate funding of Technical and Vocational institutions has caused the turning out of half baked graduates because there is no fund to build and maintain workshops, laboratories or even purchase modern equipments (Durotola, 1999). Staffing of Vocational Technical Education is generally inadequate because of poor funding. Experienced and skilful teachers may not be employed. Those that are employed, because of poor remuneration do not stay long in the teaching profession, but drift to some other more lucrative jobs especially in the industries and abroad. Consequently, inexperienced and unqualified technical teachers are employed thereby lowering academic standard, resulting to wastage in the achievement of technical education goals (Mbipom, 1999). Inadequate funding of Vocational Technical institutions has often caused a lot of difficulties in the payment of staff salaries. It has also resulted to the retrenchment of teachers or retirement of teachers at early age.

Furthermore, Momoh (2012) observed that government lack of commitment to technical education and inadequate funding has weakened technical education in Nigeria. A direct consequence of this is that while the number of technical education institution is dwindling that of general education is growing in bounds (Momoh, 2012).

Inadequate facilities: Most technical education departments in Nigerian Universities do not have laboratories or workshop space, let alone useable equipments and where they exist, they are grossly inadequate, as the workshops only have items or equipment that were provided when the departments were first established of which most of them are already obsolete or grounded (Ojimba, 2012). It is quite unfortunate and surprising too to know that most technical education departments still depends on engineering workshops and lecturers to teach technical education concepts in this 21st century. The available facilities programme as at today are inadequate quantitatively and qualitatively and besides they are out- dated. Oryem Origa (2005) opined that Technical Education institutions in Nigeria have little or no laboratory or workshop space for technical education programmes. This has resulted to the low quality of technology programmes in our higher institutions. The author also observed that the few schools that have laboratories, experience acute shortage of laboratory equipment and supplies. The conclusion is that the situation is partly the reason it has been very difficult to carryout experiments effectively for students. This has also made teaching and research in science and technology difficult and therefore the country was producing insufficient and ill prepared technical education graduates for driving the technological and socio-economic development of Nigeria. Uwaifo(2009),noted that performance of technical education graduate is no longer news as very important projects in the country, particularly, the construction industry are now run by technicians and craftsmen from neighbouring West African countries

Brain Drain: This refers to the movement of technical teachers and lecturers of technical education which are very much needed for the implementation of TVET programmes and technological development of Nigeria from one University to the other or to other professions where they feel will offer them better conditions of service. This gives rise to some of the Nigerian professionals including technical educators leaving the Nigerian shores over the years. Between 1997 and 2007 alone, Nigeria lost over 10,000 middle level and high level managers to the western economies. About 500 lecturers from Nigerian tertiary institutions have continued to migrate each year, particularly to Europe, America and other African countries. (Bassi, 2004)

Staff Training and Retention: Training of academic staff is a continuous exercise to ensure consistent improvement in the quality of their products. The training can be acquired either locally or overseas. Usually, local training within the country is cheaper than overseas training but more strenuous because of inadequate facilities, literature and distractions rising from the need to meet the necessary demands. Overseas training requires a lot of foreign exchange but the enabling environment exist to achieve success in a record time. However, overtime, it has always been difficult to get the trainees back to their respective countries after the completion of their study. The salary and service benefits paid to technical education teachers in Nigeria is about the lowest in the world (Ojimba, 2012). This leads them to migrate to other countries of world for better pay.

Curriculum of Technical Education: The curriculum of a subject with practical content is generally organized into an average of 67% for the theoretical classes and 33% for workshop practical. Olunloyo (2002) noted that one of the issues confronting the design of appropriate curriculum for technical education is preparing students for the shift from the fordist to Information Communication and Technology (ICT) paradigm in technology practice. The low pace of industrialization and technological growth in Nigeria can be attributed to the widening gap between science and technology as a result of the inability of technical education to adequate utilization of the scientific ideas to promote technology. This suggests the need to overhaul technical education curricula in Nigeria. The overhauling of the curricula may not necessarily translate to the production of highly literate technical education experts of ready-made graduates for the industry which may result in rapid industrialization or economic growth of the nation unless solutions are proffered to some constraints that may militate against positive outcomes, but will adequately equip our youths with the relevant skills needed for their daily living.

Apathy of Political holders/law makers: Education generally including Technical and Vocational Education and Training programme has been grossly neglected in Nigeria. Technical educators have the greatest challenge of convincing the law makers on the reason they should give priority attention to the programme in resources allocation. Many options of getting positive results have been advocated at different fora namely; lobbying, participation of technical educators in governance etc, yet the government is still playing a lopsided attitude to the proper development of the programme in Nigeria. Therefore, Nigeria will remain a technologically backward and will depend on other nations if this negative attitude is not reversed.

Nigerian Value System: In Nigeria today too much emphasis is placed on University qualifications not minding whether the holder possesses the required knowledge and skill. But in advanced societies those with technical qualification are highly regarded. In fact, the value system in those countries depends on the person's skills and knowledge, and not on the stack of academic degrees one has. In the public service, graduates of technical education are often discriminated against and their career prospect limited. Nworlu- Elechi,(2013),observed that secondary school leavers and parents prefer University education to technical education.

Implementation of TVET Programme

The challenge of (TVET) programmes is half way to its solution. The effective implementation of technical and vocational education training in Nigeria entails the correction of the anomalies highlighted in this paper. To achieve this, the following strategies should be

Boosting the Image of Vocational and Technical Education: In this 21st century, the business environment is changing at a very fast pace with regard to the world of work. This demands new skills for proper adaptation to the business world. For Nigerians to meet the skill needs of the 21st century job market, they should have a rethink and change their negative mindset by embracing TVET skill acquisition for the improved socio-economic development of the country. The image of TVET programmes should be boosted through adequate and proper sensitization of the general public and students in particular. Government should make TVET programmes more attractive by awarding scholarships to its students, making it compulsory for each student to acquire at least one vocational/technical skill irrespective of the area of specialization. The government professionals and institutions offering TVET should use persuasive advertising both print and electronic media, workshops, conferences, seminars, churches and other local means to create awareness of what TVET is for , what it does, and its benefits in improving the political, social and economic status of individuals and the nation at large. Students must be made to realize that certificates do not count again but the depth of knowledge and vocational skills which they have acquired and their ability to sustain the skill. Once there is improvement in the image of vocational training in Nigeria, young people will move into the programme because the quest for certificate has failed Nigerian youths and the nation at large.

Involving TVET Professionals in Policy Decisions: The major problem confronting TVET is the use of non-professionals in handling TVET matters. Ibeneme (2007) noted that many administrators of TVET programme at policy making level are not vocationally and technically trained persons and thus do not seem to understand the needs of the programme regarding fund distribution. For TVET to be successful, government must ensure that TVET professional are involved in TVET policy making decisions, planning and implementation. This is necessary because TVET professionals knew the needs of the TVET programmes in terms of deploying human and material resources for effective implementation, monitoring and evaluation.

Matching TVET Policies with Needs Assessment and Proper Planning: Government should conduct needs assessment of the people and the country at large with respect to TVET and match it with proper planning before implementation. Policies on education made in haste will never give desired results. It would be better according to Eze (2012), if policies are made in such a way that changes can be accommodated without disturbing the overall system. Proper planning will also help to avoid inconsistencies in policy decisions which could hinder performance and success of TVET programmes. In line with this, Emeh, (2012) stressed that if the youth of the country are to be prepared for the anticipated radical in the world of work, there is need for a plausible plan to overhaul the education system in favour of TVET to enable the youths secure their future.

Enrich Laboratory/Workshop: Dramatic changes occasioned by globalization have shown that functional skill acquisition is truly capable of improving ones economic destiny rather than mere acquisition of certificates. To acquire the right skills needed for wider choice of jobs and career paths, well equipped laboratory. Workshop becomes critical. Government should equip TVET workshops with modern equipment, tools and machines to enable teachers and students practice the skills using a replica of what should be obtained in the workplace and as well undertake socially relevant researches. This is why Emeh, (2012) stressed need to end the artificial division between the academics and the practical.

Exchange Programmes within and Outside the Country: Government and institutions should plan, negotiate and fund exchange programmes with other countries that are already neck deep in skill acquisition practices. This will definitely help to increase the graduates and teachers knowledge and technical know-how in the field of vocational and technical education and training. The involvement of government agencies in skill programmes such as ITF, SURE–P, National Economic Empowerment and Development Strategies (NEEDS), and National Directorate of Employment (NDE) in the TVET programme will help and promote the image of TVET. Cooperation between institutions and industries will help to provide students with state-of-the-art equipment, machines and tools and also make the students' experience real life situations. Interaction between Institutions and the General Public through Exhibitions: Internally, there should be a planned interaction among institutions offering TVET programmes and the general public through institutional exhibitions. This will help institutions to know where they have comparative advantage over others in the area of skills acquired.

Staff Training: The training of academic staff should be a continuous exercise to ensure consistent improvement in the quality of TVET teachers. The training should be in two folds: training to acquire qualifications required for teaching and continuing professional training. Both types of training can be acquired either locally or overseas. Government should adequately fund and support TVET programme through scholarships awards, funding/research grants, provide current books and journals in order to meet the needs required for staff on job performance

Funding: Considering the economic forces reshaping the world today, getting education right should be given priority attention in this democratic dispensation. Government should endeavour to fund TVET and other skill acquisition programmes very well, bearing in mind the capital intensive nature of the programmes a special fund to be tagged "Vocational and Technical Education Intervention Fund" should be created for the effective implementation of TVET programmes at all levels. This will help to equip the workshops and laboratories for effective skill acquisition.

Conclusion

For effective progress to be achieved in Nigeria the challenges confronting technical education must be recognized and adequate measure be taken. Adequate resources should be allocated to the (TVET) programmes in Nigeria in order to achieve positive outcomes. A comprehensive reform toward technical vocation education and training, and a deliberate attempt to upgrade the programme is the only way to a technological development of this country

Recommendations

In view of the problem highlighted in the paper the author hereby recommends that:

1. The Governments Federal, state and local should compulsorily make technical and vocational education subject a foundation course in all primary and post primary education in the country.

2. Government through the various State Ministries of Education should plan and convert one or two secondary schools in every local government headquarter to a vocational and technical secondary school

3. Government should make sure that all the abandoned physical resources like machines tools, equipments and materials provided by Federal Government years ago put to use.

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POTENTIAL IMPROVEMENT NEEDS OF ELECTRICAL/ELECTRONICS TEACHERS FOR EFFECTIVE MAINTENANCE OF MEASURING INSTRUMENTS IN TECHNICAL COLLEGES IN NORTHERN NIGERIA

By

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Abstract
The study determined the potential improvement needs of Electrical Electronics teachers for effective maintenance of measuring and testing instruments in technical colleges in Northern Nigeria. Two research questions were answered and two null hypotheses formulated were tested at 0.05 level of significance. The study adopted descriptive survey design. The target population was all 112 Electrical/Electronic Teachers in Technical colleges in the northern part of Nigeria. There was no sampling since all the teachers involved in the study were of manageable size. The reliability coefficient of the instrument for the study was determined using Cronbach alpha reliability method and 0.80 coefficient value was obtained. The instrument was subjected to face validation by three lecturers in the Department of Industrial Technical Education, University of Nigeria, Nsukka. It was found that teachers need improvement on both the potentials for maintain measduring instruments as well as the strategies needed for maintenance of electrical/ electronics measuring instrument for effective teaching and learning. It was therefore recommended that the state government should provide adequate tools, materials, machines and measuring instrument for teaching and learning. WORKshop or training programme should be orgainsed for improving teachers' competencies in maintenance of electronic measuring instrument. Finally, since Technical Education is capital intensive, it was recommended that the government at various levels should encourage participation and involvement of various companies and the societies at large.
Keywords: Potential, Improvement Needs, Electrical Electronics Teacher, Measuring Instruments

Introduction

Technical colleges in Northern part of Nigeria require competent electrical/ electronics teachers and other manpower. Technical colleges are special institutions established to training individuals in different trades for employments. The goal of technical education, according to Onwuegbuna (2003), is the transmission of ideas, skills, knowledge and values of work and what individuals can do with their life through the help of a teacher. Technical education according to United Nations Educational Scientific and Cultural Organization (UNESCO, 2002) and the International Labour Organization (ILO, 2002) is a means of preparing individuals in an occupational field. Northern Nigeria has more technical colleges that require high potential electrical electronics manpower

Electrical/Electronic teachers perform majorly the teaching of content of electrical electronics curriculum (UNESCO, 2002). Such a teacher is expected to be highly knowledgeable in the subject matter. Teachers are always in the best position to identify the direction of change in the objectives or parts of the content because they are directly involved in the practices of teaching and learning in school and to the society. In extension, electrical electronics Teachers are expected to manipulate instructional strategies and translate information, experience and wisdom into relevant knowledge that a student can understand, retain and pass to others Abdullahi (2010) asserted that the quality of teachers is the single most important factor affecting students' achievement and that countries which score highly on international test have multiple policies in place to ensure that the teachers they employ are as effective as possible. An electrical electronics teacher is one who has acquired professional training in teaching with relevant skills in the use of measuring instruments (Adewumi, 2009). Technical teachers with various qualifications and experiences need to update their knowledge and skills on regular basis in order to meet the expected needs of the society.

Need is described as something that is required not just because one would like to have it, but because it is useful or very important. It suffices that any technical skill that is very useful for teaching and which teacher lack becomes a need to a teacher. Thus, becomes imperative to update and improve the teachers. Improvement in the view of Ado (2012) is the process of making something better. Ado further stated that if something or situation improves that thing or situation become well. Improvement needs, therefore is a gap between the performance ability/skill which an employee possess to perform. In the context of this study, improving teachers' potentials becomes inevitable for the technical development in Nigeria.

Potential means competence in or the ability to do what is needed. In extension, it is a quality or state of being functionally adequate or having knowledge, skill or strength (as for a particular duty or respect). According to Olaitan (2003), to be competent implies that an individual has acquired the knowledge, skills, attitude and judgment which he requires in order to perform successfully at a specified proficiency level in a given task. According to Sowande (2002), updating of skills of teacher is a professional improvement which is retraining of teachers in relevant job skills to enhance their performance on the task using equipments, hand tools and measuring instruments in process of delivering the teachers duty. Measuring instruments are equipment or devices that are used to provide sizes or values of electrical quantities while carrying out special operation. Grobs and Schultz (2005) defined measuring instrument to mean formal test equipment which define the instrument's use, and the means by which related numbers are obtained. William (2000) revealed that little maintenance is needed for most measuring instruments. According to PCE Eberica Instruments UK, electrical electronics teacher is suppose to possess potentials in; Performance of equipment, frequency of us, operating conditions, stability of previous calibrations, accuracy required and quality control requirements of the measuring instrument. Measuring instruments could be in any of the following categories; Sensors, Power Supplies and Analyzers, Data Acquisition, Calibration and Standards, BUS Analyzers and Industrial PC Solutions. Periodic safety inspection of infrequently used measuring instruments requires careful and frequent inspection to maintain their safe use (Brain, 2007). To achieve this, strategies has to be put in place.

Strategy is planned series of action for achieving something. According to Egbita (2006), instructional strategies are decision about organizing people, materials and idea to provide learning. Also Umar (2013) posited that strategy teaching requires comprehensive instruction that include attention to promote knowledge (what to do), procedural knowledge (how to do it) as conditional knowledge (when and why to do it) as a coherent and substantiated logic for making one set of choices rather than other. Operationally, strategy is the total pattern of decision which shapes the long-term capabilities to the overall strategy. Strategy is the therefore, reconciliation of technical requirement with operational resources for successful programme (Umar, 2010). Since maintenance of equipment used in technical workshop is an essential activity, it is therefore beholds on the technical teacher to improve their skills on the maintenance of equipment. This becomes necessary to find the potential improvement needs of teacher for effective maintenance of equipment in technical colleges in Northern Nigeria. The general purpose of this study was to identify the potential improvement needs of electrical electronics teachers for effective maintenance of measuring and testing instruments in technical colleges. Specifically, the study south to identify:

1. the potential improvement needs of teachers in the maintenance of measuring instruments.

2. strategies for improving the potentials possessed by teachers.

Hypotheses

The following null hypotheses were formulated and tested at 0.05 significant levels of significance:

1. There is no significant difference between the mean responses of teachers in urban area and teachers in rural area on the potential improvement needs in the maintenance measuring instruments.
2. There is no significant difference between the mean responses of teachers in urban area and teachers in rural area on the strategies for improving the potentials possessed by teachers.

Methodology

The study adopted descriptive survey design. The study was carried out in technical colleges in Northern part of Nigeria. The population for the study was 112 electrical /electronic technology teachers in the selected technical colleges. The choice of technical college teachers of electrical/electronic was made because they are the group responsible for the training of technical college graduates in Nigeria. There was no sampling because of the manageable size of the population. Non structured questionnaire was used as the instrument for data collection. To develop the questionnaire, the researcher visited the industries and listed skills and complemented it with additional information from literature. The questionnaire was divided into parts 1 and 2. Part 1 was used to obtain information on personal characteristics of the respondents while part 2 was divided into sections A and B. Section A consists of the potential improvement needs of teachers in the maintenance of measuring instruments, Section B deals with the strategies for improving the potentials possessed by teachers.

The instrument for data collection was validated by three experts. One expert in the Department of Vocational Technical Education, University of Nigeria, Nsukka, one expert from Tai Solarin College of Education Omu-Ijebu and one expert of fabrication and welding industry in Lagos State. Each expert was served with a copy of the instrument and requested to identify ambiguities and ensure that items are clearly stated and appropriate for the research questions and null hypothesis formulated. They were asked to give suggestions for improving the instrument towards meeting the objectives of the study. The experts vetted the items of the questionnaire one by one and included relevant ones.

Cronbach alpha method was used to determine internal consistency of the instrument items. Statistical Packages for Social Sciences (SPSS) 16 versions was employed to analyse the data collected from the respondents and 0.80 reliability coefficient value was obtained for the entire items in the questionnaire. One hundred and twelve copies of the questionnaire were administered on electrical/electronic teachers with the help of three research assistants. The research assistants were instructed by the researcher on how to administer instrument so as to ensure safe handling and return of the instrument. Each of the research assistants was deployed to administer copies of questionnaire to respondents in their various locations while the researcher closely supervised the research assistant. Two weeks was given to the respondents in order to complete the copies of the instrument for data collection. After two weeks the researcher and the three assistants and the researchers went round to collect the administered copies of the instrument for analysis and they were able to retrieve back 111 copies of the questionnaire which represent 97.90 percent return rate.

Data collected was analyzed using mean and standard deviation to answer the research questions 1-2. Decision on the research questions was based on the cut-off point of 3.50, in other words, any item with a mean rating of 3.50 or above is regarded as Agree and was accepted while any item with a mean rating below 3.50 was taken as disagree and will not be accepted. Data collected for testing null hypothesis was analyzed using analysis of covariance. The decision on testing the hypothesis was based on comparing the significant values with 0.05 level of significance. The hypothesis of no significant difference was upheld for any item whose exact probability value was greater than 0.05 level of significance. Hypothesis of no significant difference was rejected for any item whose exact probability value was less than 0.05 level of significance.

Table 1: Mean Responses and Standard Deviations of Respondents on Potential Improvement Needs of Teachers in the Maintenance of measuring instruments in Technical Colleges in Northern Nigeria

S/N	Item statements	$\bar{x}$	SD	Remarks
1	Selecting the right tool for the right job	4.70	0.62	VHN
2	Do not carry too many instruments at the same time	4.38	0.55	HN
3	Selecting the appropriate range when measuring quantities	4.81	0.62	VHN
4	Storing instrument appropriately	4.51	0.73	VHN
5	Use of oscilloscope to determine wave form	4.24	0.98	HN
6	Keeping the work table tidy and dry always	4.19	1.13	HN
7	Removing batteries when instruments are not in use	4.32	0.78	HN
8	Correct grasp of meter probes while measuring a quantity	4.32	0.78	HN
9	Handling oscilloscope diligently	4.73	0.51	VHN
10	Replacing meter batteries when weak	4.54	0.77	VHN
11	Constant cleaning of instruments to prevent errors	4.41	0.83	HN
	Cluster mean	4.50	0.75	HN

The results in Table 1 shows that items 1, 3, 4, 9 and 10 were rated very highly needed by respondents as potential improvement needs of teachers in the maintenance of measuring instrument in technical colleges in Northern Nigeria. On the other hand, the remaining items were rated highly needed (HN) by the respondents. The overall cluster mean of 4.50 with a standard deviation of 0.75 indicates that all the 11 items were rated as highly needed by the respondents as potential improvement needs of teachers in the maintenance of measuring instrument in technical colleges in Northern Nigeria.

Table 2: Mean Responses and Standard Deviations of Respondents on Strategies for Improving the Potentials Possessed by Teachers in Technical Colleges in Northern Nigeria

S/N	Item Statements	$\bar{x}$	SD	Remarks
1	Providing full in-service training for skills and knowledge upgrading	4.73	.51	VHN
2	Staff upgrading through seminars and conferences	4.41	.73	HN
3	Constant supply of equipment and materials	4.57	.73	VHN
4	Sales of finished students projects to meet the running cost should be encourage	4.19	.94	HN
5	Regular supervision by inspectors and accreditation board	4.08	.86	HN
6	Improvisation of practical material by teaching staff	4.32	.78	HN
	Cluster Mean	4.38	.46	HN

The results in Table 2 show that only item 1 and item 5 were very highly needed (VHN) by respondents as strategies for improving the potentials possessed by teachers in technical colleges in Northern Nigeria. These items had mean ($\bar{x}$) of 4.73 and 4.57, respectively. On the other hand, the other items were highly needed (HN) by the respondents. The overall cluster mean of 4.38 with a standard deviation of 0.78 indicates that all the 6 items were highly needed by the respondents as strategies for improving the potentials possessed by teachers in technical colleges in Northern Nigeria.

Table 3: t-test analysis of the Mean Responses of Teachers in Urban and Rural Areas on the Potential Improvement Needs in the Maintenance of Measuring Instrument

		Urban N = 15		Rural N = 22					
S/N	Item Statements	$\bar{x}_1$	SD_1	$\bar{x}_2$	SD_2	t-cal	df	Sig	Rmk
1	Selecting the right tool for the right job	4.8	0.4	4.8	0.3	-0.14	3	0.89	NS
2	Do not carry too many instruments at the same time	4.4	0.5	4.3	0.5	0.20	3	0.85	NS
3	Selecting the appropriate range when measuring quantities	4.8	0.4	4.6	0.7	0.79	3	0.48	NS
4	Storing instruments appropriately after use	4.6	0.4	4.4	0.8	1.05	3	0.30	NS

5	Using oscilloscope to determine wave forms	4.0	0.7	4.3	1.0	-0.90	3	0.38	NS
6	Keeping the work table tidy and dry	4.0	0.9	4.2	1.2	-0.54	3	0.59	NS
7	Removing batteries when instruments are not in use	4.2	0.7	4.3	0.8	-0.37	3	0.70	NS
8	Correct grasp of meter probes while measuring a quantity	4.3	1.0	4.4	0.9	-0.23	3	0.82	NS
9	Handling oscilloscope diligently	4.6	0.5	4.8	0.5	-1.29	3	0.20	NS
10	Replacing meter batteries when weak	3.8	0.9	4.3	0.5	-2.02	3	0.05	S
11	Constant cleaning of instruments to prevent errors	4.5	0.5	4.4	0.6	0.38	3	0.7	NS
	Cluster t	4.2	0.4	4.3	0.3	-0.74	3	0.4	NS

Results in table 3 are t-test analysis of the difference between the mean responses of teachers in urban and rural areas on the potential improvement needs in the maintenance of measuring instruments. Results reveal that there was no significance difference ($p>0.05$) between the mean responses of teachers in urban and rural areas on the potential improvement needs in the maintenance of measuring instruments. This is because all the significant values are above the stated 0.05 level of probability. This implies that significant difference does not exist between the responses of teachers in urban and rural areas on the potential improvement needs in the maintenance of measuring instrument.

Nevertheless, there was a significant difference in the mean responses of teachers in Urban and Rural areas on the potential improvement needs in the maintenance of measuring instrument on item 10. This is because the significant value is 0.05 as table value. Furthermore, the cluster t-value of -0.74 with a degree of freedom of 35 and a probability value of 0.46 showed that the null hypothesis which stated that there is no significance difference between the mean responses of teachers in urban area and teachers in rural area on the potential improvement needs in the maintenance of measuring instrument is not rejected. Inference drawn therefore is that, teachers in urban and rural areas did not differ significantly in their opinion on potential improvement needs in the maintenance of electrical electronics measuring instruments.

