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Correlation Study of Pre-Service Technical Teachers Preparedness, Beliefs, Attitudes, and Intention towards use of Information Technology for Teaching: A Case Study

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Abstract

The study empirically x-rayed the correlation between pre-service technical teachers' preparedness, beliefs, attitudes and their intentions towards use of information technology. Descriptive survey method and an adapted instrument was used to collect data for the study. The study participants comprised of 119 pre-service technical teachers at 300 level and 400 level of Federal College of Education, Pankshin respectively. The instrument for the study was subjected to validity and reliability check by three experts, and the internal consistency of the instrument using Cronbach alpha yielded 0.76. Pearson product moment correlation was used for the analysis of the data. The findings of the study reveal that technology preparedness of pre-service teachers correlated positively with their belief, attitude and their intention towards uptake of IT for teaching. Therefore, the study recommended among others that teacher educators should integrate IT for implementing the teacher education curriculum and the technology should be used at all levels of pre-service technical teacher training.

Keywords: Technology, Preparedness, Beliefs, Attitude, Intention towards IT use.

Introduction

The need to integrate Information Technology (IT) for teaching, is growing rapidly in the contemporary world, due to its influence on all fields of human endeavour. While IT use has become prevalent and pervasive across the school system in advanced nations, in less advanced nations, schools are still grappling with how to successfully deploy IT for implementing school curriculum. Besides provision of IT, there is the growing concern of the capacity of in-service teachers to use IT in teaching. Therefore, developing teacher capacity to enhance the quality of learning in tandem with contemporary educational needs has triggered a concern among researchers into pre-service teachers training in the recent time.

Preparing pre-service teacher on how best to effectively integrate IT for classroom teaching has become a focus of many teacher education programmes. Due to the importance attached to pre-service teachers

training, there is an upward increase in the number of empirical researches on pre-service teachers' technology preparation towards use of IT for teaching (Rekenes & Krumsvik, 2014). Researchers such as Dexter and Riedel (2003); Barton and Haydn, (2006); Tomte (2013); Shittu, Gambari, Gimba and Ahmed (2016) have conducted a study to ascertained the influence of technology prepared-ness on pre-service teacher attitude and belief towards uptake of IT for professional practice, but the strength and relationship between the variables was not well established.

According to Leatham (2007), teacher preparation needs to involve a provision of adequate knowledge on the use of technology for teaching school curriculum. Study on teacher technological preparation and its influence on pre-service teacher belief and attitude conducted by Cullen and Greene (2011) revealed that pre-service teachers' motivation to use IT is been predicted by the positive attitude of students. The study on teacher preparation program especially, that which involve Technology, Pedagogy, and Content Knowledge (TPACK) is receiving more attention in the recent time as researchers try to ascertain the degree of IT competence that pre-service teacher possessed as they are prepared for their professional calling. Results emanating from the studies on what influence pre-service teachers' belief about using IT differs from setting to setting, country to country and it also involve a complex combination of personality traits (Hancock, Bray, & Nasoa, 2002).

In the last decade, studies were carried out to understand the use, value, role and the influence of information technology in education. Most of these studies were tailored toward debating on whether or not the integration of IT would have any meaningful effect on student academic performance, achieve-ment and interest (Russell, Bebell, O'Dwyer & O'Conno, 2003; Kirkwod, & Price 2005; Conde, Monro, Seagrave & Kenesson, 2007). However, currently, the pendulum of research has swung and researchers are refocusing their attention to how the use of IT can be explored in different areas of education. This is due to rapid changes in different societies and the increasing role of IT in the 21st century technology based world.

The role of IT in the development of knowledge, skill and competence required by an individual to become a life-long learner cannot be disputed. (Lankshear, & Knobel, 2006; Ng, 2012; Voogt, Erstad, Dede, & Mishra, 2013). The fact remain that IT have become an essential educational tool in the contemporary education. Despite the importance of IT in educational enterprise, for it to be effectively used for teaching and learning depend solely on the competence of the in- service teacher as well as the training given to the future teachers (Gudmundsdottir, Loftsgaarden, & Loi, 2013).

This explains the emphasis on the need for proper teacher training program that involve developing pre-service teacher IT digital competence (Mims, Shepherd, & Lman, 2010; Krumsvik, 2011; Shittu et al, 2016). Finding on teacher education still show that pre-service technical teachers lack fundamental knowledge on how to utilize IT in a pedagogical and didactic manner (Tomate, 2013). Buttressing

this assertion, Yusuf and Balogun (2011) in a study on student teacher competence and attitude toward information communication technology in Nigeria University reported that student teacher lacked the necessary competence in the full integration of ICT for curriculum implementation: In another similar finding from Ofoegbu and Asogwa (2013) study in Nigeria on ICT competence assessment of Basic Science and Technology teacher indicated that this category of teachers lack competence in basic ICT operation. The finding was a reflection of inadequacy in the technology preparedness of this category of teacher while in training or the skill gap that need to be address.