Table 4: t-test analysis of the Mean Responses of Teachers in Urban and Rural Areas on the Strategies for improving the potentials Possessed by Teachers

		Urban N = 15		Rural N = 22					
S/N	Item Statements	$\overline{x_1}$	SD_1	$\overline{x_2}$	SD_2	t-cal	Df	Sig	Rmk
1	Providing full in-service training to staff for skills and knowledge upgrading	4.7	0.46	4.7	0.5	0.04	3	0.97	NS
2	Staff upgrading through seminars and conferences should be encouraged	4.3	0.8	4.4	0.6	-0.49	3	0.62	NS
3	Constant supply of required equipment and materials	4.4	0.8	4.6	0.6	-0.69	3	0.49	NS
4	Sales of finished students projects to meet the running cost	4.2	0.8	4.1	0.9	0.41	3	0.68	NS
5	Regular supervision by inspectors and accreditation board	3.8	0.9	4.2	0.8	-1.26	3	0.22	S
6	There should be provision of enhance allowance to maintain staff in-service	4.1	0.7	4.0	1.1	0.13	3	0.89	NS
	Cluster sig.	4.3	0.3	4.4	0.5	-0.65	3	0.5	NS

Results in Table 4 above reveals that there was no significance difference ($p>0.05$) between the mean responses of teachers in urban and rural areas on the strategies for improving the competencies possessed by teachers. This is because all the values are above the stated 0.05 level of probability except on item 5. This implies that hypothesis two which stated that there is no significance difference between the mean responses of teachers in urban and rural areas on strategies for improving the potentials possessed by teachers is not rejected. This is because the cluster t–value of -0.65 has a significant value of 0.52 which is greater than 0.05 as table value. Inference drawn therefore is that, teachers in urban and rural areas did not differ significantly in their opinion on strategies for improving the potentials possessed by teachers.

Discussion of Findings

Findings of the study as revealed from tables 1 and 2 indicates that Teacher of electrical electronics needs improvement in both potentials possessed and strategies needed for maintenance of measuring and test instrument. Results in Table 3 revealed that there was no significant different between the mean responses of teachers in urban and rural areas on the potential improvement needs in the maintenance of measuring instruments. This is because all the significant values are above the stated 0.05 level of significance, it implies that no significant differences exists between the responses of teachers in urban and rural areas on potential improvement needs in the maintenance of measuring instruments. Result in Table 4 showed that there was no significant difference between the mean responses of teachers in urban and rural areas on the strategies for improving the potentials possessed by teachers. This is because all the significant values above the stated except on items are above the stated 0.05 level of significance, this implies that hypothesis two which stated that there is no significant difference between the mean response of teachers in urban and rural areas on strategies for improving the competencies possesses by teachers is not rejected.

Conclusion

Based on the findings of this study the following conclusions were made. It was observed that technical education is capital intensive in terms of human and material resources needed for improving the performance of teachers in the maintenance of measuring instrument. The study equally reveals that teachers lack potential skills in the maintenance of electrical electronics measuring and testing instruments. Therefore, graduates from these technical colleges may be half backed. These is as the result of insufficient measuring instrument, materials and equipment, funding for conferences, seminar, workshop and lack of equipping the electrical electronics workshop with modern equipment and the libraries among others. These variables are influencers of teachers' skill in maintenance of electrical electronics measuring instrument.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. Teachers are requested to constantly upgrade their potentials in measuring instrument as the electronic world is constantly digitalizing
2. Well trained qualified teachers should be employed to teach the contents in electrical electronics curriculum in technical colleges in Northern Nigeria.
3. Government, non-governmental organizations (NGOs) and agencies should supply adequate and modern facilities to technical colleges' workshops for the purpose of teaching and learning workshop activities.
4. Seminars, workshops and in-service training should be organized for teachers so as to constantly update their knowledge as well as learning new innovations on the trade

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SKILL IMPROVEMENT NEEDS OF TEACHERS OF CARPENTRY AND JOINERY IN TECHNICAL COLLEGES IN ENUGU STATE

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Abstract
The study determined the skill improvement needs of teachers of carpentry and joinery in technical colleges in Enugu State. Two research questions guided the study. Descriptive survey design was adopted for the study. The population was 83 which comprised 33 site supervisors and 50 technical teachers in technical colleges in Nsukka and Obollo Afor Educational zones of Enugu State. The population was manageable, so, sampling was not necessary. Questionnaire used as instrument used for data collection. The questionnaire was validated by three experts in the Department of Industrial Technical Education, University of Nigeria, Nsukka. Cronbach alpha reliability method was used in determining the internal consistency of the instrument items and a reliability coefficient of 0.81 was obtained. The data was analyzed using mean and improvement need index to answer the research questions while t-test was employed to test the null hypotheses at 0.05 level of significance. The study found out that teachers of carpentry and joinery need improvement in stress grading and Computer Aided Drafting. The researcher recommended among other things, that skill improvement programme inform of workshops, and seminars should be organized for teachers of carpentry and joinery in areas of stress grading and Computer Aided Drafting in order to enable them produce graduates who would satisfactorily sustain the workforce in the era of emerging technology.
Keywords: *Carpentry, Joinery, Computer Aided Drafting, Stresss grading, Improvement*

Introduction

Carpentry is a skilled trade in which the primary work performed is the shaping, cutting and installation of building materials during the construction of buildings, ships, timber brides, concrete formwork and roofing (Vogt, Floyd and Levis, 2006). Carpentry is one of the major skill areas in woodwork technology. A person who does the work of carpentry is referred to as a carpenter, a word derived from the French word “Charpentier” meaning maker of a carriage. He is also referred to in British slang as a “choppy” (Roza, 2011). Carpenters traditionally worked with natural wood, and they did the rougher work such as forming, but today, many other materials are also used and sometimes the finer trades of cabinet making and furniture building are considered carpentry. Wood connotes all the materials got from the trunk of a tree. It is a hard, tough substance that forms the trunk of a tree. Wood has served man from the primitive age till today (Nneji, Okon, Nwachukwu, David and Ogbuanya, 2011). Joinery on the other hand may be defined as the woodwork fittings to building. It is the section of carpentry which is connected with fixes and fittings. The above definitions show that both carpentry and joinery are sections of woodwork that are connected to construction of building. Okwori, (2012) explained that woodwork involves activities in occupation that entails designing and construction of wood items or product. It is a subject that has an educational value in its own right and a useful application to everyday life. Woodwork as a trade subject offered at technical colleges is been classified into; upholstery, carpentry and joinery, wood machines and furniture making as outlined in (FGN, 2013).

Carpentry and Joinery is one of the vocational and technical education programmes whose primary purpose is to prepare individual recipients for employment in recognized institutions. It is a sub-professional trade offered at the technical college (NPE, 2013). CJ though to the layman is derogatorily referred to as a cut-and-join-technology, but their perception is negative. CJ like every other practical oriented disciplines, requires skills and business opportunities abound in the trade (Omeje, 2013). Therefore, CJ is one of the professional courses studied in the higher institutions. Suffice it to stating the obvious that CJ is diametrically a skill trade with educational value on its own nature and inevitable purpose in techno cultural development. CJ is described as an aspect of building construction trade that deals with the erection of permanently and temporarily wooden structures (NABTEB, 2014). A carpenter and joiner have much broader skills ranging from joinery, finishing, carpentry, building construction and structural formwork. So it is rightfully expected that CJ programme at technical college should equip recipients with those skills that would make them productive in building construction industries which includes: stress grading, and computer aided drafting (CAD) to ease and fasten up the work of CJ. Stress grading is the skills and processes involved in testing and selecting timbers for a purpose while Usman (2006) defined Computer Aided Drafting (CAD) as a system of construction drawing that uses a computer to eliminate repetitive drawing chores and increase versatility.

Skill is the ability to do something well, usually gained through training or experience, (Omeje 2013). It is a well-established way of doing things well (Uga 2015). In the context of this study, skill is the ability that an individual has acquired, to improve upon that will enable him perform a task efficiently in teaching carpentry and joinery. The skills that technical teachers of CJ trade in Enugu state has in stress grading, and CAD, needs to be improved on a continuous basis. Needs refers to something that is lacking while improvement refers to supply of that which is lacking. Princeton (2007) defined improvement needs as a change for better. It is an activity undertaken based on meeting targeted objectives and satisfaction from lower achievements (Galesbum, 2007). For the purpose of this study, skill improvement needs in CJ trade refers to an anticipated change to bridge the gap between perceived level of performance of theCJ teachers in teaching CJ in technical colleges when exposed to certain numbers of skills required for service improvement.

Skill improvement needs in CJ therefore, is a vital factor in harnessing the natural resources because, skill acquisition and development advances intrinsic potentials in individual learners,(Mohammed 2011). However, it is very pertinent to imagine the present condition of professional technical teachers in technical colleges. According to Lawal (2012), there is lack of quality in technical teachers training programme in the country today because most of the institutions are faced with insufficient training facilities and equipment to train students in their choice of occupation, including CJ. Haruna (2010) observed that there is lack of quality woodwork teachers in all the technical colleges in Nigeria. In other words woodwork teachers are not excluded and Enugu State not on exception. Omeje (2015) explained that most teachers of various woodwork sections lack the skills required for effective execution of jobs in building construction at this era of new technology. This is true because many site supervisors in Nsukka has severely lamented over disappointments and breach of quality of jobs sub-contracted to craftsmen from technical colleges. Site supervisors are those building industry employees who supervise all the stages of works as carried out at building construction site.

The world progresses technologically every day, and computers and improved consumables are used in the world of woodwork for precision and ease. Therefore, there is great need to have people who will be able to operate or use them. Moreover, knowledge of material use in any work is good quality of a competent worker; Haruna (2009) stresses that a well-trained CJ worker has to put all the principles of design and construction into consideration. So the best product is expected when the producer has the ability to design good, and select sound materials devoid of defects. In CJ, the ability to select good materials (wood) is known as stress grading. A CJ worker should be able to select non defective wood for his projects. Computer Aided Drafting (CAD) is very important in building construction and CJ trades for the drawing of building and woodworking drawings. NABTEB (2014) recommended the use of computers for teaching and learning in technical colleges in Nigeria. Meanwhile CAD should substitute the traditional manual drawing to introduce students to the use of new technology in design and drafting in order to fit into the world of work properly.

To this effect, Osinem and Nwoji (2010) expressed that teachers are posed with problems on how to use new technology and keep up with teaching methods in various vocational training. However, skill improvement needs is very necessary to CJ teachers in technical colleges since the one they have in training the trainee is no longer meeting the needs of the society/industries in the world of work. Therefore, skill improvement needs in CJ teachers is a continuing process due to technological innovations. This is in line with the view of Olufemi and Oyenu (2010), that the influence of technology has rendered traditional skills inadequate for the world of work while creating new sophisticated skills.

Statement of the Problem

There is a growing concern and complaint among site supervisors in Enugu state over the inability of technical college graduates of CJ and building construction to adapt or perform well in industries let alone self relient. This problem of unskilled CJ graduate craftsmen led to low production, poor quality products and high cost of wood products that presently affect the nations economy. The question now is; can these teachers of CJ impart onto students those skills they do not have? The answer can be derived from Anavberokhai, (2008) who asserted that the quality of education depends on the level of the teachers who teaches. It is therefore pertinent to state the obvious that for CJ students to have replica of learning to the current needs of the society/industries, their teachers needs improvement of relevant skills in the trade, hence this study to determine the skills improvement needs of CJ teachers in technical colleges in Enugu state in south-eastern part of Nigeria. The study sought to determine the;

1. Skill improvement needs of CJ teachers in stress grading
2. Skill improvement needs of CJ teachers in CAD

Research questions

The following research questions were answered:

1. What are the skill improvement needs of CJ teachers in stress grading?
2. What are the skill improvement needs of CJ teachers in CAD?

Method

Descriptive survey design was adopted since structured questionnaire will be used to gather data on the representative opinions of respondents on the skill improvement needs of teachers of CJ in technical colleges in Enugu State. The study was carried out in Nsukka and Obollo education zone in Enugu State of Nigeria. There are both government and private owned Technical and Vocational Colleges offering Carpentry and Joinery in these zones.

The population comprised of 83 personnel in building and woodwork departments in Technical Colleges and industries in Enugu State which include 40 CJ teachers and 43 site supervisors. The instrument for data collection was structured questionnaire. The question has two types of response scale: the needed and performance scale both based on a five-point-scale with nominal value assigned as follows: Very Highly Need (VHN) -1, Highly Needed (GN) -2, Moderately Needed (MN) - 3, Slightly Needed (SN)- 4, Not Needed (NN)- 5. While the second type of response sought to determine the level of performance of those skills and adopted; performance type: Very Highly Performance (VHP)- 1, High Performance (HP) - 2, Moderate Performance (MP) - 3, Low Performance (LP)- 4, and Very Low Performance (VLP) - 5 respectively.

The instrument was face validated by three experts in Building and Woodwork Technology Education section of Industrial Technical Education, University of Nigeria Nsukka. There suggestions and recommendations were integrated into the modified copy and a trail test was conducted on six technical college teachers and six industry based supervisors both in Kogi state that is not part of the population of the study. The internal consistency was determined using Cronbach Alpha formular which resulted in a reliability coefficient of 0.81. Questionnaire was administered on the respondents through the help of 2 assistants of equivalent research experience. A week was given during which communication was through mobile phones between the respondents and the researchers. A return visit was made by the researcher and hundred percent return was obtained. The data collected was analyzed using mean and improvement need index (INI) to answer the research question, while t-test was used to test the hypothesis at 0.05 level of significance. Skill improvement needs was determined as follows:

i. The mean ($\bar{x}$n) of the needed category was determined for each item.
ii. The mean ($\bar{x}$p), of the performance category was determined for each item.
iii. The performance gap (PG) was determined by finding the difference between the values of the two means.

That is $\bar{x}$n - $\bar{x}$p = PG. Where PG is zero (0), means that skill improvement is not needed (SINN) for the item because the level at which the teacher performs the skill is equal to the level at which the skill is required.

Where XP is less than the xn, it means that skill improvement is needed because the level at which the teachers perform.

In taking decision, any item with mean between 4.50 to 5.00 is considered very high performance, any item between 2.50 to 3. 49 is moderate performance, while any item with mean of less than 1.50 is considered as very low performance. The hypothesis were interpreted based on 0.05 level of significance and result analyzed using SPSS

Results

The data for answering question 1 are presented in the Table 1.

Table 1: Performance Gap Analysis of the Mean Response of the Respondents on Skill Improvement Needs of Teachers of CJ in Stress Grading N=83

S/N	Item statements	$\bar{x}n$	$\bar{x}p$	PG $\bar{x}n - \bar{x}p$	Decision
1	Identify hardwood	3.52	3.89	-0.37	SINN
2	Identify softwood	3.64	3.77	-0.13	SINN
3	Determine measurement by viewing	3.71	2.48	1.23	SIN
4	Recognize interlocked grain	3.68	2.21	1.47	SIN
5	Select beautiful woods with regards to ribbon	3.54	2.31	1.23	SIN
6	Identify woods that were badly seasoned	3.74	2.45	1.29	SIN
7	Distinguish between dead and live knot	3.62	3.74	-0.12	SINN
8	Select a type of wood by color	3.62	2.04	1.58	SIN
8	Identify some wood by odor	3.66	2.08	1.58	SIN
9	Select timber with appropriate measurement	3.81	2.92	0.89	SIN
10	Explain different conversions or sawing methods	3.95	1.22	1.73	SIN
11	Recognize the presence of wood pests in timber	3.55	2.48	1.07	SIN
12	Identify pests infected timber	3.73	2.99	0.74	SIN
13	Identify dead knot	3.59	3.10	0.49	SIN
14	Identify shakes in wood	-	2.84	0.77	SIN
15	Identify warps in timber	-	2.87	1.04	SIN
16	Identify cups affected timber	3.61	2.88	0.73	SIN
17	Refuse using timbers with indiscriminate horizontal sans kerf	3.84	2.88	0.96	SIN
18	Distinguish between 2 x 2 inches and 3x3 inches timber	3.66	2.63	1.03	SIN

Key: SIN = Skill improvement needed
SINN = Skill Improvement not needed

Data in Table 1 revealed that 16 out of 19 items had performance gap values ranged from 0.49 to 1.73 and were positive indicating that the teachers of CJ needed skill improvement in 16 items. Three out of 19 items had their performance gap as follows (-0.37, -0.13, -0.12) and were all negative indicating that the teachers of CJ do not need skill improvement in the three items on stress grading skills. Generally, teachers of CJ need skill improvement in the 19 items but less analysis on the three items with negative performance gap values.

Data for answering research question 2 are presented in Table 2.

Table 2: Performance Gap Analysis of the Mean and Response of the Respondents on Skill Improvement Needs of Teachers of CJ in Computer Aided Drafting N=83

S/N	Item statements	$\bar{x}n$	$\bar{x}p$	PG $\bar{x}n - \bar{x}p$	Decision
1	Ability to read and interpret woodwork drawing	3.54	2.27	1.27	SIN
2	Ability to recognize and start window button	3.60	3.98	-0.38	SINN
3	Move the mouse pointer onto CAD program	3..60	3.91	-0.31	SINN
4	Ability to open CAD existing document	3.61	2.80	0.81	SIN
5	Ability to use two dimension (2D) program	3.78	2.34	1.44	SIN
6	Ability to use three dimension (3D) in CAD program	3.54	2.60	0.94	SIN
7	Design concrete formwork in CAD	3.92	2.11	1.81	SIN
8	Draw wood joints in CAD	3.83	2.62	1.21	SIN
9	Access CAD drawings from internet	3.96	2.37	1.59	SIN
10	Modify drawing on CAD	3.86	2.48	1.38	SIN
11	Organization and print drawing in CAD	3.69	2.44	1.25	SIN
12	Retrieve CAD drawing from internet	3.80	2.35	1.45	SIN
13	Edit items in CAD program	3.61	2.63	0.93	SIN
14	Store drawing in CAD	3.78	2.69	1.09	SIN

Data in Table 2 revealed that 12 out of 14 items had performance gap values ranged from 0.81 to 1.81 and were positive indication that the teachers of CJ in technical colleges needed skill improvement in 12 items. Two out of 14 items had their performance gap as follows: (-0.31, -0.38) and were all negative indicating that teachers of carpentry and joinery did not need skills improvement in two items. Generally, teachers of CJ needed skill improvement in the 14 items but less emphasis on the two items with negative performance gap values.

Discussion

Analysis of research question 1 which sought to determine the skill improvement needs of CJ teachers in stress grading showed that teachers of CJ in Technical Colleges in Enugu state need skill improvement in the 16 items on stress grading. These items identified by the respondents includes ability to identify wood by type, method of conversion or sawing, select wood by odour, colour, ribbon and recognize presence of defects and pests in timber, and refuse timber that has indiscriminate horizontal saw kerf. These findings are in agreement with the SAA document (1989) which imported this findings when it stated above all that even if grading is targeted to performance rather than appearance, that customers are more and more looking of timber with good mechanical properties, yet nice looking.

The findings in table 2 revealed that teachers of CJ in Technical Colleges in Enugu State need skill improvement in CAD. The respondents identified 12 items which include ability read and interpret drawings, recognize CAD program, use CAD tools, open CAD document use 2D and 3D in CAD program, draw wood joints in CAD, organize and print CAD drawing, retrieve CAD drawing from internet, edit item in CAD and store drawings in CAD. This finding corroborated the opinion of Onah and Okoro (2010) that teachers in Colleges of Education have no skills to impart good knowledge of ICT (CAD), tools to the students due to the fact that they lack the desired training.

Conclusion

CJ students in technical colleges can only acquire needed skills for employment in building industries as well as self-reliant if their teachers have these skills to impact on them. Therefore, CJ teachers need to improve and this calls for government intervention to fund technical colleges and motivate teachers in order to expose them well in practical’s which entail learning by doing.

Recommendations

Based on the findings of the study, the following recommendations were made.

1. Carpentry and joinery teachers should be sent and sponsored for further training in industries to acquire CAD skills for instructional purposes.
2. Government and philanthropists in the society should endeavour to provide training equipment, machines, computers and books for technical college.

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SKILL NEEDS IN AUTOMOBILE FOR TEACHING EMERGINGTECHNOLOGIES IN TECHNICAL COLLEGES IN BENUE STATE, NIGERIA

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Abstract

The study determined the skills need in automobile for teaching emerging technologies in technical colleges in Benue State, Nigeria. Four research questions guided the study while two null hypotheses formulated were tested at 0.05 level of significance. Descriptive survey research design was chosen to guide the study. Twenty four subjects made up of automobile teachers teaching in six technical colleges and a basic skill acquisition center located in rural and urban areas responded to the 84 items designed questionnaire for the study. Three experts face validated the instrument while Cronbach alpha coefficient reliability method was used to determine internal consistency of the questionnaire items and 0.94 reliability coefficient was obtained. Mean and standard deviation were used to answer the research questions while the two hypotheses were tested using t-test at 0.05 level of significance. The findings of the study revealed that automobile teachers teaching in technical colleges in Benue State, Nigeria possessed skills in maintenance and repairs of motor vehicle but lack skills in ICT and diagnostic process. Recommendations include that production of craftsmen in automobile trade by technical colleges should be based on the need and technological development of automobile industries. Consequently, the curriculum contents should be reviewed to reflect what automobile industries and society need.

KEYWORDS: Skills, Teaching, Technical Education, Automobiles, Emerging technologies

Introduction

Skill is the ability to do something expertly and well in accordance to set standard or manufacturer instructions. According to Okeke (2002), skill is to demonstrate the habit of acting, thinking and behaving in a specific way such that the process becomes natural through repetition of practice. Skill development and improvement is very important in harnessing competency in one’s chosen career, this is because skill acquisition and improvement helps in developing and advancing intrinsic potentials in individuals. Computer (ICTs) skills is therefore highly essential for transmission technicians to work on these complex components on gears trains couplings, hydraulic pumps and other parts of transmission. According to Benneth (2006), the knowledge of computer skills will give teachers and technician an insight of some electronic components like microprocessors that perform a numerous amount of tasks. Such microprocessors include engine control unit (ECU) that controls engine functions like spark plug timing, obtaining the correct fuel and air mixture intake into the engine block. Engine control unit gathers information from sensors and performs millions of calculations in seconds to determine the best part, timing and how long the fuel injector should remain open and other micro processes include; airbag module that controls airbag deployment, body control which controls interior light, door locks, windows, seats and many other systems. Chouinard (2006) stated that need is expressed as the capacity to reach a condition or to perform a task according to a required minimal level of satisfaction. In a school environment especially technical, the situation of need experienced by teachers expresses itself as inability, a great difficulty or great restriction in performing a given task, in attempting a given learning inquiry, or in reaching a given competency according to an acceptable, identifiable and measureable minimal level. According to Chouinard, a person in a situation of need experiences insecurity, marginality, inequality, inequity and handicap. The situation of need, because it implies necessary and essential values requires an adapted or appropriate solution to narrow or eliminate the gap. Once the acceptable minimum level is reached, the improvement of the general state, the situation or the condition of a person tends towards standardization, feeling of well-being, security, equity and equality of opportunities.

Technical skill in any technical trade is acquired either formally through attending technical college or through apprenticeship. In each case, skill is acquired through repeated performance of given tasks. When tasks are carried out repeatedly and by the same person using correct sequence tools and environment efficiency is enhanced and that becomes skill. The technical skill possessed by technical teachers in general and automobile teachers in particular are meant to impart, maintain and repair automobile and light trucks that run on diesel and gasoline engines. These teachers are supposed to possess skills in the application of variety of traditional hand and power tools such as pneumatic wrenches remain bolts quickly, machines tools like lathes and grounding machines to rebuild brakes welding and frame cutting equipment to remove and repair exhaust system, jacks and hoists to lift cars and engines.

The work of automobile mechanics and automobile teachers is basically on mechanical repairs of engines. Their skill in maintenance of automobile vehicles is important for the skill required in emerging technologies. The general occupational qualification (Technical skills) for automobile teachers must be adequate for the assignment of producing mechanics craftsmen who are masters of handling tools and imparting their technology to the students. According to the National Automobile Technicians Education Foundation (NATEF, 2006), automobile teachers should possess the under listed skills; - Repairing vehicle systems or components using the needed and correct tools; dismantling and assembling of engines, maintaining and maintaining of engine accessories, maintaining and repairing of the following systems; suspension, brakes, ignition and other systems on the motor vehicles.

The automobile industry has of recent undergone tremendous technological transformation. The dynamism of emerging technologies in all the sections of designing, manufacturing/production and maintaining/repairing has been on the increase necessitating continual changes in all the sections. According to Tim (2011), the designing, manufacturing/production and maintaining/repairing sections of automobile have also been transformed in many ways. Duff (2005) stated that automobile now integrates sophisticated computer technology, advanced wiring, intricate circuiting and complex engineering. Confirming the rapid technological transformation in automobile industry, Malone (2006), stated that today's automobiles are factory fixed or equipped with computer systems that have more intelligence than the U.S.A's National Aeronautic and Space Administration (NASA) space craft sent to the moon in 1969. Malone further stated that automobiles are equipped with onboard diagnostic (OBD) systems. Many engines and machines that were manually or mechanically operated are now controlled by information technology

Emerging technologies' vehicles are those whose operations and control are based on computer operations. Byron (2010) defined emerging technologies as those technical innovations (in automobile) which represent progressive developments within a field for competitive advantage; emerging technologies represent previously distinct fields which are in some way moving towards stronger inter-connection and similar goals. However, the opinion on the degree of impact, status and economic viability of several emerging and converging technologies varies.

Skills required by automobile teachers in technical colleges in emerging technologies are meant to enable automobile teachers to teach effectively at that level of skill development. Automobile teachers in technical colleges need new skill in ever-changing automobile technology so as to be able to impart such current skills to students both in theory and practice of maintenance and repairs of automobile vehicles. When automobile teachers lack basic skills in imparting relevant skills to students then they become a liability to the trade instead of asset. Okorie (2000), illustrated skill as expertness, practical ability, dexterity, and to possess skill is to demonstrate the habit of acting, thinking and behaving in a specific activity in such a way that a process becomes natural to the individual through repetition of practice.

Automobile industry is one of the earliest, biggest and longest serving industries worldwide and Nigeria in particular. According to Rajput (2008), automobile industry designs, manufactures/produces and maintains/repairs different types and brands of vehicles. The automobile industry is broadly divided into three main sections: designing, manufacturing/production and maintaining/repairing. The advanced nations of the world design manufacture/produce and maintain/repair all brands of automobiles or motor vehicles. These vehicles are bought by developing nations including Nigeria. The advanced nations of the world such as U.S.A, Germany, Japan, France, Britain, China, Italy, South Korea and others have been on the lead competing for supremacy in the technology of designing and manufacturing/production of various brands of automobile vehicles while the developing nations including Nigeria are "battling" with difficulties on how to master the technology of maintenance and repairs.

The term maintenance means different things to different people depending on the way it is perceived even within the technical trades in which automobile is one of the major ones, (Ogbunanya, 2009). Ogbunanya further stated that there are three classes of maintenance, namely; preventive, predictive and corrective maintenance. Giving insight into the classes of maintenance, Ogbunanya described preventive maintenance activities as including scheduled inspection for early detection and remediation of causes leading to failure, adjustment repairs, replacement of equipment/ item parts at an economic basic at calculated intervals before failure could force an emergence shutdown, regular cleaning, lubrication, (oiling or greasing), painting and servicing. Planned preventive maintenance reduces the possibility of failure and performance degradation and It also saves time and money. The major purpose of the study was to determine the skills need in automobile for teaching emerging technologies in technical colleges in Benue State, Nigeria.

Research Questions

The following research questions guided the study:

1. What are the automobile skills possessed by automobile teachers in technical colleges in Benue State?
2. What are the technological skill needs of automobile teachers for teaching emerging technologies in technical colleges in Benue State?
3. What are the skill needs of automobile teachers in using ICT for teaching emerging technologies in technical colleges in Benue State?
4. What are the suitable pedagogical skill needs of automobile teachers in teaching emerging technologies in technical colleges in Benue State?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

1. There is no significant difference between the mean response of automobile teachers in urban and rural areas on skill needs in emerging technologies by automobile teachers and
2. The mean responses of automobile teachers in urban and rural areas does not differ significantly on skill needs of automobile teachers in ICT for teaching of emerging technologies in technical colleges in Benue State.

Method

Design of the Study

This study was conducted using survey design. Ezeji (2004) defined survey research design as the one which involves the assessment of public (a part or the whole population) opinion using collection of detailed description of existing phenomena with the intent of using the data to justify current conditions and practices or to make better plans for improving phenomena. In his own opinion, survey research design is the one in which a group of people or items are studied by collecting and analyzing data considered to be representative of the population. It involves the assessment of public opinion, using questionnaire as instrument. It assesses the present practices, compares it with set standards and suggests ways of improving on the existing practices, (Owens, 2002, Uzoagulu, 2011,). Descriptive research design was considered most suitable for this study

The study was conducted in Benue State. Benue State is divided into 3 senatorial zones A, B and C. There are eight science and technical colleges and one trade centre located in different parts of the State. All automobile teachers in these science and technical colleges were studied. Population for this study was 24 made up of automobile teachers in technical colleges located in rural and urban areas in Benue State. The 24 automobile teachers were drawn from all the six technical colleges and trade center.

The instrument for data collection was structured questionnaire. The instrument was divided into two parts; 1 and 2. Part 1 sought information on personal data of the respondents while part 2 sought information from the respondents that were relevant to answer research questions. Part 2 was sub-divided in five sections in line with the specific purposes of the study.

The instrument for data collection was subjected to face validation by three experts in the Department of Industrial Technical Education, University of Nigeria, Nsukka. The Experts were supplied with necessary document and information such as the topic of the study, purpose of the study, research questions and hypotheses to aid the process of validation. The experts were requested to freely comment on items with reference to good communication of ideas, facts, clarity, correctness and their appropriateness in addressing the purposes of the study. Based on their comments and inputs, the final copy of the instrument was developed for the study. The reliability of the instrument was determined using Cronbach Alpha (α) reliability technique and 0.87 reliability coefficient was obtained.

The researcher employed the services of two research assistants to help in administering and collecting the instrument. The researcher handled the administration and collection of the instrument in zone A comprising 7 local governments and 5 technical colleges. The two assistant's one each handled zone B and zone C with 7 local governments and 4 technical colleges and 9 local governments with 3 technical colleges respectively. The data collected for this study was analyzed using mean, standard deviation and t-test statistics. The mean and standard deviation were used to answer the four research questions while t-test was used for testing the two hypotheses at 0.05 level of significance. The response categories were assigned nominal values of 5, 4, 3, 2 and 1 on each item.

Results

Table 1: Mean Responses and Standard Deviation of the Respondents on Automobile Skills Possessed by Automobile Teachers in Technical Colleges in Benue State N = 36

S/N	Items	$\bar{x}$	SD	Remark
1	Diagnose Engine and correct for peak performance	3.83	0.87	HP
2	Dismantling and assembling engine for high performance	3.97	1.02	HP
3	Carrying out complete engine tune-up-overhaul	3.92	1.05	HP
4	Remove and replace pistons, rings valves and con. rod.	4.17	0.84	HP
5	Diagnose, overhaul and assemble carburetor	4.03	0.87	HP
6	Maintenance and repairs of systems	3.92	0.77	HP
7	Fuel system	4.11	0.82	HP
8	Ignition system	3.86	0.83	HP
9	Brake system	4.19	0.78	HP
10	Steering system	4.00	0.98	HP
11	Transmission system	3.86	0.89	HP
12	Charging system	3.75	0.93	HP
13	Lightening system	3.67	1.09	HP
14	Cooling/ Lubricating system	4.08	0.73	HP
15	Skill on Adjustment	4.06	0.75	HP
16	Valves	3.92	0.84	HP
17	Spark plug	4.25	0.77	HP
18	Contact point	4.00	0.71	HP

19	Clutch	4.08	0.80	HP
20	Injectors	3.42	1.05	AP
	Cluster mean	**3.95**	**0.63**	**HP**

Key: N = Number of respondents, $\bar{x}$ = mean, SD = Standard Deviation.

Data in Table 1 on research question one reveal that 19 items have their mean values ranged from 3.67 to 4.11 which are greater than 3.5 cut-off point. This shows that automobile teachers highly possessed 19 out of 20 skill items in automobile maintenance. The standard deviation values for the 20 skill items ranged from 0.73 to 1.09 and this shows that the respondents were not far from one another in their responses and that their responses were not far from the mean.

Table 2: Mean and Standard Deviation of Respondents Responses on Technical Skill Needs of Automobile Teachers for Teaching Emerging Technologies in Technical Colleges in Benue State

N = 36

S/N	Technical Skills	$\bar{x}$	SD	Dec.
	Engines	4.31	0.85	HN
21	Propulsion vehicle engines	4.25	0.90	HN
22	Hybrid vehicle engines	4.25	0.77	HN
23	Gasoline direct injection engines	4.36	0.63	HN
24	Clean diesel engines	4.19	0.71	HN
25	Hydrogen combustion engines	4.03	0.65	HN
26	Variable displacement engines	3.94	0.95	HN
	Fuel			
27	Ethanol fuel engines	4.14	0.72	HN
28	Compressed Natural Gas (CNG)	4.00	0.63	HN
29	Tri-Fuel System	3.86	0.76	HN
30	Flex-Fuel System	4.31	0.78	HN
31	Electronic fuel injection system	4.53	0.65	VHN
	Systems			
32	Auto-active transmission system	4.42	0.69	HN
33	All wheel steering system	4.33	0.67	HN
34	Active suspension system	4.31	0.82	HN
35	Air-bags system	4.36	0.76	HN
36	All wheel drive system	4.14	0.68	HN
37	Anti-Lock Breaking System	4.31	0.71	HN
38	On Board Detection And Diagnostic System	4.17	0.77	HN
39	Transaxle-Transmission System	4.14	0.76	HN
40	Exhaust Gas Recirculating System	4.22	0.76	HN
41	Supercharging Variable Valve Timing	4.28	0.61	HN
42	Timing Intelligence System	4.28	0.70	HN
43	Turbo-Inter Cooling System	3.97	0.91	HN
44	Drive-by-Wire Systems	4.11	1.00	HN
45	X-by-Wire Technology system	4.28	0.65	HN
	Tools			
46	Off-Board Detection and Diagnostic Tools	4.19	0.82	HN
47	Electronic Calipers	4.22	0.72	HN
48	Electronic Micrometers	4.33	0.63	HN
49	Scanning Tool	4.39	0.76	HN
50	Mechanic Engine Analyzer	4.44	0.65	HN
	Safety			
51	Night Vision System	4.31	0.82	HN
52	Back-Up And Parking System	4.17	0.73	HN
53	Blind Spot Detection System	4.17	0.77	HN
54	Lane Departure System	4.33	0.75	HN
55	Lane Keeping System	4.31	0.62	HN
56	Tyre Pressure Monitoring System	4.25	0.64	HN
57	Adoptive Cruise Control	4.28	0.77	HN
58	Collusion Avoidance System	4.23	0.62	HN
	Cluster Mean	**4.23**	**0.42**	**HN**

Key: N = Number of respondents, $\bar{x}$ = mean, SD = Standard Deviation.

Data in Table 2 on research question two have their mean values ranged from 3.94 to 4.44 which are greater than 3.50 cut-off point. This shows that automobile teachers need improvement in the 38 items for teaching emerging technologies. The standard deviation values for the 38 items ranged from 0.63 to 1.00 and this shows that the respondents were not far from one another in their responses and that their responses were not far from the mean.

Table 3:Mean Responses and Standard Deviation of Respondents on Skills Need of Automobile Teachers in ICT for Teaching Emerging Technologies in Technical Colleges in Benue State **N = 36**

S/N	Items	$\bar{x}$	SD	Remark.
59	Knowledge of computer hardware	4.56	0.65	VHN
60	Knowledge of computer software	4.69	0.57	VHN
61	Knowledge of logging information in the computer	4.50	0.77	VHN
62	Programming Computer	4.47	0.77	HN
63	Retrieval of information	4.50	0.84	VHN
64	Identify Computer signals	4.56	0.69	VHN
65	Interpret computer signals	4.58	0.64	VHN
66	Read trouble codes on computer vehicle model system	4.50	0.65	VHN
67	Examine and adjust computer on running vehicles	4.44	0.73	HN
68	Diagnose and repair computer problem in computerised vehicles	4.50	0.60	VHN
69	Use computer skills to keep vehicle, in good operation condition	4.67	0.63	VHN
70	Identify and use relays to execute computer commands that are independent of sensors (input), control unit and actuators (output)	4.44	0.77	HN
71	Scan and control computer problems in a computerized automobile vehicles	4.44	0.77	HN
72	Carry out basic tests and repairs on computer system using computer animation	4.42	0.73	HN
73	Access larger networks and work on microprocessors on on-board diagnosis (OBD)	4.42	0.69	HN
	Cluster mean	**4.51**	**0.56**	**VHN**

Key: N = Number of respondents, $\bar{x}$ = mean, SD = Standard Deviation.

Data in Table 3 reveal that all the items have their mean values ranged from 4.42 to 4.69 which are greater than 3.50 cut-off point. This shows that automobile teachers need all the ICT skills for teaching emerging technologies in technical colleges in Benue State. The standard deviation values for the 15 items ranged from 0.57 to 0.84 and this shows that the respondents were not far from one another in their responses and that their responses were not far from the mean.

Table 4: Mean Responses and Standard Deviation of Respondents on the Suitable Pedagogical Skills Need of Automobile Teachers in Teaching Emerging Technologies in Technical Colleges in Benue State
N = 36

S/N	Items	$\bar{x}$	SD	Remark.
74	Examine the curriculum of the training programme	4.33	0.63	HS
75	Select and adopt relevant methods for content delivery	4.42	0.69	HS
76	Specify instructional concepts in learnable units	4.36	0.54	HS
77	Select and emphasis appropriate techniques for instructional delivery	4.44	0.55	HS
78	Adopt demonstration method	4.47	0.56	HS
79	Adapt of observation method.	4.33	0.67	HS
80	Engage in laboratory practical project sessions.	4.39	0.64	HS
81	Individualized instruction method.	4.25	0.69	HS
82	Group study during practical lessons.	4.28	0.84	HS
83	Up-skilling of students in out of class tasks.	4.39	0.72	HS
84	Use of ICT for instructional purposes.	4.42	0.69	HS

Cluster mean		4.37	0.43	HS

Key: N = Number of respondents, $\bar{x}$ = mean, SD = Standard Deviation.

Data in Table 4 reveal that all the items have their mean values ranged from 4.28 to 4.44 which are greater than 3.50 cut-off point. This shows that automobile teachers need all the ICT skills for teaching emerging technologies in technical colleges in Benue State. The standard deviation values for the 15 items ranged from 0.57 to 0.84 and this shows that the respondents were not far from one another in their responses and that their responses were not far from the mean.

Hypotheses 1

There will be no significant difference between the mean responses of automobile teachers in urban and rural areas on skill needs in emerging technologies by automobile teachers.

Table 5: t-test Analysis of the Mean Responses of Automobile Teachers in Urban and Rural Areas on their Skill Needs in Emerging Technologies

			Rural = 12,		Urban = 24			
S/N	**Item Statement**	**Location**	$\bar{x}$	**SD**	**t-cal**	**df**	**Sig**	**Dec**
1	Diagnose Engine and correct for peak performance	Rural Urban	3.33 4.08	0.88 0.77	-2.61	34	0.01	S
2	Dismantling and assembling engine for high performance	Rural Urban	3.50 4.21	0.79 1.06	-2.04	34	0.05	S
3	Carrying out complete engine tune-up-overhaul	Rural Urban	3.58 4.08	0.90 1.10	-1.36	34	0.18	NS
4	Remove and replace pistons, rings valves and con. rod.	Rural Urban	3.83 4.33	0.93 0.76	-1.72	34	0.10	NS
5	Diagnose, overhaul and assemble carburetor	Rural Urban	3.83 4.13	0.83 0.90	-0.94	34	0.36	NS
6	Maintenance and repairs of systems	Rural Urban	3.67 4.04	0.65 0.80	-1.40	34	0.17	NS
7	Fuel system	Rural Urban	3.75 4.29	0.62 0.85	-1.94	34	0.06	NS
8	Ignition system	Rural Urban	3.58 4.00	0.66 0.88	-1.44	34	0.16	NS
9	Brake system	Rural Urban	3.75 4.42	0.62 0.77	-2.59	34	0.01	S
10	Steering system	Rural Urban	3.67 4.17	0.77 1.04	-1.46	34	0.15	NS
11	Transmission system	Rural Urban	3.42 4.08	0.90 0.83	-2.21	34	0.03	S
12	Charging system	Rural Urban	3.33 3.96	1.07 0.80	-1.96	34	0.06	NS
13	Lightening system	Rural Urban	3.08 3.96	0.90 1.08	-2.41	34	0.02	S
14	Cooling/ Lubricating system	Rural Urban	3.75 4.25	0.45 0.79	-2.02	34	0.05	S
15	Skill on Adjustment	Rural Urban	3.83 4.17	0.38 0.86	-1.26	34	0.22	NS
16	Valves	Rural Urban	3.42 4.17	0.79 0.76	-2.75	34	0.01	S
17	Spark plug	Rural Urban	3.92 4.42	0.51 0.83	-1.90	34	0.07	NS
18	Contact point	Rural Urban	3.75 4.13	0.62 0.74	-1.51	34	0.14	NS
19	Clutch	Rural Urban	3.75 4.25	0.75 0.79	-1.81	34	0.08	NS
20	Injectors	Rural Urban	3.08 3.58	0.51 1.21	-1.36	34	0.18	NS
	Cluster t	**Rural** **Urban**	**3.59** **4.14**	**0.52** **0.60**	**-2.67**	34	**0.01**	**S**

Key: N = Number of respondents, $\bar{x}$ = mean, SD = Standard Deviation.

The Table 5 indicates that all the items had their P-values greater than 0.05. This indicated that there was no significant difference between the mean responses of automobile teachers in urban and rural areas on skill needs in emerging technologies by automobile teachers. Therefore, the null hypothesis of no significant difference was upheld for all the 20 items

Hypotheses 2

The mean responses of automobile teachers in urban and rural areas will not differ significantly on skill needs of automobile teachers in ICT for teaching of emerging technologies in technical colleges in Benue State.

Table 6: **t-test Analysis of the Mean Responses of Automobile Teachers in Urban and Rural Areas on their Skill Needs in ICT for Teaching of Emerging Technologies in Technical Colleges in Benue State**

				Rural = 12,		Urban = 24		
S/N	**Item Statement**	**Location**	$\bar{x}$	**SD**	**t-cal**	**Df**	**Sig**	**Dec**
59	Knowledge of computer hardware	Rural Urban	4.33 4.67	0.77 0.56	-1.47	34	0.15	NS
60	Knowledge of computer software	Rural Urban	4.58 4.75	0.66 0.53	-0.81	34	0.42	NS
61	Knowledge of logging	Rural Urban	4.33 4.58	0.98 0.65	-0.91	34	0.37	NS
62	Computer programming	Rural Urban	4.08 4.67	0.90 0.63	-2.25	34	0.03	S
63	Retrieval of information	Rural Urban	4.42 4.54	0.90 0.83	-0.41	34	0.68	NS
64	Computer signals	Rural Urban	4.42 4.63	0.90 0.57	-0.85	34	0.40	NS
65	Interpretation of computer signals	Rural Urban	4.33 4.71	0.88 0.46	-1.68	34	0.10	NS
66	Read trouble codes on computer vehicle model system	Rural Urban	4.17 4.67	0.57 0.63	-1.29	34	0.03	S
67	Examine and adjust computer on running vehicles	Rural Urban	4.17 4.58	0.71 0.71	-1.64	34	0.11	NS
68	Diagnose and repair computer problem in computerized vehicles	Rural Urban	4.25 4.63	0.62 0.57	-1.79	34	0.08	NS
69	Use computer skills to keep vehicle, in good operation condition	Rural Urban	4.33 4.83	0.88 0.38	-2.38	34	0.02	S
70	Identify and use relays to execute computer commands that are independent of sensors (input), control unit and actuators (output)	Rural Urban	4.25 4.54	0.96 0.65	-1.07	34	0.29	NS
71	Scan and control computer problems in a computerized automobile vehicles	Rural Urban	4.17 4.58	0.93 0.65	-1.56	34	0.13	NS
72	Carry out basic tests and repairs on computer system using computer animation	Rural Urban	4.25 4.50	0.86 0.65	-0.97	34	0.34	NS
73	Access larger networks and work on microprocessors on on-board diagnosis (OBD)	Rural Urban	4.08 4.58	0.66 0.65	-2.15	34	0.04	S
	Cluster mean	**Rural** **Urban**	**4.28** **4.63**	**0.68** **0.45**	**-1.85**	**34**	**0.07**	**NS**

Key: N = Number of respondents, $\bar{x}$ = mean, SD = Standard Deviation.

The Table 6 indicates that all the items had their P-values greater than 0.05. This indicated that there was no significant difference between the mean responses of automobile teachers in urban and rural areas on skill needs of automobile teachers in ICT for teaching of emerging technologies in technical colleges in Benue State. Therefore, the null hypothesis of no significant difference was upheld for all the 15 items

Discussion

The findings regarding the possessing of skill in automobile technology trade in technical colleges in Benue State by automobile teachers as presented in table 1 showed that all the 20 items agreed with the skill possessed by automobile teachers teaching in Technical colleges in Benue State. This implies that hitherto the emerging technologies in automobile industries; effective teaching in technical colleges was being carried out. Automobile teachers also needs skills in using common hand tools such as screwdriver, pliers and wrenches to work on small parts and in hard-to- reach places, The work of automobile mechanics and automobile teachers is basically on mechanical repairs of engines. Their skill in maintenance of automobile vehicles is important for the skill required in emerging technologies. The general occupational qualification (Technical skills) for automobile teachers must be adequate for the assignment of producing mechanics craftsmen who are masters of handling tools and imparting their technology to the students. According to the National Automobile Technicians Education Foundation (NATEF, 2006), automobile teachers should possess the skills in repairing vehicle systems or components using the needed and correct tools.

The findings regarding the technological skill needs of automobile teachers for teaching emerging technologies in technical colleges as presented in table 2 revealed that automobile teachers need technological skills in modern engines, fuel systems, diagnostic tools and safety. The 33 items showed that automobile teachers highly need (HN) technological skills for effective teaching in technical colleges in Benue State. This signifies that teachers should be trained to acquire technological skills in emerging technologies, so as to be able to teach effectively. According to Allan, (2001) the maintenance of emerging technology vehicles that use on- board diagnostic tools is made possible as a result of scan tools and other diagnostic tools used to diagnose the problem of the engine as indicated by the trouble code.

The findings regarding skill needs of automobile Teachers in ICT as presented in Table 3 showed that, out of 15 items, 10 showed very highly needed (VHN) while 5, showed highly needed (HV). This implies that with emerging technological vehicles, ICT plays very significant role. This is in agreement with what most experts express in their views. According to Nice (2001), ICT incorporated on the emerging technologies vehicles bring the control of vehicle nearer to the driver. It is therefore, important that automobile teachers can hardly teach anything to students in the present technological transformation if automobile teachers do not have technological skills in ICT. NATEF (2006) stated that computer skills will allow automobile teachers and technicians to demonstrate basic skills in computer operation and software. Applications skills such that can be demonstrated on modern automobile on-board computer system in modern vehicle includes: Read trouble codes on computer vehicle model systems, Examine and adjust computers on a running automobile, Diagnose and repair computer problems in computerized motor vehicles, Use computer skills to keep the vehicles in good operating condition etc.

Concerning the findings on suitable pedagogical skill need of automobile teachers in Technical colleges in Benue State as presented in Table 4, all the 11 items showed that automobile teachers need suitable pedagogy skills in teaching emerging Technologies. A teacher may have pedagogies skills but when it comes to applying suitable skills as the emerging technologies demand, the teacher may be found wanting. By implication of the findings, automobile teachers need highly suitable (HS) pedagogical skills to teach in Technical colleges in Benue State. This is in agreement with Seymour (1993), this approach belief merely develop a generation of people who will make a great game-show contestants but does a little to provide future adult citizens with needed problem solving skills. It only develops rule-based learners in an era that needs model based reasoners and system thinkers. The pedagogy that can successfully produce reasoners and thinkers is what is needed by those who teach emerging technologies in automobile to the learners. The complexities of emerging technologies in automobile industry require teachers of sound pedagogies to be able to use them in teaching students where they are lacking.

Conclusion

It was concluded that automobile teachers teaching in technical colleges in

Benue State, Nigeria need skills in ICT and emerging technologies for effective teaching, maintenance and repairs of modern vehicles in technical colleges in Benue State, therefore, an urgent need to improve skills of automobile teachers.

Recommendations

1. Production of craftsmen in automobile trade by technical colleges should be based on the need and technological development of automobile industries. Consequently, the curriculum contents should be directly related to what industries and society need of automobile graduates so as to make automobile graduates work easily in industries and take care of societal demand.
2. There should be an advocacy on the importance of skill training of automobile teachers which translates into skill acquisition of automobile students on ICT and emerging technologies. All stakeholders in technical education should be made to understand that emerging technologies is blowing through automobile industry.

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CURBING THE ENTREPRENEURIAL CHALLENGES OF NIGERIAN YOUTHS FOR SUSTAINABLE GROWTH AND DEVELOPMENT

By

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Abstract

This paper examined the challenging entrepreneurial issues confronting Nigerian youths hitherto regardless of their geopolitical zones. The major challenges as x-rayed in this paper include: inadequate political will and constant fluctuation of the education curriculum especially vocational and Technical curriculum, lack of career information, labor market information for young job seekers and inadequate development of positive attitudes towards attainment of relevant vocational skills As a consequence of these factors, many young people face significant obstacles to obtaining decent work and thriving in their first jobs. Among the solutions to entrepreneurial challenges of Nigerian youths include that Government and Non Government Organisations should organize career and guidance programmes for both graduates and youths still in school. Support information projects should be put in place to provide career and labor market information for young job seekers. Youths should also promote a more positive image for vocational education. Parents, entrepreneurs and managers should partner with demand-driven training in order to give relevant skills to youths in Nigeria for sustainable growth and development. In the whole, government needs to provide a better platform for entrepreneurial activities in the country for better tomorrow of Nigerian youths.

Key words: Youth, Entrepreneurship, Challenges, Curbing, sustainable development

Introduction

The increase in number of youths in secondary and tertiary education is a positive development. However, labour markets in many countries are presently unable to accommodate the expanding pool of the skilled young graduates. It is estimated that about 400 million new jobs would be needed to absorb today's youths according to the ILO (ILO publication, 2007). Due to this decline in jobs and the rise in the number of those unemployed, young people are forced in the world of redundancy. At the beginning of this millennium, employment crises have emerged as the most challenging issues confronting many world economies hitherto. It was in line with this pending ills that president Muhammadu Buhari in one of his campaign tour before the 2015 election, manifested that he was going to give every graduate the sum of five thousand naira (₦5000) each to complimentthis on tolled hardship on the youths in Nigeria. This promise later developed wings which led to broken heart to many youths.According to Levinus Nwabughiogu in vanguard's newspaper report of 28 – 02, 2016, President Mohammadu Buhari has said that he would not pay the ₦5000 stipend promised to unemployed youths in the country. That it was wise to use a collation of the funds to put up infrastructures and empower the youth through agriculture than to give out monies. The President said: "This largesse ₦5,000 for the unemployed, I have got a slightly different priority. I would rather do the infrastructure, the school and correct them and empower agriculture as well as mining so that every able bodied person can go and get work instead of giving ₦5,000 to those who don't work".The question is where is the position of youths in Agriculture and mining today?

In the recent development, the disenchantment and frustration of youths, much due to mass poverty and unemployment, has further increased the number of aggrieved youths and resulted in the emergence of ‘area boys’ and Almajiris who target the very society that alienated them (Ibrahim, 2006). From the survey further conducted by Awogbenle and Iwuamadi (2010) on socio-economic characteristics of armed militants in Nigeria namely Bakassi Boys, O’dudua People’s Congress (OPC) and Egbesu Boys, Bokko Haram, Niger delta avengers, 40% of the group compositions were in the 16 - 17 year-old age group. In extension, 10% were in the 18 - 19 year-old age group, 20% in the 20 - 21 year-old age group and a further 20% between the ages of 20 - 23. Approximately 60% of them were unemployed due to economic backwardness.

However, frantic efforts are made by some organizations in Nigeria towards curbing these social vices in Nigerian youths through entrepreneurships. Specifically, Federal Government according to Hassan, Olanrewaju and Makinde has promulgated schemes and policies to curb hindrance to the development of small-scale industries since independence. One among these was the launching of the National Entrepreneurship Development Fund with a huge sum of money being set aside for the development of small industries. Entrepreneurs have always found it difficult to get seed capital (fund needed to start a business) from financial institutions especially the banks. Some of the schemes and policies established for the development of small scale industries include the following: Small Scale Industries Credit Scheme, Small Scale Graduate Employment Programmes, etc.There is yet high rate of underemployment.

The underemploymentcould be due to lack of patience, indiscipline, lack of mastery of content, frustration and most importantly, lack of entrepreneurial competency skills. Practicalentrepreneurship is what will actually bail out such ugly anomalies in Nigerian youth today and thereafter. A cursory look at entrepreneurship implied understanding who is an entrepreneur first. According toMaigida, Saba, Namkere (2013),entrepreneur refers to a person. That is, who is he and what does he do that differentiate him from a non-entrepreneur? while, entrepreneurship refers to a process which seeks answers to what he does, how does he (an entrepreneur) do what he does? Entrepreneur can be defined as one who brings resources, labour, material among others into combinations that make their value greater than in the past, as well as been able to introduce changes, innovation and new ideas for the growth of a business. Similarly, Kitzer (2007) viewed entrepreneurship as a special type of labour that requires the assembling of all factors of production namely capital, land and labour, and tries to ensure optimum utilization of them to ensure maximum profit.

From the management angle, entrepreneurs are pictured as managers of small business. They organize, manage, and assume the risk of a business or an enterprise. In entrepreneur management, an entrepreneur does not only organize resources to create wealth but manages such resources efficiently in order to sustain his/her innovation and minimize possible risks that might lie ahead.As a process, Allawadi (2007) defined entrepreneurship as that which involves evaluating business opportunities, development of a business plan, and determination of the required resources as well as management of resulting enterprise. According to Maria-Carmen (2009), entrepreneurial programmes and modules offer the beneficiaries the ability to think creatively and become an effective problem solver. It is only when you practice problem solving that would lead to sustainable development. It must be understood that there is no single definition for sustainable development but they key idea common to all definitions concerns resource exploitation at a rate that would not prove detrimental to future generations. For instance, according to Jonathan (2000), sustainable development is defined as development that meets the needs of the present without compromising future generations to meet their own needs. In the view of Cecelia (2009) and Akintoye and Opeyem (2014),sustainable development means a better quality of life now and for generations to come. It means not using up resources faster than the planet can replenish, or re-stock influences decision making with organizations, and therefore can go towards forming principles and business ‘values’. International Institute for Sustainable Development (IISD) viewed sustainable development as development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

From the definitions so far it contains within it two key concepts: - the concept of needs, in particular the essential needs of the world's poor, to which overriding priority should be given; and the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs". All definitions of sustainable development require that we see the world as a system-a system that connects space and a system that connects time. For youths in Nigeria to attain a sustainable development that would meet their present yearning needs without compromising the ability of future generations to meet their own needs, government has to provide an enabling space, time, resources and environments. In extension, providing better quality of life today is what will determine a better tomorrow. Simply put, a better plat form for entrepreneurship now is a sine qua non for successful and sustainable development in the future. Achieving the aforementioned would mean putting some majors in place that would cushion the entrepreneurial challenges.

Challenges are true indices of anomalies in youth which inhibitsentrepreneurial development. Simply put, they are factors that prevent the youths towards attaining greener employment. This according to Abdulkarim,(2012),jeopardizes their effort towards being successful entrepreneurs upon graduation. It is also a true recipe for dropouts, deviance, social misdeals such as terrorism, robbery, prostitution and economic underdevelopment of a country. These anomalies are not healthy factors for the development of Nigerian youths, hence needs to be curbed. To curb means to limit the reoccurrence of such challenges.First and foremost, there is the need to identify these youth entrepreneurial challenges in Nigeria then curbing strategies follows.

Youth Entrepreneurial Challenges

Entrepreneurship has been hindered by three major factors in Nigeria. According to Salami (2011), these factors are: structural, cultural and the lack of political will by policy makers as discussed below.Structural inhibitors in the growth of entrepreneurship have its origin in the Nigerian education policies since independence in 1960. Between then and now Nigeria has introduced and implemented not less than three policies: the 7:5:2:3, 6:3:3:4 and now the 9:3:4 (elementary, Secondary and University). One of the major problems of the past education policies stemmed from the fact that new policies were not fully implemented before they are changed. Another related structural problem is the low budgetary allocation to the education sector, particularly the vocational and technical education sub-sector. Poor leadership, corruption and mismanagement of resource have contributed to the gross under-finding of education. Secondly, it can be argued that entrepreneurship has been hindered by two major cultural factors: society's perception about the socioeconomic status of artisanship and the value system which is fast being eroded. There is the general perception that artisans and technicians are "never-do-wells",dropouts, societal rejects or even failures that should perpetually remain at the bottom of the socio-economic ladder. Another related factor is the general Nigerian value system which appears to have cultivated a new value system just like the larger society in their quest for making fast money as well as generally living on the fast lane. For example, the apprenticeship systems of the olden days are fast disappearing.

Gone are the days when a master of auto mechanic would have about three to five apprentices under his tutelage. While many youths would sign up to learn a trade, a great majority of them quit apprenticeship and opt for motorcycle taxi business (popularly called Okada) to start making fast money while some who remain to learn the trade don't participate in such activities. Lastly, the neglect of vocational and technical education has been robbing the nation of the potential contributions of its graduates to national growth and economic development. According to salami (2011), the inability of policy makers to make both rational and educated decisions continue to affect the rate of progress of the Nigeria nation. As Dike (2006a) has noted, the under-development status of Nigeria could be linked to the neglect of its educational institutions.

Although science and technology has been a part of Nigeria's National Policy on Primary Education (NPE) since 1981 (Maigida, Saba, & Namkere, (2013).Like every other public policy, implementation has always been the major problem. Consequently, the society lacks competent bricklayers, carpenters, printers, auto mechanics, laboratory,pharmacy technicians and vocational nurses etc.Furthermore, many factors apart from the aforementioned are responsible for the difficulties that youth experience in initial workforce entry. These factors according to manpower (2012) include:

- **Inadequate information network and connection amongst youths**-this is typical of youths from the families who are lacking significant social capital. Many young people lack knowledge of what the world of work is actually like, and have not given careful thought to their own potential career choices. They have not used their time in school to prepare appropriately for realistic career paths. They lack informal networks and connections that are traditionally the major source of information about job opportunities. More so, they do not know how to navigate the labor market to identify and pursue available jobs or to find and use the most relevant training resources.
- **Inadequate skills relevant to the workplace**- Even those young people who have pursued a course of study with a specific career in mind often find themselves with general or theoretical knowledge that does little to prepare them for the actual tasks they will encounter on the job. This is partly the fault of school curricula and poor connections between employers and the educational system. Young people also lack specific "21st century workplace skills" such as cooperation, communication, critical thinking, creativity, and a focus on the needs of the enterprise. Lack of relevant entrepreneurial skills such as marketing, production, managementand financialskills are indices of underemployment.
- **Lack of experience and credentials that addresses employers' risk in making hiring commitments-** Many employers are skeptical about young people's ability to apply the skills they learn in schools to the practical challenges of the workplace. They also question the social skills and work ethic of youth. They see these deficits as a significant barrier to the productivity of inexperienced young people, and at the same time they are reluctant to invest resources in training young people when more experienced adult workers may be unemployed and available for hire.
- **A lack of available jobs suited to entry-level skills-** In some labor markets, especially in the developing world, there is simply a demographic mismatch between the number of young people seeking work and the level of local economic activity. Most available work may be in informal or underdeveloped industry sectors. There may be a severe shortage of locally-available jobs that are entry-level but that still lead to meaningful careers.As a consequence of these factors, many young people face significant obstacles to obtaining decent work and thriving in their first jobs. In addition, in difficult economic times, young people are often the first to be laid off, making it still harder for them to consistently build their skills and experiences. Consequently many young people end up facing extended periods of unemployment, or significant under-employment in jobs that fail to offer career opportunities.There is therefore the need to curb these anomalies that are challenging the development of youth entrepreneurship in Nigeria by providing solutions.

Creating business-driven solutions to the youth employment challenges

Most career guidance programs suffer from poor funding, under-qualified instructors, and lack of access to timely and relevant labor market information according to Manpower group (2012). It also recommends that such guidance begin earlier, in the lower-secondary level (ages 13-15). Employers can partner with schools to improve the quality and delivery of career services for young people at a time when they are making important decisions about their future.

Solution1 ***Participate in Career Guidance Programs for Youth Still in School.***

One of the simplest and most direct things that employers can do is to partner with schools and vocational institutions to increase young people's exposure to the world of work. They can volunteer as classroom visitors and deliver courses such as those developed by Junior Achievement. They can provide speakers and participants for related activities such as career days and job shadowing. For many youth, business leaders can serve as role models and as an inspiration to set more ambitious goals for themselves. Without waiting for the implementation of more ambitious curriculum reform agendas, employers can use their influence to encourage schools to adopt courses that help young people navigate the job-search process and build key soft-skills relevant to the workplace. They can advise on the importance of these programs in contributing to the success of entry-level workers, consult on the selection of off-the-shelf curricula, and assist in the design of new curriculum content.

Solution2-*Support information projects to provide career and labor market information for Young Job Seekers*.

Internet, mobile devices, and social networking technology provides young people with more transparent access to labor market information while it maximizes the recruitment reach of employers. According to the 2011 Source of Hire Report by CareerXroads, internet job boards are the source of about 25% of new hires among surveyed businesses (principally US-based large and multinational corporations). Employers have an opportunity to reach beyond the job-board model while still working proactively with emerging job information services and platforms popular with youth, such as mobile phones/texting and smartphone-based applications, in order to connect with young people more efficiently. Employers can also cooperate with special programs and initiatives that are designed to give youth a deeper understanding of overall career trends and opportunities. By using these channels and transparently specifying the qualifications required for their positions, employers can help youth gain an understanding of the jobs available in the local economy, the avenues for pursuing those jobs, and the skills and experience necessary for obtaining them.

Solution 3-*Promote a More Positive Image for Vocational Education*

A major and specialized new messaging initiative, with the credibility of employers behind it, is needed in the area of vocational education. Manpower Group's talent shortage surveys consistently include technicians and skilled trades' positions among the most acute areas of skills shortage around the globe.Young people, especially those disenchanted with an academic education and in danger of dropping out of school, need to understand the high demand that exists, and the competitive salaries available, for skilled and well-prepared vocational and technical personnel. Young people can be inspired by a vision of vocational career paths that include entrepreneurship and small business formation based on technical and trades expertise, as well as the possibilities for academic re-entry in technical, engineering, and other stem programmes at a later career stage.

According to the OECD (Giving Youth a Better Start, 2011), there are very large differences between countries in the percentage of secondary students who are on a vocational track. In countries like Australia and Germany vocational students make up the majority of secondary students; not coincidentally, these countries have extensive curriculum offerings well aligned with the varying needs of the business community, and are very successful in moving young people from school to work. By encouraging more students to enter vocational education in countries where it is not a widespread choice, employers can expand career opportunities for a more diverse range of young people, help address their own skills shortages, and stimulate greater attention and improvement to the vocational education system.

Solution 4-*Partner with Demand-Driven Training-to-Employment Programs*

Training-to-employment programs focus training narrowly and intensively on the requirements of specific, available jobs, and include a post-training placement component based on prior hiring commitments from employers. These programs can help employers rapidly address skills shortages and they can efficiently expand access to work opportunities for individuals who may not have been able to obtain these jobs on their own. Training-to-employment programs can be organized and managed by workforce intermediaries like ManpowerGroup, by governments or NGOs, or by employers themselves. The model is not limited to "disadvantaged" or nontraditional workers, but has been effective in re-skilling experienced workers who may need help in moving to related fields in response to changes in an industry.

Conclusion

Most Nigerian youths as a matter of concern suffer from entrepreneurial challenges. This jeopardizes their effort towards being successful entrepreneurs upon graduation. It is also a true recipe as well as an index for economic underdevelopment of a country, dropouts, deviance, indulging in social misdeals such as terrorism, Niger delta Avengers, robbery and prostitution. Inadequate political will as a major challenge which grosslyaffects the economy of Nigeria is what need to be addressed urgently in effect.In extension, the constant fluctuation of the education curriculum especially vocational and technical curriculum needs to attain a stable state for sustainable development of youths as the case in China today. Career information,Labor Market Information for Young Job Seekers and development of positive attitudes towards attainment of relevant vocational skills will go a long way towards curbing the youth entrepreneurial challenges in Nigeria.

Recommendations

- Government and NGOs should organize Career and Guidance programmes for both Youthsstill in School and graduates
- Support information projects to provide Career and Labor Market Information for Young Job Seekers.
- Nigerian Youths should promote a more positive image for Vocational Education.
- Parent, entrepreneurs, and managers should Partner with Demand-Driven Training in order to give relevant skills to youths in Nigeria.
- For youths in Nigeria to attain a sustainable development that would meet their present yearning needs without compromising the ability of future generations to meet their own needs, government has to provide an enabling space, time, resources and environments.

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IMPACT OF FOREIGN PRIVATE INVESTMENT ON NET EXPORT IN NIGERIA

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Abstract
The study investigated the impact of foreign private investments on net exports in Nigeria. Two research questions guided the study while two hypotheses formulated were tested at 0.05 level of significance. The study adopted descriptive survey design. The simple random sampling technique was employed to select 50 staffs of public organizations in Edo State. The instrument used for the study was a non structured questionnaire which was designed using a four-point rating scale. Three experts validated the instructment for data collection. The internal consistency of the questionnaire items was determined using Cronbach alpha reliability method and 0.78 reliability coefficient value was obtained. Data obtained was analysed using frequency count and simple percentage. Based on the empirical findings of this study, it was concluded that foreign private investment has a significant and direct impact on net export in Nigeria. It is recommended that the federal government should create an enabling environment that can enhance foreign private investment in Nigeria.
Keywords: Foreign private investment, net export, public organisation

Introduction

Given that investment is one of the major components of income (Gross Domestic product), therefore an increase in investment will lead to an increase in the equilibrium level of income and vice versa. Before 1990, Foreigners were free to invest in any sector of the Nigeria Economy. This practice led to some problems in the economy which the govern men t at the time was unable to solve through moral suasion. These resulted in the promulgation of the Nigeria enterprise promotion decree. The resultant effect of this action was a reduction in the inflow of foreign investment into the country. In 1997, the decree was amended to accommodate more foreign investment (Anyanwu, 1997). Finally the Nigeria enterprise promotion decree of 1989 was reviewed in 1990 and it was replaced by the Nigeria investment promotion commission decree of 1995. This action according to the government was intended to attach foreign investment inflow and enhance capacity utilization in the productive sector of the economy. However, some analysis has criticized the new industrial policy. They claim that it amount to inconsistency in government policies some also claims that it is a step backward to new colonialism. Alternatively when compared to the option of external borrowing to finance the saving investment gap in the economy, it seems to be a welcome development. In view of the above it therefore pre- supposes that there is an amount of foreign investment that will be consistent with a given level of desired economic growth vis-a-vis net export. Determining this level of foreign investment will be of paramount benefit to decision makers and economic planners in Nigeria.

The benefit of foreign private investment cannot be under- estimated. The benefit derivable from foreign investment can be addressed under capital technology, employment competition and expanded market (Magbabeola, 1998) it should be noted that foreign investment lead to some problems, such as was experienced in Nigeria before 1990. Although foreign investment Increases, employment, income distribution but when it's competes with domestic investment, capital and other resources may reduce flow to domestic investment. Many economic operating in less developed countries reserves all executive position for their national's and pay them very high salaries as against what they pay the staff of the host country. Foreign investment also involves cost in forms of a lot of domestic autonomy when foreign firm interfere in policy making decision of the government of a less developed country in order to favour the foreign enterprises. In as much as foreign investment is required to fill the saving gap in Nigeria, it should not be an open ended affair. Given a specific level of growth rate of (income) and the desired level of the total investment to meet this target the next step is to ascertain the level of such investment that can achieved locally.

Foreign direct investment (FDI) or foreign investment refers to the net inflows of investment to acquire a lasting management interest (10 percent or more of voting stock) in an enterprise, investor (Anyanwn, 1997). It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital as shown in the balance of payments. It usually involves participation in management, joint-venture, transfer of technology and expertise. There are two types of (FDI): Inward Foreign Direct Investment and Outward Foreign Direct Investment, resulting in a net (FDI) inflow (positive and negative) and "stock of foreign direct investment", which is the cumulative member of a given period. Direct investment includes investment through purchase of shares. (FDI) is one example of international factor movement (Wikipedia, 2011).

In as much as is important to create an enabling environment for the inflow of FDI, it is equally necessary to control such inflow. Renewed research interest in FDI stems from the change of perspectives among policy makers from "hostility" to "conscious encouragement", especially among developing countries. FDI had been seen as "parasitic and retarding the development of domestic industries for export promotion until recently. However, Bende-Nabende and ford (2000) submit that the wide externalities in respect of technology transfer, the development of human capital and the opening up of the economy of inter-national forces, among other factors, have served to change the former image.

Borensztein, De Gregoria and Lee (2000) see FDI as an important vehicle for transfer of technology, contribution to growth in larger measures than domestic investment Findlay (1978) postulated that FDI increases the rate of technical progress in the host country through a "contagion" effect from the more advance technology, management practice, etc. used by the foreign firms on the basis of these assertions governments have often provided special incentives to foreign firms to set up companies in their countries. Carkavic and Levine (2002) wrote that the economic rationale for offering special incentives to attract FDI frequently derives from the belief that foreign investment produces externalities in the form of technology transfer and spill overs.

Curiously, the empirical evidence of the firm level and the national level remain ambiguous. De aregorio (2003), while contributing to the debate on the important of FDI, notes that FDI may allow a country to bring in technologies and knowledge that are readily available to domestic investors, and in this way increases productivity growth throughout the economy. FDI may also bring in expertise that the country does not possess, and foreign investors may have access to global market. In fact that increasing aggregate investment by one (1) percentage of GDP increase economic growth of latin American countries by 0.1% to 0.2% a year, but increasing FDI by the same amount increased growth by approximately 0.6% a year during the period 1950-1985, thus indicating that FDI is three times more efficient than domestic investment.

A lot of research interest has been shown on the relationship between FDI and economic growth, although most of such work is not settled in Africa. The focus of the research work of FDI and economic growth can be broadly classified into two. First FDI is considered to have direct impact of trade which the growth process is assured, (markissen and vernables, 2000). Second, FDI is assumed to argument domestic capital there by stimulating the productivity of domestic investment (Borenszten et al, 2000, Drffiend, 2001). This two arguments are in conformity with encougenous growth theories (Romer, 1990) and cross country models on industrialization

(Chenery, Robinson & Syrquin, 1986) in which both the quantity and quality of factors of production as are ingredients in developing a competitive advantage. FDI has empirically been found to stimulate economic growth by a number of researchers (Borensztein, De Gregoria and Lee, 2000, Glass & Saggi, 1999). Dees (2000) Submit that FDI has been important in explaining Chinas economic growth, while De Mercio (1997) presents a positive correlation for selected Latin American countries. Inflows of foreign capital are assumed to boost investment levels. Blomstrom, Lipsey and Zegan (1994) report that FDI exert a positive effect on economic growth, but that there seems to be a threshold, level of income above which for have positive impact on economic growth and below which it does not. The explanation was that only those countries that have reached a certain income level can absorb new technologies and benefit from technology diffusion, and this reap exert advantages that FDI can offer. Provisions works suggest human capital as one of the reason for the differential response to FDI at different level of income. This is because it takes a well educated population to understand and spread the benefit of a new innovation to the whole economy. Borensztein, De Gregoria and Lee (2000) also found that the interruption of FDI and human capital had important difference in the technological absorptive ability may explain the variation in growth infect of FDI across countries. They suggest further that countries may need minimum threshold stocks of human capital in order to express positive Balasubramanyan, mohammed, salisu and David Sapsford (1996) report positive interaction between human capital and FDI. They had earlier found significant results supporting the assumption that FDI is more important for economic growth in export-promoting than import- substituting countries. This implies that the impact of FDI varies across countries and that trade policies can affect the role of FDI in economic growth. In summary, UNCTAD (1999) Submit that FDI has either a positive or a negative impact on output depending on the variables that are entered alongside it in the test equation. These variables include the initial per capital (GDP), education attainment, domestic investment ratio, political instability terms of trade, black market exchange rate per minimums and the state of finance development examining other variable that could explain the interaction between DD and growth, Obwona (2001) submitted that the beneficiary effect of FDI are stronger in those countries with a higher level of institutional capability and therefore emphasized the importance of bureaucratic efficiency in enabling FDI effects.

The neoclassical economist argues that FDI influences economic growth by increasing the amount of capital per person. However, because of diminishing returns to capital, it does not influence long-run economic growth. Bengos and Sanchez-Robles (2003) assert that even though FDI is positively correlated with economic growth, host countries require minimum human capital economic stability and liberalized market In order to benefit from long-term FDI inflows. Interestingly, Bende Nabende, Ford, Sen and Slate (2002) found that direct long-term impact of FDI on output is significant and positive for comparatively In the economically less advanced Philippines and Thailand, but negative in the more economically advanced Japan and Taiwan. Hence the level of economic development may not be the main enabling factor in FDI growth nexus; on the other hand, the endegous school of thought opines that FDI also influence long-run variables such as research and development (R and D) and human capital (Rome, 1986, Lucas, 1988). Adelegan (2000) explained that seemingly unrelated regression model to examine the impact of FDI economic growth in Nigeria and found that FDI is pro-consumption and pro-import and negatively to gross domestic investment. Akinlo (2004) found that foreign capital has a small ends not statistically significant effect on economic growth in Nigeria. Jerome and Ogunkola (2004) assessed the magnitude, direction and prospects of FDI in Nigeria. They noted that while the FDI regime in Nigeria was generally improving, some senous deficiencies remain.

These deficiencies are mainly in the areas of the corporate environment (such as corporate law, bankruptcy, and labour law etc.) and institutional uncertainty as well as the rule of law. The establishment and the activities of the Economic and Financial Crimes

Commission, the Independent Corrupt Practices Commission and the Nigeria Investment Promotion Commission are efforts to improve the corporate environment and uphold the rule of law. FDI could be beneficial in the short term but not in the long term. Durham (2004) for example, failed to establish a positive relationship between FDI and growth; but instead suggests that the effects of FDI are contingent on the "absorptive capability" of host countries. Obqoma (2001) notes in his study of the determinants of FDI in Uganda that macroeconomic and political stability and policy consistency are important parameters determining the flow of FDI in Uganda and that FDI affects growth positively but insignificantly. Ekpo (1995) reports that political regime, real income per capital, rate of inflation, world interest rate, credit rating and debt service explain the vanance of FDI in Nigeria. For non-oil FDI, however, Nigeria's credit rating is very important in drawing the needed FDI into the country.

On the firm level productivity spillover, Aganwelea and Bamitre (2001) assess the influence of FDI on the firm level productivity in Nigeria and report a positive spillover of foreign firms on domestic firm's productivity. Furthermore, spill over effects could be observed in the labour market through learning and its impact on the productivity of domestic investment (Sjoholm, 1999). Sjoholm (1999) suggests that through technology, transfer to their affiliates and technological spill overs to unaffiliated firms in host economy, Trans-National Corporation (TNC) can speed up development of new intermediate product varieties, raise the quality of the product, facilitate international collaboration Rand D, and introduce new forms of human capital. FDI also contributes to economic growth via technology transfer. This can transfer technology either directly (internally) to their foreign-owned enterprise (FDE) or indirectly (externally) to domestically owned and controlled firms in the host country (Blomstrom, Konan & Lipsey, 2000; UNCTAD, 2000). Spill overs of advanced technology from foreign owned enterprises to domestically owned enterprises can take any of four ways; vertical linkage between affiliates and firms in the same industry (Lim, 2001; Smarzynka, 2002), labour turnover from affiliates to domestic firms, and internalization of R and D (Hanson, 2002, Blomstrom & Kokko, 1998). The pace of technological change in the economy as a whole will depend on the innovation and social capabilities of the host country, together with the absorptive capacity of other enterprises in the country (Carkovic & Levine, 2002). According to Markussen and Vern ables (1998), FDI has a direct of trade of goods and services (Markussen & Vernables, 1998). Trade theory expects FDI inflows to result in improved competitiveness of host countries exports (Blomstorm & Kokko, 1998).

The benefit of foreign direct investment can be summarized to include resource transfer effects, balance of payment effect and standard of living. As part of resource transfers effect, multinational cooperation due to their size and financial strength have access to financial resources that are not available to the host country, pertained profits and ease of borrowing from capital markets. Technology transfer may lead to lower production costs relative to rivals or even allow the introduction of new products (Husted & Meluin, 2007). This is most relevant in other industries as electronics and energy. Use superior management skills to train local workers and stimulate local supplies. It is often difficult for local management to a world class level in the absence of FDI (Pend, 2008). The purpose of this study was to examine the impact of foreign private investment on net export in Nigeria. However, the specific objectives include to:

1. To determine the impact of foreign investment inflow on the level of net export in Nigeria.
2. To estimate the impact of such inflow on national income in Nigeria.

Research Questions

1. To what extent does foreign direct inflow impact on the level of net export in Nigeria?
2. What is the impact of foreign investment inflow on national income?

Methodology

The study adopted a descriptive survey design. The population for the study was 50 staff of some selected Government Organisations in Edo State. The simple random sampling technique was used to select 50 staff. The instrument for data colection was a ten (10) item survey questionnaire. The Questionnaire was designed on five point Likert Scale of Strongly Agree, Agree, Undecided, Disagree and Strongly Disagree with numerical values of 5, 4, 3, 2, and 1 respectively. The questionnaire was divided into two sections. The first section was made up of information like age, sex, marital status, religion and name of Organisation while the second section was made up of ten items used to elicit information from the respondents on their assessment of the impact of foreign private investment on net export in Nigeria.

The face validation of the instrument was carried out by three experts in the Department of Vocational and Technical Education, University of Benin, Edo State. The instrument was trial tested on a pilot group of 20 respondents. The Cronbach alpha reliability method was used to determine the internal consistency of the questionnaire items and a reliability coefficient value of 0.76 was obtained which showed that the instrument is reliable. The researchers visited the sampled Government Organisations to administer questionnaire. The questionnaire were administered and retrieved the same day. This was to ensure that none of them was missing. Frequency count and simple percentages were used to answer the two research questions.

Results

The Results are presented as follows:

Table 1

Frequency and Percentage of the Responses of the Respondents on the Impact of Foreign Investment Inflow on the Level of Net Export in Nigeria

S/N	Item statements	Responses			
		Agreed	%	Disagreed	%
1	Foreign direct inflow should be discourage in Nigeria	43	48.8	45	51.1
2	Foreign direct inflow impact on the level of net export in Nigeria positively	52	59.0	36	40.9
3	Foreign direct inflow does not have any effect on the net export in Nigeria	41	46.5	47	53.4
4	Foreign direct inflow reduces the exchange Nigeria’s Currency	53	60.2	53	60.2
5	Foreign direct inflow causes inflation	33	37.5	55	62.5
	TOTAL	**222**	**50.45**	**218**	**49.54**

Source: Field Survey

Table 1 showed responses in percentage. From the analysis, 222 of the respondents agreed to the items while 218 disagreed. This represents 50.45% and 49.54% respectively. The result from table 1 indicates that the level at which foreign direct inflow impact on the level of net export in Nigeria is high.

Table 2

Frequency and Percentage of the Responses of the Respondents on the Impact of Inflow on National Income in Nigeria

S/N	Item statements	Response			
		Agreed	%	Disagreed	%
1	Foreign investment inflow have negative impact on Nigeria national income	52	59.0	36	40.9
2	Foreign investment inflow does not have any effect on Nigeria national income	46	52.2	42	47.7
	TOTAL	**98**	**55.68**	**78**	**44.31**

Source: Field Survey

Table 2 showed responses in percentage. From the analysis, 98 of the respondents agreed to the items while 78 disagreed. This represents 55.68% and 44.31% respectively. The result from table 2 indicates that Foreign investment inflow have an impact on national income.

Discussion

The essence of this study was to find out the impact of foreign private investment on net export in Nigeria. Results of this study showed that foreign private investment have great impact on Nigeria's economic growth and development. This is in line with Adelegan (2000) study that found that there was significant relationship between dimensions of foreign private investment and net export in Nigeria. The findings of this study indicated that the level at which foreign direct inflow impact on the level of net export in Nigeria is high. The findings of this study also reveal that Foreign Direct Inflow has great impact on national income. From the result obtained, it reveals that Foreign Private Investment has a direct and significant impact on the level of Net Export in Nigeria. Hence, any policy action by the government that increases Foreign Private Investment will also increase the level of Net Export in Nigeria.

Conclusion

This research study has examined the impact of Foreign Private Investment on Net export in Nigeria. Based on the empirical findings of this research, the following conclusions were hereby made. Foreign Private Investment has a significant and direct impact on the level of net export in Nigeria. This is basically because, Foreign Private Investment will increase the national productivity of the economy, and this will subsequently increase the tendency to export output to the foreign market. The level of Gross Domestic Product has a significant and direct impact on the level of foreign Private Investment in Nigeria. As such, an increase in the level of Gross Domestic Product, will lead to an increase in the level of Foreign Private Investment in Nigeria. This is because foreign investors will be willing to invest when the level of national productivity is high.

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PROPER MAINTENANCE OF HANDTOOLS AND EQUIPMENT IMPACT ON PERFORMANCE OF BUILDING CONSTRUCTION CRAFTSMEN IN LAGOS STATE

By

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Abstract

The study investigated the impact of proper maintenance of hand tools and equipment on the performance of building construction craftsmen in Lagos State. Three research questions guided the study. The population for the study was 201 subjects. There was no sampling because of their manageable size. A 39-items structured questionnaire was used as instrument for data collection. The instrument was validated by three experts. Cronbach alpha method was used to determine the reliability of the instruments with a coefficient of 0.86. Two hundred and one copies of the instrument were administered on the respondents by the researchers and research assistants on one to one basis. One hundred and eight one copies of the questionnaire were retrieved and analyzed using mean to answer the research questions. The study found out that 10 statuses of various tools and equipment used for building construction by craftsmen. Holistically, proper maintenance of tools and equipment improve performance of craftsmen in setting out, foundation laying, flooring and wall setting. Recommendations include that all the tools and equipment using for building construction work should be properly maintained for maximum productivity. Building construction industries should always provide first class tools and equipment to their workers for better performance.

Introduction

Building construction is any industry that has the main objective of constructing, renovating demolishing, relocating, maintaining and repairing of buildings, chimneys sporting, recreational activities waste disposal, fencing, landscaping structural works using building equipment and tools (Krause, 1996). Building construction according to Duruzeochi (1999) covers a wide range of loosely integrated group involved in the construction, renovation, alteration repairs and maintenance of buildings. Sleey (1993) observed that building construction satisfies man's needs for shelter and infrastructures such as houses, schools, offices, hospitals, shops, factories, recreational facilities warchouses, banks, churches etc. and to construct all equipment, tools and materials are involved. Thus building construction is the pivotal and primary conduit for infrastructure development in developed and developing countries. Building construction is an organized education which is directly related to preparation of individual for paid or unpaid employment or for additional preparation for a career. Knowledge and skills acquired by individuals in building construction are used to erect buildings that serve as homes for humans.

Buildings serve as shelters for humans and their belongings. They must be properly planned, designed and erected to obtain desired satisfaction from the environment. The factors to be observed in building construction include durability, adequate stability to prevent its failure or discomfort to the users, resistance to weather, fire outbreak and other forms of accidents. The styles of building construction are constantly changing with the introduction of new materials and techniques of construction. Consequently, the work involved in the design and construction stages of buildings are largely that of selecting materials, components and structures that will meet the expected building standards and aesthetics on economy basis.

Well designed and constructed buildings are \required to satisfy the basic needs, which include the following: resistance to penetration of rainwater, sun, and protection against wind. Buildings are also expected to regulate heat (thermal insulation), insulate sound, and provide resistance to fire outbreak and security to man and materials among others. Ezeji (1984) observed that these are the basic functions of buildings. He explained that, buildings that do not satisfy these functions have not satisfied the objectives of their construction. Non-satisfaction of the objectives could result from lack of technical expertise required and good workmanship of construction activities of such building. American Society of Civil Engineer ASCE (2007) stated that most building were less efficient and were designed more conservatory than necessary because of limited knowledge of personnel, at the same time pressure to achieve efficiency or economy in design or versatility in occupancy may lead to system that have little inherent energy absorbing collapse. To reduce frequent occurrence of building collapse there is need to have plans or take series of actions which will improve the performance of the craftsmen to ensure competencies in performing their responsibilities. Parts of the series of actions to be taken include proper maintenance of hand tools and equipment.

Hand tools are simple objects used to carry out a given task. Nkaru (2010) described hand tools as an object designed to do a specific kind of work such as cutting or chopping by directing manually applied force or by means of a motor. Examples of building construction hand tools include: trowel, shovel, cutlass, head pan, line, range among others. Equipment on the other hand are objects that are more complex and required special knowledge and skills for their operations. Equipment according to Microsoft (2009) is the intellectual and emotional resources that enable somebody to succeed at a task. When hand tools and equipment are misused they reduce job performance of the users such as craftsmen. Misuse can also cause fatal accidents. Hand tools and equipment have great impact on performance of building construction craftsmen. In Lagos State, among building construction craftsmen, researcher observed that they work with all kinds of tools and equipment without carrying out proper maintenance and this has resulted to low productivity among the craftsmen in the site. These craftsmen often sustain injuries and have accidents at building construction sites. Bad maintenance culture of these craftsmen results to low performance of craftsmen of building construction. The negative impact could be eliminated by embarking on proper maintenance of hand tools and equipment. It could also improve the performance of craftsmen. The craftsmen, who are specifically trained, through formal academic and practical experience, to manage the production process of building project on day to –day basis, are builders (Bamisile, 2006). A craftsman is a skilled manual worker who uses tools and machinery in a particular craft. The status is considered between a laborer and a professional, with a high degree of both practical and theoretical knowledge of their trade. These artisans/tradesmen/craftsmen are the bricklayers/block layer, masons, carpenter/jointers, glazers, electricians, plumbers, painters/decorations, plasterers, welders/iron workers, scaffolders, building inspectors, site supervisors and others that may be required in the building construction services.

Craftsmen and builders work together in the site. Builders are professionals at the center of the physical construction of building. Their roles in building development process in general, are to construct building. They do these by taking charge of the activities on a building construction site in translating designs, working drawing, schedules and specifications into physical structure. Performance in the statement of Quirk (1995) is the process of carrying out a piece of work or function.

Maintenance is an activity that is done regularly to keep a machine, building, or piece of equipment in good condition and working order (Bakare, 2014). Maintenance including tests, measurements, adjustments, and parts replacement, performed specifically to prevent faults from occurring. The primary goal of maintenance is to avoid or mitigate the consequences of failure of equipment. This may be by preventing the failure before it actually occurs which planned maintenance and condition based maintenance help to achieve. It is designed to preserve and restore equipment reliability by replacing worn components before they actually fail. In addition, workers can record equipment deterioration so they know to replace or repair worn parts before they cause system failure. The need for maintenance is predicated on actual or impending failure – ideally, maintenance is performed to keep equipment and systems running efficiently for at least design life of the component(s).

Maintenance, including tests, measurements, adjustments, and parts replacement, performed specifically to prevent faults from occurring. The primary goal of maintenance is to avoid or mitigate the consequences of failure of equipment. This may be by preventing the failure before it actually occurs which planned maintenance and condition based maintenance help to achieve. It is designed to preserve and restore equipment reliability by replacing worn components before they actually fail. In addition, workers can record equipment deterioration so they know to replace or repair worn parts before they cause system failure. The need for maintenance is predicated on actual or impending failure – ideally, maintenance is performed to keep equipment and systems running efficiently for at least design life of the component(s). There are different types of maintenance that can be carried out on hand tools and equipment: Breakdown maintenance means that people waits until equipment fails and repair it. Such a thing could be used when the equipment failure does not significantly affect the operation or production or generate any significant loss other than repair cost.

Maintenance is really a productive activity both at the private (leads to lower depreciation cost) and at the national levels (leads to lower expenditures on replacement). To achieve maintenance goals some issues need to be developed like, proper guidelines and standard, proper scheduling of activities, and provide necessary resources (financial and human) (Duffuaa, 1992). These craftsmen need the basic skills to handle and maintain hand tools, equipment and materials accurately, efficiently and safely. Good manual dexterity, eye-hand coordination, physical fitness and a sense of balance are important. Building craftsmen erect building structures. This involves hard work and risk taking, which require competence of craftsmen. These craftsmen need to be well qualified in their areas of specialty and keep their knowledge and skills up to date in the world of work. In the light of this, McClelland (2001) asserted that the implication of the changes in the construction industries require the continued development of professionals in the building industry. In Nigerian for instance, and Lagos state in particular, there is lack of proper professional growth among construction workers (National Institute of Standards and Technology, 2001). Consequently, this construction workers knowledge, skills, attitudes to work is obsolete and cannot give what they lack. Such construction workers employ unsuitable methods of construction; use inferior materials, which result to faulty construction and foundation failure. There is need to investigate the impact of proper maintenance of hand tools and equipment on the performance of building construction craftsmen in Lagos State.

Statement of the Problem

Hand tools and equipment are relevant facilities for building all kinds of houses in Lagos State. They are used because of their convenience. First class or well maintained hand tools and equipment are expected to increase job performance of building construction craftsmen in setting out, foundation laying, flooring and wall setting. In Lagos State, among building construction craftsmen, researcher observed that they work with all kinds of tools and equipment without proper maintenance and this has resulted to low productivity among the craftsmen in the site. In order to confirm the observation of the researcher that low performance of craftsmen is as a result of using hand tools and equipment that not are properly maintenance, this study is now set up in order to investigate the impact of proper maintenance of hand tools and equipment on the performance of building construction craftsmen in Lagos State.

Purpose of the Study

The major purpose of the study was to investigate the impact of proper maintenance of hand tools and equipment on the performance of building construction craftsmen in Lagos State. Specifically the study found out the:

1. Status of various tools and equipment used for building construction by craftsmen
2. Impact of proper maintenance of tools and equipment on the performance of building craftsmen in setting out
3. Impact of proper maintenance of tools and equipment on the performance of building craftsmen in foundation laying

Research Questions

The following research questions were developed to guide the study:

1. What are the types of tools and equipment used for building construction work by craftsmen?
2. What is the impact of proper maintenance of tools and equipment on the performance of building craftsmen in setting out?
3. What is the impact of proper maintenance of tools and equipment on the performance of building craftsmen in foundation laying?

Method

Design of the Study

The study adopted a survey research design. A survey is a research which involves the assessment of public opinion using questionnaire and sampling method. Survey research design is suitable for the study because Osuala (2001) stated that the survey research is interested in the accurate assessment of the characteristics of the whole population of the people. Therefore, survey research focuses on people, the vital facts of people, their beliefs, opinions, attitudes, motivations and behavior. The survey research design is suitable for this study since data were collected through questionnaire from building construction craftsmen in order to investigate the impact of proper maintenance of hand tools and equipment on the performance of building construction craftsmen in Lagos State.

Area of the Study

The study was carried out in Lagos State because low performance and poor work output has been notice among building construction craftsmen. In order to carry out this study successfully reasonable number of building construction craftsmen are required. These make Lagos state a good place for this study.

Population for the Study

The total population for the study was 201. This includes all building construction craftsmen in registered building construction industries in Lagos State of Nigeria. Information about the respondents is obtained from registered construction industries. Therefore, there was no sampling since the population was small to be managed.

Instrument for Data Collection

The instrument for data collection was structured questionnaire. The questionnaire is made up of two parts: namely, Part 1 and 2. Part 1 will solicit information on personal data of the respondents while part 2 with five sections A, B, C, D and E. Section A solicits information on status of various tools and equipment used for building construction by craftsmen, section B dwelt on impact of proper maintenance of tools and equipment on the performance of building craftsmen in setting out, while section C was on impact of proper maintenance of tools and equipment on the performance of building craftsmen in foundation laying. The response option of the questionnaire was structured on five point Likert scale as follows: Highly Required, Required, Undecided, Not Required, Highly Not Required with value of 5, 4, 3, 2 and 1 assigned to them respectively.

Validation of the Instrument

The instrument was face validated by three Experts from the School of Technical Education, Federal College of Education (Technical) Akoka Lagos State. These experts were asked to scrutinize each item of the questionnaire for clarity of statements. They will be requested to examine the appropriateness and suitability of all items of the questionnaire in providing appropriate responses or data for answering each of the research questions. Their suggestions and recommendations were used in the final production of the questionnaire items.

Method of Data Collection

The researcher administered the copies of instruments on the building construction craftsmen in their various registered building construction industries in Lagos state through personal contact and with the help of three research assistants. The research assistants were briefed on how to questionnaire will be administered. The copies of the questionnaire were collected back five days later by the research assistants and researcher in order to give respondents adequate to react to the questionnaire. Through personal administration of the instrument, a hundred percent return rate was anticipated.

Method of Data Analysis

The five research questions were answered using Mean and standard deviation. Any item with a mean value of 3.50 and above was regarded as agree. Any item with a mean value of less than 3.50 was regarded as disagree. Also, any item whose standard deviation is below1.96 that is 95% confidence limits indicates that the respondents are close to the mean and not too far from one another in their responses while any item with standard deviation above 1.96 that is 95% confidence limits indicates that the respondents are far from the mean and from one another in their responses.

Results

Table 1

Mean Responses of the Respondents on the Types of Tools and Equipment Used for Building Construction Work by Craftsmen

S/N	Item statements	X	S.D	Remarks
1	Trowels used for construction work are appropriate	3.50	0.70	Agree
2	Hand tools available for construction work are first class	3.68	0.68	Agree
3	Equipment for construction work are obsolete	3.79	0.82	Agree
4	Construction hand tools are not properly maintained	3.50	0.64	Agree
5	Equipment for construction work are bad beyond maintenance	3.56	0.79	Agree
6	Some modern construction work equipment and tools are not available for work	3.88	0.84	Agree
7	Little available modern tools and equipment are not useful because of the technical skills involvement	3.59	0.68	Agree
8	Precautionary measures for available tools and equipment are not stated	3.62	0.82	Agree
9	The craftsmen lack operational skills for operating most of the building construction equipment	3.65	0.70	Agree
10	The life span of the equipment and hand tools used for building construction are short	3.78	0.65	Agree

Keys: *X = Mean of Respondents, SD = Standard Deviation*

The data in Table 1 revealed that all the items had their mean values ranged from 3.50 to 3.88 and were above the cut off point of 3.50. This indicated that all the 10 items were the statuses of tools and equipment of building construction used by craftsmen. All the 10 items had their standard deviations ranged from 0.64 to 0.84. This indicated that the respondents were not too far from the mean and from one another in their responses.

Table 2
Mean Responses of the Respondents on the Impact of Proper Maintenance of Tools and Equipment on the Performance of Building Craftsmen in Setting Out

S/N	Item statements	$\bar{X}$	S.D	Remarks
1	Proper maintenance of hand tools makes setting out neater	3.57	0.77	Agree
2	Proper maintenance of equipment for construction work makes the setting out activities easier	3.61	0.68	Agree
3	Setting out activities becomes fasters when maintained equipment and tools are employed	3.79	0.70	Agree
4	Well maintained wheel barrow conveys more concrete to setting out point	3.58	0.66	Agree
5	Use of well maintained trowel for setting out saves time of craftsmen	3.51	0.57	Agree
6	Maintenance of tools helps in determining site plan and specifications	3.72	0.64	Agree
7	Well maintained equipment assists in comparing site plan and specification with other available plans	3.78	0.68	Agree
8	Use of well maintained tools and equipment results to easy location of existing features from site plan	3.62	0.78	Agree
9	Proper maintenance of hand tools allows the craftsmen to locate the position of proposed construction works from site plan	3.64	0.70	Agree
10	Proper maintenance of hand tools and equipment makes the excavation of top soil to become easier	3.79	0.65	Agree

Keys: *X = Mean of Respondents, SD = Standard Deviation, N = Number of the Respondents*

The data in Table 2 revealed that all the items had their mean values ranged from 3.51 to 3.79 and were above the cut off point of 3.50. This indicated that all the 10 items were the impacts of proper maintenance of tools and equipment on the performance of building craftsmen in setting out. All the items had their standard deviations ranged from 0.57 to 0.77. This indicated that the respondents were not too far from the mean and from one another in their responses.

Table 3
Mean Responses of the Respondents on the Impact of Proper Maintenance of Tools and Equipment on the Performance of Building Craftsmen in Foundation Laying

S/N	Item statements	$\bar{X}$	S.D	Remarks
1	Proper maintenance of tools makes foundation laying neater and attractive	3.78	0.76	Agree
2	Use of well maintained equipment saves time and energy of the craftsmen	3.70	0.63	Agree
3	Use of proper maintained hand tools increases the output of the craftsmen	3.71	0.82	Agree
4	Well maintained tools and equipment helps in carrying out soil surveys to ascertain the compressibility or consolidation potentials as well as bearing capacity of the soil.	3.82	0.64	Agree
5	Use of proper maintained hand tools make the Clearing, scraping and leveling of the building site neater	3.56	0.73	Agree
6	Well maintained hand tools and equipment help in laying continuous membrane over the whole area of the building	3.72	0.64	Agree
7	Maintained equipment helps in digging trenches around the perimeter of external walls and under load bearing walls.	3.52	0.68	Agree
8	Well maintained tools help in using 2*10 boards to build forms for the footings	3.62	0.83	Agree
9	Proper maintained hand tools assist in marking column base to achieve a smooth level	3.64	0.71	Agree

10	Well maintained hand tools helps in accurately marking center wall lines to know where wall forms will be placed	3.70	0.65	Agree
11	Maintained tools results to well laid reinforcement bars in the trenches	3.90	0.65	Agree
12	Maintenance of construction equipment assists in carrying out mechanical vibration to consolidate the concrete and eliminate air pockets	3.67	0.66	Agree
13	Proper maintenance of building construction equipment helps in carrying out compaction to expose invisible holes under the ground easily	3.70	0.65	Agree

The data in Table 3 revealed that all the items had their mean values ranged from 3.52 to 3.90 and were above the cut off point of 3.50. This indicated that all the 13 items were the impact of proper maintenance of tools and equipment on the performance of building craftsmen in foundation laying. All the 13 impacts had their standard deviations ranged from 0.63 to 0.83. This indicated that the respondents were not too far from the mean and from one another in their responses.

Discussion of findings

The findings of the study revealed 10 statuses of various tools and equipment used for building construction by craftsmen. These include equipment for construction work are obsolete, construction hand tools are not properly maintained, equipment for construction work are bad beyond maintenance, some modern construction work equipment and tools are not available for work, little available modern tools and equipment are not useful because of the technical skills involvement, precautionary measures for available tools and equipment are not stated, the craftsmen lack operational skills for operating most of the building construction equipment, the life span of the equipment and hand tools used for building construction are short. The findings were in agreement with the opinion of Ayininuola and Olalusi (2004) that craftsmen and other construction workers hardly used well maintained tools and equipment for construction work.

It was found out that the following were the impacts of proper maintenance of tools and equipment on the performance of building craftsmen in setting out: proper maintenance of hand tools makes setting out neater, proper maintenance of equipment for construction work makes the setting out activities easier, setting out activities becomes fasters when maintained equipment and tools are employed, well maintained wheel barrow conveys more concrete to setting out point, use of well maintained trowel for setting out saves time of craftsmen, maintenance of tools helps in determining site plan and specifications, well maintained equipment assists in comparing site plan and specification with other available plans and use of well maintained tools and equipment results to easy location of existing features from site plan. These are in agreement with the opinion of Yates (2002) that setting out activities becomes fasters when maintained equipment and tools are employed by building construction craftsmen.

The finding revealed 13 impacts of proper maintenance of tools and equipment on the performance of building craftsmen in foundation laying. The impact are proper maintenance of tools makes foundation laying neater and attractive, use of well maintained equipment saves time and energy of the craftsmen, use of proper maintained hand tools increases the output of the craftsmen, well maintained tools and equipment helps in carrying out soil surveys to ascertain the compressibility or consolidation potentials as well as bearing capacity of the soil, use of proper maintained hand tools make the Clearing, scraping and leveling of the building site neater, well maintained hand tools and equipment help in laying continuous membrane over the whole area of the building, maintained equipment helps in digging trenches around the perimeter of external walls and under load bearing walls, well maintained tools help in using 2*10 boards to build forms for the footings and proper maintained hand tools assist in marking column base to achieve a smooth level. These findings are in consonance with the opinion of Rahmat (2000) that well maintained tools and equipment helps in carrying out soil surveys to ascertain the compressibility or consolidation potentials as well as bearing capacity of the soil. These findings are in consonance with the opinion of Oladapo (2013) that proper maintained tools help in ramming down the hardcore until it is level with the bottom of the walls. Also, these findings are in consonance with the opinion of Yates (2002) that well maintained tools and equipment helps in removing blocks and preparing for the laying of the first course.

Conclusion

Hand tools and equipment are relevant facilities for building all kinds of houses in Lagos State. They are used because of their convenience. First class or well maintained hand tools and equipment are expected to increase job performance of building construction craftsmen in setting out, foundation laying, flooring and wall setting. In Lagos State, among building construction craftsmen, researcher observed that they work with all kinds of tools and equipment without proper maintenance and this has resulted to low productivity among the craftsmen in the site. It was in this direction that this study was carried out to determine the impact of proper maintenance of hand tools and equipment on the performance of building construction craftsmen in Lagos State and the study found the proper maintenance of tools and equipment has impact of the performance of building construction craftsmen.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. All the tools and equipment using for building construction work should be properly maintained for maximum productivity.
2. Building construction industries should always provide first class tools and equipment to their workers for better performance
3. Workshop and seminars on importance of proper maintenance of tools and equipment should be organized for building construction craftsmen

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COMPETENCIES IN MOBILE PHONE MAINTENANCE FOR EMPOWERING OUT OF SCHOOL YOUTHS IN LAGOS STATE

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Abstract

The study was carried out to determine competencies in mobile phone maintenance for empowering out of school youths in Lagos State. Three research questions guided the study and three null hypotheses formulated were tested at 0.05 level of significance. A survey research design was adopted for the study. The population for the study was 149 which comprised of all the 35 lecturers and 14 instructors of electrical/electronic technology from three polytechnics, 33 supervisors in telecommunication industries and 67 road side cell phone technicians in Lagos State. The sample for the study was 149 respondents. These were purposively sampled 67 literate road side cell phone technicians, all the 35 lecturers, 14 instructors in the polytechnics, and 21 supervisors in telecommunication industries in the study area. A structured questionnaire was used for data collection. The instrument was validated by five experts. Cronbach alpha reliability method was adopted to determine the internal consistency of the questionnaire item and 0.82 was obtained. One hundred and forty nine copies of the questionnaire were administered. One hundred and thirty seven copies of the questionnaire were retrieved and analyzed using mean while analysis of variance was used to test the null hypotheses at 0.05 level of significance. The study found out that all the determined competencies in mobile phone maintenance should be used to train out of school youths at skill acquisition centres in Lagos State.

Keywords: *competencies, Smart phones maintenance, Youths empowerment, Skills acquisition centre*

Introduction

Youths are young, active and energetic individuals. Youths according to World Bank (2006) refers to those who are between the ages of 15 - 25. This age range may go up to 30 years in developing countries like Nigeria. The National Youth Development Policy (2001) defined youths as people aged 18-35. The youth population according to the 2006 census in Nigeria is almost a hundred million. This means that they constitute more than two thirds of the country's population of 140 million. They are the backbone of the development of the country. As enshrined in Nigeria, it is expected that when a child attained the ages of 18, he/she must have acquired a skill or competence that will make a person to be productive to himself and the society (Federal Government of Nigeria, 2004), which by implication can fend for himself with minimum supervision from elders. Ogbuanya and Bakare (2014) explained that if Nigeria is to be sustained as a viable entity, there must be a very good plan to tap the energy and resourcefulness of the youth population to fast track economic development. Youths can easily be used against a community, individuals or a nation most especially when they are not equipped with competence and others resources needed for a survivor. Youths are therefore young and energetic groups of people who can be trained to be competent in mobile phone maintenance.

Mobile phones are sophisticated mobile telecommunication gargets used to make mobile telephone calls across a wide geographic area. Smart phones are high end phones with wonderful features. Bakare (2014) stated that cell phones that offer advanced computing abilities are referred to as smart phones. They are capable of sending and receiving emails, editing documents and storing files. Prasart (2006) described mobile phones as third generation (3G) mobile phones which mostly use symbian operating system, linux and windows. Mobile phones are non-touch screen devices that offer a robust mobile operating system (James, 2011). Feig-Nancy (2007) stated that mobile phones and their network vary very significantly from provider to provider and country to country. However the basic communication method of all of them is through the electromagnetic microwaves with a cell base station. Donner and Steenson (2008) explained that mobile phones make use of different mobile communication methods, such as SMS, Wireless Application Protocol (WAP), Wireless Local Area Network (WLAN), WIFI, GPRS, Bluetooth, Infrared, Infra red Data Association (IrDA) and I-Phone. Smart phones are in different sizes and types manufactured by different companies with their trademarks or brands. Some are nokia, samsung, motorola, Philip, tecno products among others. Ogbuanya and Bakare (2014) stated that mobile phones have a number of features in common, but manufacturers also try to differentiate their own products by implementing additional functions to make them more attractive to consumers. Igor (2010) explained that a mobile phone usually contains the screen, application processors, the baseband that enables the connection between phone and cell tower, the ancillary wireless and case. Mobile phones and their components are prone to faults such as hardware faults, software faults and setting faults most especially when they are handled carelessly (Boniface, 2008).

Mobile phones help in selling and buying of goods and services with ease but has created some management problems for the users in the areas of maintenance (James, 2011). In Nigeria and Lagos state in particular, most of the users could not easily locate competent technicians who can repair and service faulty smart phones thereby making users whose phones are bad to abandon them for the purchase of new ones. Availability of competent technicians to maintain or service these mobile phones when they are bad will reduce continuous spending of money and electronic wastage which can cause health problems such as cancer to people especially where they are disposed carelessly. Right now in Lagos state, there is no training document or instruction empirically developed to empower youths at various skills acquisition centres. Training institutions in the state have not fully integrated the mobile phone maintenance into their programmes and this makes competent personnel who can repair or service smart phone so scarce for the users. Potentials of youths can be tapped in smart phone maintenance if appropriate competencies are developed for empowerment.

Competency according to Olaitan and Ali (1997) is described as the knowledge, skills, attitude and judgment generally required for the successful performance of a task. Tom (2004) explained competency as a combination of skills, knowledge and attitude that enable an individual to perform a job to the standard required. Rick in Abu (2014) stated that in a competency based training system, the unit of progression is mastery of specific knowledge and skills and is learner or participant centered. Competency deals with what is expected in the work place with emphasis on performing the actual job. To be competent, according to Olaitan (2003), means that the individual has acquired the knowledge, skills, attitude and judgment which he requires in order to perform successfully at a specified proficiency level in a given work. Competency in this study is a well-developed ability of youths in performing a task in any given job such as in smart phone maintenance making use of required resource inputs.

Appropriate competencies are a requirement for effective training in mobile phone maintenance. Appropriate competencies embody knowledge, skills and attitude to be learnt by the learners. They are required when trying to solve social problems like shortage of manpower in a particular area, unemployment among others. Appropriate competencies in mobile phone maintenance are skills, knowledge and attitudes required to troubleshoot, service, repair, configure and flash. Bakare (2014) described mobile phone maintenance as the activities carried out to repair, service, flash, upgrade, and configure damaged or malfunctioned cell phones. Training becomes easier and functional only when appropriate competencies have been developed for use. Training of youths with appropriate competencies in smart phone maintenance will help in reducing societal problems. Insurgency in the Nigeria today is as a result of mass unemployment. Akor (2014) explained that commitment to improvement of the socio economic well being of the youths would help bring the situation under control and not the use of force as was the case now. Development of appropriate competencies in mobile phone maintenance can lead to effective maintenance of smart phones as well give employment to the teeming youths. Ogbuanya and Bakare (2014) stated that development of appropriate contents in cell phone maintenance for youth empowerment will not only help providing information on the knowledge, skills and attitude required for effective cell phone maintenance but if also well implemented with relevant facilities will enhance technological development and provide employment to the youths. The general purpose of the study was to determine appropriate competencies in mobile phone maintenance for empowering youths at skills acquisition centres in Lagos State. Specifically the study sought to identify:

1. appropriate competencies in maintaining faulty mobile phones
2. appropriate competencies in configuring malfunctioned mobile phones
3. training procedures that could be utilized by trainers for empowering the youths with appropriate competencies in mobile phone maintenance at the skill acquisition centres

Research Questions

The following research questions guided the study:

1. What are the appropriate competencies in maintaining faulty mobile phones
2. What are the appropriate competencies in configuring malfunctioned mobile phones
3. What are the procedures that could be utilized by trainers for empowering the youths with appropriate competencies in mobile phone maintenance at the skill acquisition centres?

Hypotheses

The following hypotheses were tested at .05 level of significance:

$H0_1$: There is no significant difference in the mean response of lecturers, instructors, road side technicians and supervisors in telecommunication industries on the appropriate competencies in maintaining faulty mobile phones

$H0_2$: There is no significant difference in the mean response of lecturers, instructors, road side technicians and supervisors in telecommunication industries on the appropriate competencies in configuring malfunctioned mobile phones

$H0_3$: There is no significant difference in the mean response of lecturers, instructors, road side technicians and supervisors in telecommunication industries on the procedures that could be utilized by trainers for empowering the youths with appropriate competencies in mobile phone maintenance at the skill acquisition centres

Method

The study adopted survey research design. A survey research design, in the opinion of Ali (2006) is a descriptive study which uses sample of an investigation to document, describe and explain what is in existent or nonexistent on the present status of phenomena being investigated. In survey study, views and facts are collected through questionnaire, interviews among others, analyzed and used for answering research questions. The survey research design was appropriate for this study because it aims at developing appropriate competencies in mobile phone maintenance for empowering youths at skills acquisition centres.

The study was conducted in Lagos State of Nigeria. The population for the study was 149 which comprised of all the 35 lecturers and 14 instructors of electrical/electronic technology from Department of Electrical/Electronic Technology, Yaba College of Technology, Lagos State Polytechnic Ikorodu and Lagos City Polytechnic Ikeja, 33 supervisors in Mobile Telecommunication Network (MTN), GLOBACOM, Celtel, Etisalat and Samsung and 67 road side cell phone technicians in

Lagos State. The sample for the study was 149 respondents. These were purposively sampled 67 literate road side cell phone technicians, all the 35 lecturers, 14 instructors in the polytechnics, and 33 supervisors in telecommunication industries in the study area.

A structured questionnaire titled: Mobile Phone Maintenance Competency Questionnaire (MPMCQ) was used as instrument for data collection and was on 5-point Likert scale. The structured questionnaire had 92 competency items developed for collecting data in accordance with the research questions. The instrument was in four sections A-D. A centered on appropriate competencies in maintaining faulty mobile phone, B was on appropriate competencies in configuring malfunctioned mobile phone, C centered on appropriate facilities for the maintenance of mobile phones. The instrument was face validated by three experts. These were experts in the Department of Science and Industrial Technology Education, University of Lagos, Akoka, Department of Electrical/Electronic Technology, Yaba College of Technology, Yaba and Telecommunication Industry in Lagos State. The internal consistency reliability coefficient of 0.82 was obtained for MPMCQ using Cronbach alpha technique. Out of one hundred and forty nine copies of the questionnaire administered to the respondents with the help of five research assistants, only 137 copies were duly retrieved which represent 91.94 percent return rate.

The data collected from the respondents were analyzed using factor analysis for answering the research questions. For selecting the appropriate competencies in smart phone maintenance for youth empowerment, 0.50 as factor loading was utilized. Any competency with factor loading of 0.50 and above was required and any competency with factor loading less than 0.50 was not required. Analysis of variance (ANOVA) was employed for testing all the null hypotheses at 0.05 and relevant degrees of freedom. The null hypothesis of no significant difference was accepted for any item whose P- value was greater than the 0.05, but it was rejected for any item whose P-value was less than 0.05.

Results

The results for the study were obtained from the research questions answered through data collected and analyzed.

Table 1: Outcome of Factor Analysis for answering Research Question One and Analysis of Variance for Testing Hypothesis One

S/N	Appropriate Competency Items	Factor Loading at 0.50	P-values	Remarks,	Ho
E	**Appropriate competencies in maintaining malfunctioned cell phones**				
1	Dismantle cell phone before embarking on maintenance actions	0.64	0.59	*Appropriate*	*NS*
2	Check the battery contacts for proper connection	0.56	0.88	*Appropriate*	*NS*
3	Clean the battery by removing carbon from the contacts	0.78	0.57	*Appropriate*	*NS*
4	Clean the motherboard of a phone using soft wool	0.58	0.65	*Appropriate*	*NS*
5	Adjust the settings of the phone for functionality	0.65	0.08	*Appropriate*	*NS*
6	Heat each ICs inside the phone for functionality	0.57	0.57	*Appropriate*	*NS*
7	Dry clean the phone if drop inside the water	0.62	0.69	*Appropriate*	*NS*
8	Check for proper contact of SIM card	0.59	0.21	*Appropriate*	*NS*
9	Clean the whole of cell phone with appropriate agents	0.68	0.33	*Appropriate*	*NS*
10	Check the speaker or mouth piece for proper operation	0.65	0.73	*Appropriate*	*NS*
11	Check the charging point of a phone for functionality	0.66	0.12	*Appropriate*	*NS*
12	Clean the screen of a cell phone	0.59	0.52	*Appropriate*	*NS*

13	Check the flash light of a cell phone for proper operation	0.77	0.55	***Appropriate NS***
14	Check the flip flop IC for proper operation in case of sliding phone	0.74	0.82	***Appropriate NS***
15	Check the power ICs of a cell phone for functionality	0.64	0.52	***Appropriate NS***
16	Check all electrical installation operations as designed in schematic manual	0.63	0.49	***Appropriate NS***
17	Check for contact of keyboard for proper operation	0.50	0.55	***Appropriate NS***
18	Test the keyboard IC for effective operation	0.58	0.24	***Appropriate NS***
19	Check the active components in the charger for functionality	0.62	0.67	***Appropriate NS***
20	Check the passive components in the charger for functionality	0.65	0.54	***Appropriate NS***
21	Clean the screen of a cell phone with a very soft damped cotton cloth	0.77	0.54	***Appropriate NS***
22	Scratch the battery and SIM contacts with fine sharp paper or object	0.87	0.65	***Appropriate NS***

The data in Table 1 revealed that factor loading of the appropriate competencies in maintaining malfunctioned smart phones ranged from 0.51 to 0.87. This indicated that all the 22 competencies in maintaining malfunctioned cell phones are appropriate for empowering youths at skill acquisition centres. The table also indicated that each item had its P-value greater than 0.05. This showed that there was no significant difference in the mean response of lecturers, instructors, road side technicians and supervisors in telecommunication industries on the appropriate competencies in maintaining malfunctioned smart phones. Therefore, the hypothesis of no significant difference was upheld for the 22 competencies.

Table 2: Outcome of Factor Analysis used for answering Research Question two and Analysis of Variance for Testing Hypothesis two

S/N	Appropriate Competency Items	Factor Loading at 0.50	P-values	Remarks, Ho
A	**Appropriate competencies in configurating malfunctioned cell phones**			
1	Select or click on menu	0.66	0.53	***Appropriate NS***
2	Select settings	0.52	0.34	
3	Select configure setting correctly	0.56	0.38	***Appropriate NS***
4	Identify or generate personal configuration	0.69	0.54	***Appropriate NS***
5	Select add new in web	0.72	0.67	***Appropriate NS***
6	Create wap.mtnonlineplay.com	0.65	0.43	***Appropriate NS***
7	Select home page	0.68	0.46	***Appropriate NS***
8	Click on bearing setting to have proxy server	0.68	0.43	***Appropriate NS***
9	Generate 8080 on port	0.56	0.81	***Appropriate NS***
10	Rewrite username and password two times	0.78	0.27	***Appropriate NS***
11	Click back up and choose options	0.62	0.58	***Appropriate NS***
12	Activate as web	0.59	0.54	***Appropriate NS***
13	Click web for browsing to show bookmark	0.72	0.29	***Appropriate NS***
14	Complete the configuration correctly	0.64	0.08	***Appropriate NS***
B	**Competencies in flashing malfunctioned cell phones**			
15	Select appropriate facilities for flashing	0.63	0.56	***Appropriate NS***
16	Connect the laptop to the internet	0.53	0.88	***Appropriate NS***
17	Key in the website of the service provider	0.58	0.44	***Appropriate NS***
18	Unzip the downloaded flashing software	0.61	0.65	***Appropriate NS***

19	Download correct software from the website of the service provider	0.65	0.08	***Appropriate***	***NS***
20	Register with the CDMA or GSM carrier in the cell phone	0.67	0.54	***Appropriate***	***NS***
21	Connect the cell phone to the computer with the help of appropriate USB cable	0.65	0.69	***Appropriate***	***NS***
22	Install the downloaded software onto the phone	0.58	0.22	***Appropriate***	***NS***
23	Complete the installation within 15-20 minutes	0.57	0.12	***Appropriate***	***NS***
24	Disconnect the phone from laptop	0.88	0.23	***Appropriate***	***NS***
25	Test the cell phone for functionality	0.79	0.52	***Appropriate***	***NS***

Data in Table 2 showed that all the appropriate competencies in configuring and flashing malfunctioned smart phones had their factor loadings ranged from 0.52 to 0.88 which were either equal to or greater than 0.50 loading factor. This indicated that all the competencies in configuring and flashing malfunctioned smart phones are appropriate for youth empowerment. The table also indicated that items had their P-values greater than 0.05 at degree of freedom 3 and 100. This indicated that there was no significant difference in the mean responses of lecturers, instructors, cell phone technicians and supervisors in electrical/electronic industries on the appropriate competencies in configuring malfunctioned smart phones. Therefore, the null hypothesis of no significant difference was upheld for all the 25 competencies in configuring and flashing malfunctioned cell phones.

Table 3: Outcome of Factor Analysis for answering Research Question four and Analysis of Variance for Testing Hypothesis four

S/N	Training procedures	Factor Loading at 0.50	P-values	Remarks,	Ho
1	Teach the youths appropriate competencies in smart phone maintenance	0.76	0.60	**Appropriate**	**NS**
2	Explain the facilities to be used by the trainer for training to each trainee in each competency area of the smart phone maintenance	0.56	0.88	**Appropriate**	**NS**
3	Deliver the competencies step by step in logical order to the trainees.	0.70	0.54	**Appropriate**	**NS**
4	Demonstrate the competencies while the trainee observed during step by step teaching	0.58	0.65	**Appropriate**	**NS**
5	Request the trainees to practice what the instructor demonstrated while the instructor observes them	0.65	0.08	**Appropriate**	**NS**
6	Correct wrong practices made by the trainee	0.54	0.54	**Appropriate**	**NS**
7	Encourage repetitive practice of knowledge and skills learnt	0.62	0.69	**Appropriate**	**NS**
8	Test the practice of a group of related competency towards achieving of the objectives	0.59	0.21	**Appropriate**	**NS**
9	Provides the trainee information about their performance	0.68	0.11	**Appropriate**	**NS**
10	Encourage visit to other relevant training institutions, write a report and submit to the instructor for a feedback system	0.55	0.23	***Appropriate***	***NS***
11	Teach the youths money management and investment procedure into their enterprise.	0.66	0.12	***Appropriate***	***NS***
12	Teach the youths the source of fund for investment into the smart phone maintenance enterprise	0.59	0.32	***Appropriate***	***NS***
13	Teach the youths knowledge of profit and loss account.	0.75	0.16	***Appropriate***	***NS***
14	Teach trainee salvage value of material that can be resold for improving investment into the enterprise.	0.64	0.83	***Appropriate***	***NS***
15	Teach the youths how to manage risks in the smart	0.61	0.32	***Appropriate***	***NS***

phone maintenance enterprise through insurance policy

Data in Table 4 showed that all the procedures had their factor loadings ranged from 0.54 to 0.76 which were greater than 0.50 loading factor. This indicated that all the procedures could be utilized by trainers for empowering the youths with appropriate competencies in smart phone maintenance at the skill acquisition centres. The table also indicated that items had their P-values greater than 0.05 at degree of freedom 3 and 100. This indicated that there was no significant difference in the mean responses of lecturers, instructors, cell phone technicians and supervisors in electrical/electronic industries on the procedures that could be utilized by trainers for empowering the youths with appropriate competencies in smart phone maintenance at the skill acquisition centres. Therefore, the null hypothesis of no significant difference was upheld for all the 15 training procedures.

Discussion of findings

The findings of this study revealed 22 appropriate competencies in maintaining faulty smart phones, 25 competencies in configuring malfunctioned mobile phones and 15 training procedures for empowering youths at skill acquisition centres. This finding was in agreement with the findings of Nwachukwu, Bakare and Jika (2010) who carried out a study to identify effective laboratory safety practice skills required by electrical and electronics students for effective functioning in the laboratory of technical colleges in Ekiti State. The authors found that 10 safety practice skills were required to use electrical hand tools, 25 safety practice skills in operating electrical and electronic power tools and machines and 10 safety practice skills for working in electrical/electronic workshop.

The findings of this study agreed with the findings of Ogbuanya, Bakare and Zakka (2009) who conducted a study on mechatronics skills required for integration into electrical/electronic engineering technology programme in polytechnics for sustainable employment of graduates in contemporary Nigeria. The findings revealed that 16 mechatronics contents and 40 mechatronics skills were required for integration into electrical/electronic engineering technology programme in polytechnics for sustainable employment of graduates

This finding is also in agreement with the study of Akinduro (2006) who carried out a study on electrical installation and maintenance work skills needed by technical college's graduates to enhance their employability in Ondo State. The author found out that the graduates of technical colleges need domestic installation skills, industrial installation skills, cable jointing skills, battery charging skills and winding skills in electrical machine for employment in Ondo state. The findings of the above researchers in their various research activities helped to support the justification of the results of this study on the development of appropriate competencies in smart phone maintenance for empowerment youths at skills acquisition centres

Conclusion

Mobile phones are sophisticated electronic gadgets use for making calls. These phones are useful by many people in Lagos state but most of the users could not easily locate competent technicians who can repair or service faulty mobile phones thereby making users whose phones are bad to abandon them for the purchase of new ones. It is in this direction that this study was carried out to develop appropriate competencies in mobile phone maintenance for empowering youths at skills acquisition centres in Lagos State. It will help providing training competencies for youths in order to embark on smart phone maintenance.

Recommendation

1. It is recommended that all the competencies in maintaining faulty smart phones, configuring malfunctioned cell phones, repairing malfunctioned smart phones and training procedures should be employed for empowering youths at skill acquisition centres.

2. Relevant facilities and materials should be supplied by government and enabling individuals for training of youths at skills acquisition centres.

3. The competencies identified in this study should be integrated into the programmes of skills acquisition centres.

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PERCEPTION OF NON-TECHNICAL TEACHERS ON TECHNICAL EDUCATION DEVELOPMENT IN RIVERS STATE

by

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Abstract

This study investigated the perception of non-technical teachers on technical education development in Rivers State. Two research questions guided the study and two null hypotheses were tested. Descriptive survey research design was used for the study. The sample size was 360 non-technical teachers drawn from 24 UBE (7-9) schools in the State. A 5-point Likert scale rating questionnaire titled Perception of non-technical teachers on technical education development in Rivers State (PNTTEDRS) was the instrument developed and used for the study. The instrument was validated by three experts from Vocational/Technology Education Department, Rivers State University, Nkpolu-Oroworukwo, Port Harcourt. The reliability coefficient of the instrument was 0.89. The research questions were analyzed using mean and standard deviation, while the null hypotheses were tested using t-test statistical technique at 0.05 level of significance. The following findings were made in the study; people do not understand the relevance and importance of technical education, technical education denies one the benefit of understanding the basic principles of mathematics and other science related subjects, dwindling nature of the technical education is as a result of poor funding. Based on the findings, the following recommendations were made. There should be public awareness that technical education is not meant for low intelligent persons or school dropouts, Federal and State ministries of education should deploy the services of sciences and mathematics teachers to technical colleges andadequate fund should be made available for the provision of technical training materials.

Keywords: *Perception, Non-technical teachers, Technical Education, Development.*

Introduction

Different perceptions on technical education exist, such as doubts about its viable options to individuals wanting to enter job market, and concerns about income potentials of the graduates. Technical and vocational institutions are viable for career training, which can often cost less than four years institutions and put graduates into work force without much delay. Technical and vocational education according to the United Nations Education and Scientific Cultural Organization (UNESCO), (2002) is all forms and levels of education process involving, in addition to general knowledge, the study of technologies, and related sciences, the acquisition of practical skills, know-how, attitudes and understanding relating to occupations in the various sectors of economic and social life.

Technical and vocational education institutions train for specific skills in block laying and concreting, carpentry, electrical installation, painting, welding, fabrication and auto-mechanics among others (Isayku, Nwaokolo, Akinseinde & Uwameiye, 2001). Boateng (2012) opined that technical vocational education refers to the studies in the areas of technology, applied sciences, agriculture, business studies, industrial studies and visual arts. Vocational technical education is occupational education which helps an individual in a particular profession in the world of work (Harder, 2009). Technical education was introduced in Nigeria in 1946 to develop vocational competencies among youths so that they can contribute positively to the national economic growth and development in various occupational activities (Lawal, 2013). In line with the new system of education in Nigeria, technical education got started since then which aimed at training skilllabour. Individuals presently living in the modern age of science and technologies are products of technical education in every aspect of life.

Symonds (2000) in Taneh (2017) stated that technologies can be crucial tool to improve student s learning. This could be the reason why Oguntoye, (2001) stated that no nation can develop technologically without promoting technical education (Oguntoye, 2001). Technical education produces individuals for all types of industries and it is true that the progress of a country much depends upon its industrialization without which a handsome economy would not be possible (Obioma, 2010). These individuals possess the much needed technical skills for technological development of the society. Technical skills are knowledge gained from technical education. These skills are essential to generate job creation, employment and a productive economy (Heraty, Morlery& McCarthy, 2000; Jakubowski, Patrinos, Porta & Jerzy, 2010). Job creation through technical education implies that essential steps need to be taken toward developing the standard and quality of technical education through funding, provision of facilities, advocating for increase enrollment, establishment of modem technical colleges that will give rise to employment opportunities for graduates. Necessary developmental steps on technical issues are taken by authorities in charge of policy making, which includes technical and non-technical teachers.

Non-technical teachers in the context of this study are those without certificates in technical education, not specialist by qualification and training in the teaching of technical skills that are involved in directing supervising, teaching, and heading technical related issues and subjects by substitution or indirectly by being in position of policy making that affects technical education. Nneji (2002) affirmed that non-curriculum experts in technical and vocational education are mostly invited for development and review of vocational technical education in Nigeria. Hence the study tend to look at non-technical teachers' perception on technical education development in Rivers State as it relates to funding, facilities, infrastructures, enrollment, employment and establishment of technical colleges.The 9-3-4 system of education was seen as a laudable program capable of ushering in an educational revolution in Nigeria, hence step in the right direction, towards the technological development of the nation. However, the current situation on ground is far from this ideal. This system seems to be suffering from poor and shoddy implementation.

Development of technical education implies bringing about infrastructures, facilities and funding to the realization of acquisition of skills through formal training by both non-technical and technical teachers that are involved in the formulation and implementation of educational policies (Taneh, 2017). Such should gear towards having many students enrolled in these institutions. Obioma, (2010) observed that there is consistently low and discouraging enrollment for students aspiring for admission into vocational/technical colleges than those in secondary schools in Nigeria. This continuous tilt of enrollment in liberal arts education indicates that in spite of the importance attached to vocational technical education in the present educational dispensation, the nation’s technological age continues to decline. Vocational technical education according to Tony (2007) is the biggest sector of job market. Technical employment is the fastest- growing segment of the labour market. Major perception about technical education is that the programs are only for people who performed poorly in high schools, or who may not perform well in Colleges, (Immaculate, 2006, Omeje, 2007).

Presently in Rivers State, there are only four technical colleges and one functional crafts development centre. These are Government Technical College (GTC), Port Harcourt, Government Technical College (GTC), Tombia, Government Technical College (GTC), Ahoada, Government Technical College (GTC), Ele-Ogu and Government Craft Development Centre (GCDC), Port Harcourt. (Taneh, 2017). All these institutions have pre-vocational and vocational schools. The entry requirement for pre-vocational school is the First School Leaving Certificate (FSLC) and the students are prepared for the Universal Basic Education Certificate (UBEC). The entry requirement for the vocational program is the Universal Basic education Certificate or the Senior School Certificate (SSC). The courses offered in these technical Colleges are Motor Vehicle Mechanic, Electrical Installation and Maintenance work, Carpentry and Joinery, Plumbing, Welding and Fabrication, Blocklaying and concreting, catering Crafts Practice, Furniture Crafts among others (NABTEB, 2000) in Okorieocha (2011). Furthermore, Nwogwu (2000) stated that, the important ingredient that should influence the future decision in the educational system is a work-oriented curriculum of which vocational education is the central factor. According to Olaitan (2008), unless the meaning of vocational education is truly understood, Government and those charged with the responsibility of planning education for; the Nigeria youth will find it extremely difficult to organize and manage a truly vocational program while enrollment figures for vocational education may remain unimpressive. Low enrollment in the vocational/technical colleges has a startling effect on the economic and human development and negative impact on the employment generation policies of the government. Until there is awareness of the importance of technical education on the government as well as the citizenry, the issues of low enrollment into vocational/ technical colleges will continue unabated with negative consequences on economic emancipation of the youths and the level of readiness of the youths to take up the challenges of skill acquisition.

U*n*til students, parents, teachers, educational planners, administrators and political leaders of the nation change their negative perception on technical education and embrace, agree, understand, accept and become convinced that non-vocational education promises more than it could deliver and that is not a problem solver, enrollment into technical colleges will continue to be minimal for this nation Nigeria. (Taneh, 2017). Those sweet promises and golden expectations as entrenched in the current National Policy on Education will be an illusion until enrollment figures into technical education has increased so as to facilitate technological development which is the pivot of national growth.

Funding of technical education is essential for enhanced provision of facilities needed in the institutions. Akinsanya (2013) affirmed that adequate facilities are one of the major factors that enhance learning in school workshops. Technical education provides job orientation with adequate funding and provision of facilities.

Identified number of problems responsible for poor state of facilities in the technical education institutions is poor funding. According to a number of studies, alternative means should be sought to improve provision of basic facilities. Osuala (2009) noted that the level of funding of vocational technical education is grossly inadequate. Ewuga (1999) opined that management of institution concerned with vocational technical education programme should launch appeal funds for the procurement of equipment, tools and machines and as well solicit generous donations from philanthropists. Dykuk (2007) maintained that well to do individuals and philanthropists be encouraged to donate structures for workshops and classroom to be named after them in technical education institutions.Increase funding for technical vocational education and training (TVET) institutions for procurement of equipment and more facilities for better learning are of paramount importance (Ofonima, 2009 in Okafor, Onugu & Alfred, 2017) maintained. Federal and State governments and other education funding organizations in the views of Okafor, Onugu and Alfred (2017) should make TVET a top priority when funding educational researches. In furtherance, Olaitan (2009) observed that the principle underlying the funding of vocational technical education is that there is a minimum level of funding below which the programme cannot be effective and should not be attempted. Wodi and Dokubo (2012) posited that funding of technical and vocational educations should be to the maximum extent possible between government, industry, the community and the learner, with the government providing appropriate financial incentives. Furthermore, Lawal (2013) maintained that government should provide proper and adequate funding for technology education, insisting that most probems of the technology education are due to poor funding.

Statement of the Problem

Technical education is a program meant to facilitate the acquisition of practical and applied skills as well as basic scientific knowledge. This form of education is expected to be properly taken care of by the governments for the technological and economic growth of the country. Many administrators of the program at policy making level are not vocationally trained, in other words are not technically certified persons and therefore do not seem to understand the basic needs of the program. In practice, this has meant making what is practical more academic, to the detriment of technical skills.

The future and prosperity of a country depends on building an advanced economy founded on high level technical skills, yet individuals fail to recognize the inherent value of craftsmanship in a dwindling economy. The government built modern primary and secondary schools in almost all the wards in Rivers State, without any attention given to any of the four technical colleges in the state, leaving them in deplorable conditions, without modern training equipment, materials, and non-availability of qualified technical teachers. This has resulted to non-graduation of individuals with saleable skills which would make them fit into the world of work. Hence there is increase in criminal activities, like kidnapping, armed robbery, cultism, among others, which makes the State highly inhabitable and endangering the economic activities and growth of the State.For these reasons, this study sought to ascertain the perception of non-technical teachers on the development of technical education in Rivers State as to improve the image of this form of education and reduce criminal activities in the state.

Purpose of the Study

The general purpose of the study was to identify the perception of non-technical teachers' on technical education development in Rivers State. Specifically the study determined:

1. perception of non-technical teachers on enrollment into technical education program in Rivers State.
2. perception of non-technical teachers on teachers on teaching education funding in Rivers State

Research Questions

1. What are the perceptions of non-technical teachers on student's enrollment into technical education programme in Rivers State.?

2. What is the perception on non-technical teachers on the funding of technical education programme in Rivers State?

Hypotheses

Ho$_1$: There is no significant difference in the mean opinions of male and female non-technical teachers on students' enrolment into technical education programme in Rivers State.

Ho$_2$: There is no significant difference in the mean opinions of male and female non-technical teacher on funding of technical education programme in Rivers State.

METHOD

The study adopted a descriptive survey design in which the opinion of the respondents were used based on various issues raised to determine the implications and prospects from the perception of non-technical teachers on technical education development in Rivers State.The population of the study comprised all 3,224 non- technical teachers in the UBE (7-9)Schools in Riversstate.

A multi-stage sampling technique was adopted in this study, because the study involved more than three (3) stages in the sampling process. A stratified sampling technique was used to select the respondents in the three (3) senatorial zones in the state in respect to the local government areas, school location and academic staff strength. For the purpose of this study, four local government areas were selected from each senatorial zone using simple random sampling technique. This provided equal opportunity for all to be chosen from selected local government area, two schools were purposefully sampled, totaling twenty-four. These schools were densely populated and almost all the teachers were represented. Random sampling techniques was used to select fifteen teachers from each of the schools, therefore, the sample size is three hundred and sixty (360) non- technical teachers.

The instrument used in this study was a structured questionnaire developed by the researchersand validated by three experts in the Department of Technical Education, Faculty of Technical and Science Education Rivers State University of Science and Technology, PortHarcourt.The reliability of the instrument carried out at Community Boys' Secondary school (CBSS) Elelenwo, GGSS Oromenike PortHarcourt, CSS Nkpolu using the test-retest method. The initial questionnaire was pilot-test on teachers on UBE (7-9) teachers. Using the Cronbach Alpha technique, the reliability coefficient (r) was found to be 0.89. The research question was analyzed using Means. Any mean of 3.00 and above was accepted while any with mean below 3.00 was rejected. The hypotheses were tested at 0.05 level of significance using t-test statistical technique. The hypothesis was regarded accepted where the t-test value calculated is less than the critical or tabulated t-test value. If the calculated t-test value is greater than the critical t-test value, the null hypothesis was rejected.

Table 1: Mean Responses of Respondents on Perceptions of Non-Technical Teachers on Students' Enrollment into Technical Education Programme in Rivers State

S/N	Item Statements	$\bar{x}$	SD	REMARK
1	Technical education is only for low intelligent people	3.19	1.21	agree
2	Technical education is a specific education	3.19	1.21	Agree
3	Students of technical education are school drop outs	3.22	1.01	Agree
4	Technical education only offers on the job training opportunities	3.40	1.26	Agree
5	Technical education denies one the benefit of understanding the basic principles of mathematics and other science related subjects.	3.76	0.26	Agree
6	Skilled labours are disrespected and undue importance is placed on academic secondary education	3.66	1.15	Agree
7	People undervalue the experience gathered through practical application in favour of classroom lesson.	3.34	1.09	Agree
8.	People do not understand the relevant and importance of technical education	3.68	0.69	Agree

Table 1 indicates that respondents have the same opinion on all the items relevant to this research question. All the items have mean score above 3.00. This shows that non-technical teachers have wrong perception on enrolment into technical education programme in Rivers State.

Table 2: Mean Responses of Respondents on the Perception of Non-Technical Teachers on funding of Technical Education in Rivers State

S/N	Item Statements	*X*	SD	REMARK
9	Technical education is adequately funded	1.54	0.63	Disagree
10	Dwindling nature of technical education is caused by poor funding	3.21	1.31	Agree
11	Funding of technical education is not encouraging	3.14	1.11	Agree
12	Technical education should be funded by private sector	3.14	1.11	Agree
13	Funding of technical education should be shared between government, industry, community and leaner	3.50	1.01	Agree
14	Government should provide proper and adequate funding for technical education	3.62	0.09	Agree
15	Reduction in funds for technical education programme	3.82	0.36	Agree

Result on table 2 revealed that respondents accepted item10 – 16 as perception of non-technical teachers on technical education affect funding of technical education. The items have mean score values above 3.00. Only item 10 with a mean score below 3.00 was disagreed, by the respondents which implies that technical education is not adequately funded

Table 3: t-test Analysis on the Responses of the Respondents on the Non-Technical Teachers' Perception on Technical Education Enrollment in Rivers State

Respondents	N	$\bar{X}$	S.D	t-cal	t-critical	Decision
Male	187	3.45	0.989	0.553	1.96	Not significant
Female	147	3.40	0.981			

Significant level = 0.05, df = 332

Table 3 shows that hypothesis 1 was accepted because the calculated t-value of 0.5535 which is less than critical t-value of 1.96 at 0.05 significant value. This indicates that respondents uphold the view of non-technical teachers' perception on student's perception on student's enrollment into technical education in Rivers State.

Table 4: t-test Analyses on the Mean Responses on the Perception of Male and Female Non-Technical Teachers' on Funding of Technical Education in Rivers State

Respondents	N	$\bar{X}$	S.D	t-cal	t-critical	Decision
Male	187	3.32	0.83	0.225	1.96	Not
Female	147	3.30	0.79			significant

Significant level = 0.05, df = 332

Result on table 4 indicates that null hypothesis 2 was accepted. The calculated t-value of 0.225 is less than t-critical of 1.96 at 0.05 level of significance. The implication of this result is that respondents upheld the opinion of non-technical teachers' perception on technical education.

Discussion of Findings

Findings on research question one revealed that respondents disagreed that respondents disagree with responses such as technical education is for low intelligent people and denies one the benefit of understanding the basic principle of mathematics and other related science subjects. Technical education programs currently involve the study of mathematics and science related subjects. This is in conformity with the view of Yoleyen (2006) who stated that technical education requires an outstanding knowledge of the fundamental laws and basic principles of mathematics, science and technology supported by general courses.

The study also revealed that people do not understand the relevance and importance of technical education in the society. This is in line Olaitan (2008) who stated that unless the meaning of vocational education is truly understood, government and those charged with the responsibility of planning education for Nigeria youth will find it extremely difficult to organize and manage a truly vocational programme while enrolment figures for vocational education may be unimpressive.

The study further revealed that respondents agree that technical education is for school drop outs. This agrees with the views of Robert (2012), Omeje (2007) and Immaculate (2006) who in their various studies maintained that most enduring belief about vocational education by parents is that it is only for non-college bound, the potential drop outs, and other students with special needs. Findings on research questiontwo indicatedthat respondents agreed that dwindling nature of technical education is due to poor funding. They uphold the view that technicaleducation should be funded by the private sectors and moreover the funding presently is not encouraging. This is in agrees with Tony (2007) who observed that every aspect of vocational education hang on finance which is grossly inadequate, besides, that the insincerity of the government to contribute the minimum 26% of her total budget on education as directed by UNESCO is a problem to the development of vocational technical education.

The study also finds out that funding of technical education should be shared between the government, industry, community and learner. This is in conformity with the opinions of Wodi and Dokubo (2012) who stated that funding of technical and vocational education should be to the maximum extent possible between government, industry, community and leaner with the government providing appropriate financial incentives.

Furthermore, the study revealed that government should provide proper and adequate funding for technicaleducation. This is in consonant with the view of Lawal (2013) who opined that government should provide proper and adequate funding for technological education, insisting that most problems of this form of education are due to poor funding.

Finding of the study also indicated that technical education programme is not adequately funded. This is in agreement with Ofonime (2009) in Okafor, Onugo and Alfred (2017) who called for increase funding for technical vocational education and training (TVET), institutions for procurement of equipment and more facilities for better learning. On hypothesis testing, the study found out that there is no significant difference in the mean ratings of the male and female junior secondary school teachers' enrolment and funding of technical education in Rivers State

Conclusion

The study indicates that from the opinion of non-technical teachers, technical qualifications are not inferior as they serve the same purpose as those from general education. Technical qualifications are recognized as producers and contributors to technological developments of the nation. The curricula of technical education are left in the hands of non-technical professionals. The existing technical schools have low students enrollment caused by public perception of technical education as that for school drop-outs and those of low intelligence. Dwindling of this form of education is necessitated by it poor funding which is not encouraging.

Recommendations

Based on the findings of this study, the following recommendations are hereby made:

1. there should be public awareness that technical education is not meant for the low intelligent persons and school dropouts.
2. Adequate fund should be made available for the provision of technical training materials both consumables and non-consumables.
3. The government at both federal and state should employ the services of the private sectors in the funding and provision of tools and equipment in technical education institutions.
4. There should be payment of bursary to students of technical education as to attract more students into the program, hence, increasing students' enrollment.
5. The ministry of education should provide appropriate and adequate materialresources like equipment, consumable and textbooks to ensure effective implementation of technical education program in technical colleges.
6. Federal and state ministries of education through the relevant agencies like vocational and Technical Education Boards should deploy the services of well qualified science and mathematics teachers to the technical colleges to enhance students enrolment

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LABORATORY BASED SKILLS IN ELECTRICAL/ELECTRONIC TECHNOLOGY PROGRAMME FOR REDUCING TECHNOPHOBIA AMONG STUDENTS IN POLYTECHNICS

by

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Abstract

The study determined laboratory based skills in electrical/electronic technology programme for reducing technophobia among students in Nigeria. Three research questions guided the study while null hypotheses formulated were tested at 0.05 level of significance. A descriptive survey research design was employed for the study. The population for the study was 150 electrical/electronic engineering technology lecture and instructors. There was no sampling because of manageable size of the population. A structured questionnaire was used for collecting data from the respondents. Three experts validated the instrument while internal consistency of the questionnaire items was determined by using Cronbach alpha reliability method and 0.89 reliability coefficient was obtained. Mean was used to analyze the data for answering research questions while t-test statistics was used to test the hypotheses of no significant difference at 0.05 levels of significance and 103 degree of freedom. It was found out that all the determined laboratory based skills are required for reducing technophobia among students in polytechnics in southwest zone of Nigeria. It was recommended that all the laboratory based skills developed should be integrated into the curriculum of electrical and electronics technology for training students in polytechnics before graduation.

Introduction

World has become a place where skills determine one’s success. Skill is needed to perform virtually everything man does including maintenance and operation of different types of technologies such as machines. Technology according to Waziri (2005) is the use of the product of creativity, inventions and scientific research in the service of man. Technology can also mean hard or solve materials for solving societal problems. A good example of solve material may include modern knowledge and skill books, list of skills for acquisition in order to make use of all kinds of machines or equipment for solving problems. Electrical/electronic technology is one of the technical programmes offered in Nigeria polytechnics. Olaitan and Ndomi (2000) referred to programme as a planned list of instructions to be executed or carried out. Electrical/Electronic technology is designed to equip students with repair and maintenance skills to solve societal problems after graduation. Onifade (2005) electrical/electronic technology is designed to produce electrical/electronic personnel for manufacturing, assembling, servicing of power generators, transmission, distribution and utilization in industries. Electrical/electronic technology is concerned with the acquisition of knowledge, skills and attitudes by students in electricity and electronics. Nwachukwu, Bakare and Jika

(2009) stated that electrical/electronic technology is purely a practical field; and involves the application of scientific knowledge in the design, selection of materials, construction, operation and maintenance of electrical and electronic equipment (College-board, 2008).

The students who passed through electrical/electronic technology or someone who obtained national diploma or higher national diploma are expected to be able to repair and maintain all kinds of electrical equipment without sustaining injuries or causing more damages to the equipment contracted to them. Students in this study are individuals studying electrical/electronic technology in the polytechnics after meeting the entry requirements. They are expected to carry out maintenance and repair activities using modern equipment in the laboratories without having any form of technophobia.

Technophobia is the fear for technology. It is a fear as a result of using or working technologies. Olaitan and Ekong (2001) stated that technophobia is the fear of relating with or utilizing technology. Technophobia according to American Heritage Dictionary (2008) is the fear or dislike of advanced technology or complex devices, especially computers. Technophobia in this study is the fear for working in the laboratories where modern tools, equipment and machines are kept for carry out various maintenance and repair activities because of electric shock and other fatal accidents. This has caused some students to take stances against some modern technological developments in order to preserve their ideologies. Gilbert, Liz & Maya (2003) said that as technologies become increasingly complex and difficult to understand, people are more likely to harbor anxieties relating to their use of modern technologies. In order to suppress technophobia or fear for technologies among students in the school laboratories and in the field after graduation, there is need for the development of laboratory based skills to be integrated into the programme of electrical/electronic technology. The electrical/electronic technology programme appears to be deficient in laboratory based skills for students in contemporary Nigeria. According to Asogwa (2010), development is an organized sequence of various steps and actions geared towards a skill or task. Yerkes (1995) said that development is a state of being in progress or being carried through a course of actions towards an end result. Development of laboratory based skills in the context of this study include: (a) identification of relevant skills such as those involve in operating power equipment and machines, modern hand tools, working in a laboratory and carry out repair and maintenance of electrical and electronic equipment (b) organize the identified skills in a sequence and logical manner to facilitate teaching and learning and (c) package the identified and organized skills and then integrate into the curriculum of electrical/electronic technology. Curriculum is the experiences provided by the schools to assist the learners in attaining the designated learning outcomes (Neagly and Evan, 2002; Offorma, 2002). Inclusion of developed laboratory based skills into the curriculum of electrical/electronic technology will benefit students in the field after graduation.

Laboratory is a place where modem tools and equipment such as digital oscilloscopes, signal generators, electric motors, tachometers, drilling machines, AVO meter, digital ammeter, voltmeters, ohmmeters among others are kept and used by the students for carrying out all kinds of relevant electrical and electronic repair and maintenance. Nwachukwu, Bakare and Jika (2009) described laboratory as a place where tools and power machines are kept for practical activities. The Laboratory could be viewed as a place where an experiment is carried out, or where students work with the required skills to create or make, further technologies or rectify faulty equipment. Skill is the ability to do something well. Skil1 according to Amoyedo (2006) is a well established habit of doing things by the people. Laboratory based skills are steps involve in working successfully in electrical and electronic laboratories without sustaining injuries or causing any havoc to equipment. Laboratory based skills in the context of this study also might be seen as unique efforts, abilities, habits, capacities, dexterity and tactfulness to be possessed by students to work freely in the laboratory without having phobia for casualties or injuries or causing any havoc to equipment. These types of skills could be employed when working in the laboratories, using modern hand tools for operations, operating modern powered equipment and machines. Acquisition of these skills by the students of electrical/electronic technology in polytechnics will reduce their technophobia.

Polytechnics are tertiary institutions established for producing graduates who can practice what they have learnt. They are principal technical institutions in the country that equip national diploma and higher national diploma students with knowledge, skills and attitudes in a specific occupation. The polytechnics give two to four years training to the students before graduation. Their programme is intervened with four months students' industrial work experience scheme and one year industrial attachment. But it has been observed by the researchers that students and the graduates of electrical/electronic technology in the study area always have phobia in operating the modern equipment or tools in the laboratories. These attitudes of the students at times caused fatal accidents or electric shocks in the laboratory. These casualties have in turn also reduced the number of students that enroll for training in electrical/electronic technology programme of Nigerian polytechnics. These laboratory skills if successfully determined will be used to reduce technophobia among students in polytechnics. Specifically the study sought to determine:

1. Laboratory based skills for reducing technophobia among students when operating powered tools and machines
2. Laboratory based skills for reducing technophobia in students when using hand tools for operations
3. Laboratory based skills for reducing technophobia in students when working in electrical/electronic technology laboratories.

Research Questions

The following null hypotheses were tested at 0.05 level of significance

1. What are the laboratory-based skills for reducing technophobia in students when operating powered tools and machines?
2. What are the laboratory-based skills for reducing technophobia in students when using modern hand tools for operations?
3. What are the laboratory-based skills for reducing technophobia in students when working in electrical/electronic technology laboratories?

Method and Materials

Descriptive survey research design was employed for this study. Osuala (2001) observed that survey research focuses on people and their opinions, a motivations and behavior. The descriptive survey research design was therefore suitable for this study since it tended to obtain data from lecturers and instructors of electrical/electronic engineering technology on the laboratory based skills in electrical/electronic technology programme for reducing technophobia among students in polytechnics.

The study was carried out in South South zone of Nigeria. The population for the study was 150 respondents consisting of 100 electrical and electronic engineering lecturers and 50 instructors from government established polytechnics in the study area. There was no sampling because of manageable size of the population. Instructors are individuals that are qualified to conduct and teach practical skills to students of Electrical/Electronic engineering technology. Lecturers are individuals who qualified to teach knowledge, skills and attitudes to students in electrical/electronic engineering courses in the polytechnics. A structured questionnaire made up of 45 items was developed for collecting data in accordance with the research questions. The instrument was in four sections A-C. A was for collecting data on the laboratory based skills for reducing technophobia in students when operating powered tools and machines, B was for collecting data on Laboratory based skills for reducing technophobia in students when using modern hand tools for operations while C was for collecting data on laboratory based skills for reducing technophobia in students when working in electrical/electronic technology laboratories. Each questionnaire item was assigned a five point response scale of Strongly Agree, Agree, Undecided, Disagree and Strongly disagree with values of 5, 4, 3, 2 and 1.

Three Lecturers in the Department of Industrial Technical Education and two lecturers in the Departments of Electrical and Electronic Engineering all from University of Nigeria, Nsukka face validated the instrument for data collection. Cronbach alpha reliability method was used for determining the internal consistency of the questionnaire items and a reliability coefficient of 0.86 was obtained. The 150 copies of the questionnaire were administered on respondents with the help of three research assistants who understand the terrain of study area. One hundred and forty six copies of the questionnaire were retrieved out of 150 copies administered. The data collected from the study were analyzed using mean for answering the research questions and the t-test for testing the hypotheses at probability level of 0.05 and 144 degree of freedom. An item with a mean rating of 3.50 or above was regarded as agree while any item with mean rating below 3.50 was regarded as disagree.

Results

The results for the study were obtained from the research questions answered through data collected and analyzed.

Table 1: Mean Responses of Electrical and Electronic Technology Lecturers and Instructors on the Laboratory Based skills for reducing Technophobia in Students when Operating Powered Tools and Machines

S/N	Item Statements	$\bar{X}$	SD	P-values	Remarks, H_o
1	Switch off the socket outlet before power tool or machine is connected	3.78	0.57	0.33	*Required, NS*
2	Stop power tools or machines before cleaning activities or making any adjustment	3.69	0.61	1.09	*Required, NS*
3	Protect hands with gloves and wear safety shoes when operating portable tool and machine.	3.81	0.53	0.88	*Required, NS*

4	Never wear loose pear rotating machines	3.74	0.61`	0.59	*Required, NS*
5	Maintain safety margin specified for a machine	3,53	0.58		*Required, NS*
6	checkand retighten bit of the drill before use	3.72	0.63		*Required, NS*
7	Keep fingers away from rotating or cutting edge of power machine	3.60	0.60	0.10	*Required, NS*
8	Turn off the power machine and wait until the motor is stopped	3.55	0.82	0.28	*Required, NS*
9	Never operate powered tool or machine with wet hands	3.69	0.69	0.34	*Required, NS*
10	Switch off the power machine and tools afteroperation	3.78	0.50	0.17	*Required, NS*
11	Use brush to remove any chops from drillingmachine	3.70	0.61	0.56	*Required, NS*
12	Check faults in the power machines or tools before re-use	3.96	0.45	0.09	*Required, NS*
13	Never adjust an power tool or machine while running	3.99	0.53	0.66	*Required, NS*
14	Never use an unfamiliar machine or tool	3.98	0.41	0.58	*Required, NS*
15	Never put the hole bod eight on portable drill whiledrilling	3.95	0.34	0.78	*Required, NS*
16	Turn off the power machine and wait until the motor is stopped	3.78	0.38	0.13	*Required, NS*
17	Use good pc machine or tools always.	3.97	0.62	0.22	*Required, NS*
18	Protect hands with gloves and wear safety shoes when c portable tool and machine	3.91	0.61	0.56	*Required, NS*
19	Isolate machines before removing chips	3.89	0.52	0.11	*Required, NS*
20	Check the machine to ensure that all guards are in position together with appropriate safety devices and aids.	3.78	0.43	0.29	*Required, NS*

The data in table 1 revealed that all the twenty items on laboratory based skills for reducing technophobia in students when operating powered tools and machines had their mean values ranged from 3.55 to 3.99 which are above the cutoff point of 3.50. This showed that the identified skills are required for reducing technophobia in students when operating powered tools and machines in schools and after graduation. The table also indicated that each item had its t calculated value lower than t table value of 1.98. This showed that there was no significant difference in the mean rating of the lecturers and instructors on laboratory based skills for reducing technophobia in students when operating powered tools and machines. Therefore, the hypothesis of no significant difference was upheld for the items.

Table 2: Mean Responses of Electrical and Electronic Technology Lecturers and Instructors on the Laboratory Based Skills for reducing Technophobia in Students when using Modern hand Tools for Operations

S/N	Item Statements	$\bar{X}$	S.D	P-values	Remarks	H0
1	Avoid using unhandled tools	3.89	0.41	0.17	*Required,*	*NS*
2	Use appropriate tools for specific job or operation	3.79	0.51	0.09	*Required,*	*NS*
3	Use insulated hand tools for specific job or operation	3.70	0.56	0.11	*Required,*	*NS*

4	Use insulated hand tools for any electrical work	3.65	0.64	0.15	*Required,*	*NS*
5	Give a tool to a colleague through the handle	3.50	0.52	0.95	*Required,*	*NS*
6	Put the finger behind the tip of the screwdriver while screwing	3.89	0.41	0.12	*Required,*	*NS*
7	Never throw at colleague	3.87	0.59	0.20	*Required,*	*NS*
8	Never rest on a hand tool while using it	3.58	0.79	0.29	*Required,*	*NS*
9	Select right tool for a job	3.90	0.45	0.56	*Required,*	*NS*
10	Always sharp of cutting edges of hack saw, scribers, punch and screwdrivers before use.	3.83	0.51	0.38	*Required,*	*NS*

Data in Table 2 revealed that all the ten items on laboratory based skills for reducing technophobia in students when using modem tools for operations had their mean values ranged from 3.50 to 3.90 which are above the cutoff point of 330. This showed that the identified skills are required for reducing technophobia in students when using modern hand tools in schools and after graduation. The table also indicated that each item had its t-calculated value lower than t-table value of 1.98. This showed that there was no significant difference in the mean ratings of the lecturers and instructors on laboratory based skills for reducing technophobia in students when using modern hand tools for operations. Therefore, the hypothesis of no significant difference was upheld t the items.

Table 3: Mean Responses of Electrical and Electronic Technology Lecturers and Instructors on Laboratory Based Skills for reducing Technophobia in Students when working in Electrical/Electronic Technology Laboratories

S/N	Item Statements	$\bar{X}$	S.D	P-Values	Remarks,	H0
1	Wear hand gloves while working in the laboratory	3.78	0.53	0.15	*Required,*	*NS*
2	Remove all the loose cable from the floor of the laboratory	3.64	0.58	0.19	*Required,*	*NS*
3	Keep all tools in the laboratory in their boxes	3.50	0.79	0.28	*Required,*	*NS*
4	Never throw any hand tool to a colleague in the laboratory	3.81	0.62	0.56	*Required,*	*NS*
5	Keep gang ways clear and provide free access to every part of the laboratory	3.88	0.38	0.61	*Required,*	*NS*
6	Never touch a life wire for any reason	3.67	0.47	0.31	*Required,*	*NS*
7	Touch discharged D.C/A.C capacitor tags only	3.58	0.67	0.15	*Required,*	*NS*
8	Keep the floor off grease, oil or any other liquid	3.60	0.45	0.17	*Required,*	*NS*
9	Use only an approved fire extinguisher in the workshop	3.83	0.58	0.27	*Required,*	*NS*
10	Keep gangway free and provide free access to every part of the workshop	3.78	0.36	0.28	*Required,*	*NS*
11	Remove all the loose cable from the floor	3.52	0.71	0.18	*Required,*	*NS*
12	Keep all electrical tools and equipment in working condition	3.91	0.32	0.58	*Required,*	*NS*
13	Keep the floor off grease, oil or any other liquid because slippery floor is extremely dangerous	3.64	0.53	0.27	*Required,*	*NS*
14	Wear hand gloves when working in electrical workshop	3.86	0.21	0.28	*Required,*	*NS*
15	Handle high vacuum device such as television picture table with care	3.80	0.53	0.11	*Required,*	*NS*

Data in table 3 on research question three and hypothesis three revealed that all the ten items on laboratory based skills for reducing technophobia in students when working in electrical/electronic technology laboratories had their mean values ranged from 3.50 to 3.91 which are above the cutoff point of 3.50. This showed that identified I based skills are required for reducing technophobia in students when working in electrical/electronic technology laboratories. The table also indicated that each item had its t-calculated value lower than t-table value of 1.98. This showed that there was no significant difference in the mean ratings of the lecturers and instructors on laboratory based skills for reducing technophobia in students when working in electrical/electronic technology laboratories. Therefore, the hypothesis of no significant difference was upheld for the items.

Discussion of results

The result of the study in table 1, 2 and 3 revealed that all the laboratory based skills developed are required for reducing technophobia among students of electrical and electronics engineering technology programme in the polytechnics in south west zone of Nigeria. The findings are in agreement with the findings of Okparaeke (2004) who carried out a study on safety practice skills needed by trainees and Employees of blocklaying and concreting occupation in the building industry in Imo State. The author found out that trainees required all the safety practice skills in equipment's and machines for block moulding, preliminary site operations and concreting, block wall construction and finishing with the use of equipment, machines and safety facilities. The findings on operating of powered tools and machines in table 1 were in consonance with advice of Grundy (1991) that construction equipment must be operated and directed by trained expert and must be well maintained to avoid accidents or equipment failure. This result was also in line with the opinion of Oranu, Nwoke and Ogwo (2002) that the users or operators of power machines and tools should always wear eye goggles when drilling machines. Furthermore, the results of the study related to the finding of a study carried out by Akinduro (2006) on electrical installation and maintenance work skills needed by technical college graduates to enhance their employability in Ondo State. The author found out that domestic installation, industrial installation, cable jointing, battery charging and winding skills are needed by the graduates for employment in Ondo State.

These results were in agreement with the opinion of John (2004) that workers should keep d - in working conditions; wear hand gloves when working in workshop; remove all the loose cable on the floor, and not work under poor lightning. These findings were in line with the finding of Yakubu (2004) who conducted a study on safety practice skills needed by woodwork students of technical colleges in Kaduna state where he found out that students of woodwork in technical colleges needed sixteen safety practice skills in using hand tools twenty safety practice skills in operating portable power tools; thirty safety practice skills in operating machines; ten safety practice skills in handling wood materials and ten safety practice observances in the use of instructional operating guides. The findings of the authors cited above helped validate the findings of this study.

Conclusion

The researcher carried out this study to determined laboratory based skills for reducing technophobia of students when operating powered tools, machines and working in laboratory and using modern hand tools.

Recommendations

It is, therefore, recommended that the determined laboratory based skills should be integrated into curriculum of electrical and electronic technology in polytechnics for students to learn before graduation.

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CAPACITY BUILDING NEEDS OF TECHNOTEACHERS IN THE USE OF COMPUTER AND INTERNET SERVICES FOR EFFECTIVE TEACHING OF ELECTRICAL/ELECTRONIC COURSES IN COLLEGES OF EDUCATION IN SOUTH SOUTH NIGERIA

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Abstract
This study determined the capacity building needs of techno-teachers in the use computers and internet service for effective teaching of electrical/electronic courses in colleges of education in south south, Nigeria. Three research questions guided the study. Descriptive research design was adopted for the study. The population was 109 techno-teachers. A – 50 item questionnaire was developed for gathering data. The questionnaire was validated by three Experts. Cronbach alpha reliability method was used for determining the internal consistency of the instrument with a coefficient value of 0.82. One hundred and nine copies of the questionnaire were administered to the respondents, but 102 copies were collected back which represented 93.57percent return rate. It was found out that techno-teachers need capacity building in the use of the computer and internet service for effective teaching of electrical/electronic courses in colleges of education. Recommendations include that the identified competencies where teachers need capacity building in the use of the computer and internet service for effective teaching in colleges of education should be packaged into a training programme and be utilized retraining the teachers through workshops and seminars.

Introduction

Education is an indispensible instrument for National development and economic integration. This includes the acquisition of desirable knowledge, skills, habits, values for productive living in the society. It equips the members of any human group with the capabilities of personal survival and contributing to other group survival in the wider world. This education can be obtained from colleges of education. College of education is one of the tertiary institution in Nigeria that set up to produce teachers and other workforces to boost Nigerian economy. Colleges of education, according to Ellah (2007), are tertiary educational institutions that prepare intermediate level teachers for a minimum of three years to make them qualify to teach their respective subjects. They are under the control of the National Commissions for Colleges of Education (NCCE) which uses the minimum standard to monitor the implementation of programmes of the colleges. College of Education is a three year tertiary level of learning that helps to prepare teachers in different areas such as agriculture, business and technical.

Colleges of education play a crucial role in the development of manpower in Nigeria. They are charged with the responsibility of producing teachers for primary and junior secondary schools in the nation. Various instructional materials and technologies are used by teachers in colleges of education and other tertiary institutions to implement various programmes. To impart knowledge, skills and attitudes to students in all these aforementioned areas effectively, the teachers require the use of the computers to plan, organize, implement and evaluate instruction for certification of the students and benefit of the society. Computers are some of the prominent instructional technologies. Computer is a programmable machine that receives input, stores and manipulates data, and provides output in a useful format. It is an electronic machine that accepts input (data), processes it and gives out results (information). Computer according to Akukwe (2003) is an electronic device that is capable of accepting, storing, processing information (almost at the speed of light) following a set of predefined instructions (program) and outputting the result of the processing in the way the user wants it, for other machines, computers and people to make use of if need be. According to Alegbemi (2010) computer is a programmable device that performs mathematical calculations and logical operations, especially one that can process, store and retrieve large amounts of data very quickly. Olaitan and Dada (2009) also described the computer as an electronic device which consists of a central processing unit (CPU), a monitor, a keyboard and a mouse and touch pad. Two principal characteristics of a computer according Bakare and Ochepo (2010) are: it responds to a specific set of instructions in a well-defined manner and can execute a prerecorded list of instructions. Computers play a significant role in industries, social, political and most especially in education. There is hardly any human activity where computer has not made impact.

It makes work easy for people, saves time, has less fatigue, serves as interface between the users and the internet and also useful in the teaching and learning process. The computer and the internet complement the functions of each other for the success of every activity that man engages in. In teaching, the computer is important in many ways. Olaitan and Dada (2009) outlined this importance to include: inputting, processing and storing data and information about the inputs, process and products of instruction; retrieving the stored information through downloading and printing; and manipulating data in order to achieve the desired educational objectives. The computer and the internet have become vital parts of teaching and learning in a number of ways. Knowledge and experiences are gained through them, having a vital influence on the techno-teachers and the learners' behaviour and awareness.

A teacher is an individual who is trained in pedagogy and technical area of a particular subject to impart knowledge, skills and attitudes to students. Teacher according to Encarta (2009) is somebody who teaches especially as a profession. Techno-teacher is an individual who professionally teaches technical or technology subjects in a school. According to the Report of Technoteacher Association (2010), a technoteacher is an individual who teaches technology or technical subjects to his or her students. Bakare and Ochepo (2010) stated that techno-teachers are found in the teaching of both vocational and technical education subjects and courses. In the context of this study, a teachnoteacher is a person who has been trained professionally in the art of teaching technology or technical courses in automobile technology, building technology, electrical/electronic technology and woodwork technology to students in colleges of education. These individuals are found in the teaching of courses in colleges of education and they are popularly known as lecturers.

Teaching is the process of assisting an individual to acquire knowledge, skill and attitude through instruction. Ogwo and Oranu

(2006) viewed teaching as the science and art of assisting a person to learn. The authors stated further that the science of teaching involves the use of acquired knowledge from natural and behavioural sciences in order to help appreciate the circumstance and personality of the learner while the art aspect of teaching involves the use of creative and administrative skills in aiding delivery of instruction. Olaitan, Alaribe and Nwobu (2010) added that teaching is the process of helping an individual to learn through instruction. Teaching in the context of this study is the process of assisting students learns the content of technology curriculum in colleges of education through instruction by the teacher with the aid of computer.

The researchers have observed that techno-teachers in the study area are faced with many problems in the use of the computer for effective instructions and delivery. These problems include: the levels of computer training received by the teachers through adhoc programmes extended to them by community members are grossly inadequate; lack of practice after training due to high capital involved in acquiring the computer and its accessories. This low level of the knowledge of computer application by techno-teachers results into more learning problems than solving them. These problems range from inaccuracy of information storage and retrieval of data on students, errors in curriculum planning, teaching strategies and assessment of knowledge. This situation has caused embarrassment to parents who have no accurate information on the levels of their children performance, date of resumption, absence of medical records, absence of records on money paid and debts owed and misinformation on the subjects offered by students and those on whose grades are credited. Techno-teachers are usually targets of the errors by parents and adjudged as very incompetent in doing their jobs when compared with the output and efficiency of past manual teachers when computer was not yet in use. These teachers also found it very difficult to use computer to perform their personal work such as typing their document and analyzing data for their research studies. To solve these problems and to correct the perception of the society about these teachers and also to minimize human errors through the computer that is regarded as "cabbage in cabbage out," the techno-teachers need capacity building.

Capacity building in the opinion of Ann (1996) is a process of developing and strengthening the skills, instincts, abilities, process and resources that teachers need for them to survive, adapt and thrive in the fast changing world of technology. Ukonze and Olaitan also said that capacity building involves improving the capacity of teachers in imparting appropriate knowledge, skills and attitude to the students to achieve the set goals and objectives. In this study, capacity building will involve the retraining of techno-teachers in the operation of the computer and access to the internet and their appropriate applications to learning in schools in order to reduce to the barest minimum obvious problems associated with lack of adequate exposure and training of teachers in the use of computer in schools. The purpose of this study therefore was to determine the capacity building needs of techno-teachers in the use of computers and interactive whiteboards for effective teaching of electrical/electronic courses in colleges of education in south eastern, Nigeria. Specifically, the study sought to identity:

1. Competencies required in operating the computer effectively
2. Competencies required in using the computer to access internet
3. Competencies required in solving problems arising from the use of computer and the internet

Research Questions

The following research questions guided the study:

1. What are the competencies required in operating the computer effectively?
2. What are the competencies required in using the computer to access internet?
3. What are the competencies required in solving problems arising from the use of computer and the internet?

Method

A descriptive research design was adopted for this study. Survey design, according to Olaitan, Ali, Eyo and Sowande (2002), is the plan, structure and strategy that the investigator wants to adopt in order to obtain solution to research problems using questionnaire in collecting, analyzing and interpreting the data. This study was carried out in south south, Nigeria. The population of the study was 109 techno-teachers drawn from six randomly sampled Colleges of Education in the Zone. The population was small and therefore, the entire population constituted the sample; hence no sampling technique was adopted.

A –60 item questionnaire was developed based on the research questions and was used for data collection. The questionnaire had two response categories of needed and performance with four rating scales each. The Needed category had Highly Needed (HN) = 4; Averagely Needed (AN) = 3; Slightly Needed (SN) = 2 and Not Needed (NN) = 1. The performance category had High Performance (HP) = 4; Average Performance (AP) = 3; Low Performance (LP) = 2 and No Performance (NP) = 1 respectively.

Three experts validated the instrument; three in Industrial Technical Education Department, University of Nigeria Nsukka. Their views were utilized to fine tune the questionnaire which was tested for reliability using Split-half technique and Cronbach alpha method that yielded a coefficient of 0.82. One hundred and nine copies of the questionnaire were administered to the respondents with the help of trained Research Assistants who are conversant with the terrains of the study area. The instruments were collected with 93.57 percent retrieval and improvement need index (INI) was used to answer the research questions. To determine the capacity building need gap, the following procedure was adopted:

1. The weighted mean of each item under the needed category (Xn) was calculated.
2. The weighed mean of each item under the performance category (Xn) was also calculated.
3. The difference between the two weighted means for each item (Xn-Xp) was determined.
4. The decision rules were as follows:
    a. A zero (0) value indicates no capacity building needed because the level at which the item was needed is equal to the level at which the respondents can perform it.
    b. A positive (+) value indicates capacity building needed because the level at which the item was needed is higher than the level at which the respondents can perform it and.
    c. A negative (-) value indicates no capacity building needed because the level at which the item was needed is lower than the level at which the respondents can perform it.

Results

Results for this study were obtained from the research questions answered through data collected and analyzed.

Table 1
Performance Gap Analysis of the Mean ratings of the Responses of the Technoteachers on Competencies Needed for Operating the Computer for Effective Teaching (N = 102)

S/NO	**Item Statements**	**Xn**	**Xp**	**PG (Xn-Xp)**	**RMKS**
1	Identify computer tower, monitor, keyboard and printer	2.23	2.47	-0.24	*
2	Launch and close programs	3.41	3.03	0.38	**
3	Recognize icons on toolbars	3.11	2.54	0.57	**
4	Demonstrates acceptable behavior at the computer and in the lab	2.87	2.33	0.54	**
5	Manipulate a mouse proficiently	3.22	2.38	0.84	**
6	Demonstrate ability on computer, sign onto the network, restart, and shutdown	3.18	2.44	0.74	**
7	Demonstrate ability to start and end a program	2.66	2.10	0.56	**
8	Demonstrate ability to print student projects / work	2.44	2.02	0.42	**
9	Use the server to save and retrieve student work	3.27	2.47	0.80	**
10	Use formal keyboarding skills with home keys and correct posture	2.74	2.22	0.52	**
11	Touch type 10-15 words per minute	3.10	2.20	0.90	**
12	Use paint or drawing tools changing colours, shapes, and size to create a graphic	2.37	2.00	0.37	**
13	Demonstrates word processing skills	3.33	2.48	0.85	**
14	Change the margins, line spacing and use bullets	3.29	2.26	1.03	**
15	Highlight and make specific changes to highlighted text including deletion/moving / copy – pasting	3.11	2.13	0.98	**
16	Create and use indents, tabs, change margins, line spacing and use bullets in a word document	3.19	2.37	0.82	**
17	Students will use word to create an essay or report	3.44	2.34	1.10	**
18	Import and export graphics and applying rotating, move, stretch and shrink effects	3.28	2.22	1.06	**
19	Use thesaurus function	2.97	2.23	0.74	**
20	Ability to insert photos into project	3.66	2.38	1.28	**
21	Create a short power point presentation using pictures, text, sound, and animation	3.28	2.43	0.85	**
22	Introduction to basic charts and graphs in excel	2.77	2.44	0.33	**
23	Understand basic spreadsheet vocabulary	3.45	3.00	0.45	**
24	Use technology tools (e.g., multimedia authoring and presentation)	2.66	2.12	0.54	**

- Capacity building not needed

** Capacity building needed

The data in Table 1 revealed that the performance gap of the respondents in 23 out of 24 item were positive. The values ranged from 0.33 to 1.28. The performance gap values indicate that technoteachers in colleges of education need capacity building in the use of the computer to enable them teach effectively. The performance gap of item one is negative. It has the value of –0.24 indicating that technoteachers do not require capacity building in this item.

Table 2

Performance Gap Analysis of the Mean Ratings of Responses of the Technoteachers on Competencies for using the Computer with the Internet where they require Capacity Building for Effective Teaching (N = 102)

S/NO	Item Statements	Xn	Xp	PG (Xn-Xp)	RMKS
1	Log on and off the network	3.42	2.31	1.11	**
2	Organize and delete student's personal files on the server	3.01	2.34	0.67	**
3	Properly download files from internet to student's own folder	3.24	1.88	1.36	**
4	Can save and organize files for various software applications	2.37	2.05	0.32	**
5	Demonstrate an advanced ability to navigate between websites	3.45	1.56	1.89	**
6	Understand basic ethics of computer and internet use	3.06	2.35	0.71	**
7	Use the internet for basic research; citing electronic sources	3.43	2.11	1.32	**
8	Evaluate the accuracy, relevance, appropriateness, and bias of electronic information sources	3.55	1.94	1.61	**
9	Understand basic internet URL addresses and basic extensions	3.43	2.11	1.32	**
10	Demonstrates understanding and respects copyright laws	3.67	2.44	1.23	**
11	Identify and use accurate and appropriate information resources	2.23	1.87	1.43	**
12	Use Blogs and other forms of web communication; such as email, Polycom, online discussions.	3.35	2.34	1.01	**

** Capacity Building Needed

The data in Table 2 revealed that the performance gap of the respondents in all the twelve items were positive. The performance gap values ranged from 0.32 to 1.89. This implies that technoteachers need capacity building in all the competencies required for using the computer and the internet for effective teaching in colleges of education

Table 3

Performance Gap Analysis of the Mean Ratings of responses of the Technoteachers on Competencies Needed in Solving Problems in Computer and Internet Operations for Effective Teaching (N = 102)

S/NO	Item Statements: ability to solve	Xn	Xp	PG (Xn-Xp)	RMKS
1	PC won't start up or shut down	3.34	2.33	1.01	**
2	The computer randomly hands and crashes	3.55	2.43	1.12	**
3	The system shuts down or reboots without warning	2.83	1.66	1.17	**
4	Computer Accessories e.g Printers, monitors, keyboards, won't function properly.	3.22	2.45	0.82	**
5	System not receiving electrical power	2.90	2.32	0.58	**
6	Equipment fails to be recognized by PC before, during, or after installation	2.88	1.57	1.31	**
7	Hardware refuses to run at some point after initial setup.	3.54	3.11	0.43	**
8	Programs won't install, nor appear on your computer, or hang when you run them (or randomly crash to desktop)	3.00	2.34	0.66	**
9	Conflicts between devices appear in Windows XP or Windows Vista	3.28	2.54	0.74	**

10	Technical glitches mar programs' performance	3.14	2.88	0.26	**
11	You are unable to connect to the Internet	3.22	2.19	1.03	**
12	You experience a severe system slowdown	2.77	2.10	0.67	**
13	The computer is unusually warm continuously	3.10	2.74	0.36	**
14	Power light on the front of the computer is blinking rapidly				**

** Capacity Building Needed

The data in Table 3 revealed that all the performance gap values of the 14 items were positive. The performance gap values ranged from 0.26 to 1.31. This implies that technoteachers need capacity building in solving the problems of computer and internet operation for effective teaching in colleges of education.

Discussion of Results

It was found out that technoteachers needed capacity building in operating computer, using the computer with the internet and solving problems arising from the use of the computer and internet in teaching technical courses. This result is in agreement with Miller, Bakare and Ikatule (2010) who conducted research on professional capacity building needs of teachers for effective teaching of basic technology curriculum to students in junior secondary schools in Lagos State. The authors found out that teachers of basic technology needed capacity building in planning, implementing and evaluating instruction, classroom/ laboratory management and in teaching contents of basic technology curriculum to students in junior secondary schools.

The results of this study was also in agreement with the finding of Ebaye (2007) who in a study carried out on competency improvement needs of automobile mechanics teachers in technical colleges in Cross river and Akwa Ibom States, Nigeria. The author found out that the teachers needed improvement in knowledge of subject matter, use of instructional methods, communication skills, laboratory and classroom management and evaluation. The findings of the above authors help to validate to the finding of this study on capacity building needs of technoteachers in the use of computer for effective teaching of in colleges of education in south west zone of Nigeria.

Conclusion

From the results of this study it was discovered that technoteachers in colleges of education in south west zone of Nigeria needed capacity building in areas of computer application, use of computer and the internet and solving problems arising from the use of the computer and internet for effective teaching of electrical/electronic courses. Giving capacity building to these teachers in the above areas will help them to overcome some of the inadequacies outlined in the introduction to this study. It is therefore recommended that the identified competencies where technoteachers need capacity building for effective teaching of electrical/electronic courses in colleges of education should be packaged into a training programme and be utilized for retraining the teachers through workshops and seminars.

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