Research evidence showed that both in-service and pre-service teacher lack basic technology skill most especially in less developed nation like Nigeria (Yusuf & Balogun, 2011). Beside skill and competence, some research evidence also showed the importance of belief and attitude as well as positive disposition as a predictor of IT use for teaching by student teacher. For instance, Friel and Carboni (2002) suggested that the manner at which student teachers were taught on the pedagogical use of ICT would influence their belief on its use for teaching at the field of practice. However, Harris and Grandgenett (1999) found no significant correlation between teacher belief and use of technology for pedagogical practice. Also, Lambert, Gong and Cuper (2008) study revealed that pre-service teacher training through educational technology course enhance the pre-service teacher belief of technology use and prepared them to use technology effectively. Despite this finding, research about attribute and factors pertaining to pre-service teacher belief, attitude and intention toward use of IT are yet to be resolved (Teo, Chai, Hung, & Lee, 2008). In the present setting of this study, research on the relationship between pre-service teacher technology preparedness, belief, attitude and intention to use IT for teaching is limited; by extension to other setting the result are inconsistences. In this study, attempt was made to clarify the correlation between these variables pertaining to uptake of IT by pre-service teachers. It is hope that this study would contribute to the limited research in this area and also increase our understanding of the relationship that exists among the variables of the study.

Technology Preparedness, Attitude, Belief and Intention

Professional development of teacher toward the use of technology for teaching is receiving greater attention more than ever before, because part of what is use for measuring teacher competencies reside in their ability to use IT resources to facilitate and assist learner to reach high level of competencies (Ng'eno, Githua & Changeiwo, 2013). Technology Knowledge according to Koehler and Mishra (2009) is the fluency of IT which is beyond traditional of computer literacy. Digital technologies as explained by Mishra, carry their own properties, strength and constraint and that certain technology may perfectly match a specific task, but not with other. It is only the teacher that understood the properties of

technology that can adopt digital tool for curriculum implementation.

In a study conducted by Cox et al (1999) to examine factor relating to what influence ICT use for teaching, the study was a survey type and questionnaire was used for gathering the data of the study from the teacher and other educators who reported that the training they were exposed to influence their positive attitude toward IT use for teaching. In another study, Sheingold and Hadley's (1990) identify the source of what motivate teacher to use technology to include what they gain during professional training. Shittu et al (2016) examined technology preparedness as antecedent of pre-service teacher self-efficacy, perceived usefulness and intention toward use of IT for teaching. The finding showed that IT preparedness positively predict pre-service teacher IT self-efficacy, Perceived usefulness which in-turn predict their intention toward use of IT for teaching.

In another study, Zhao, Tan and Mishra (2001) provided evidence that showed that attitude of teachers is directly related to intention to use IT in the classroom. Also, the study of Abbot and Faris (2001); Kumar and Kumar (2003) showed that pre-service teacher attitude toward technology would improve if they are train while undergoing course work at the teacher training college. Therefore in this study, we explore the correlation between technological preparedness, belief, attitude and intention toward information technology use among pre-service teacher in a Nigerian University, so as to gain insight into practicable future integration of technology among the teachers in training for tomorrow classroom.

The purpose of this study therefore, is to examine the relationship between technology preparedness, belief, attitude and intention toward uptake of IT tool for teaching.

Research Questions:

The following research questions were raised to guide the study:

QI: What is the relationship between technology preparedness of pre-service technical teachers and their belief of using IT for teaching?

Q2: What is the relationship between technology preparedness of technical pre-service technical teachers and their attitude toward use of IT for teaching?

Q3: What is the relationship between technology preparedness of pre-service technical teachers and their intention toward IT for teaching?

Q4: What is the relationship between the beliefs of pre-service technical teachers and their attitude towards the use of IT for teaching?

Q5: What is the relationship between the attitude of pre-service technical teachers and their intentions towards the use of IT for teaching?

Methodology

This study used a descriptive survey method and a questionnaire to gather the data of the study. The participants of the study comprised of 119 pre-service technical teachers of Federal College of Education, Pankshin. The participants were 3001evel and 4001evel students undergoing 4years education program.

The Research Instrument

The instrument used for data collection was adapted but modified to achieve the objective of the study. The instrument consisted of 35 items which was used to measure the four constructs (Technology preparedness, Belief, Attitude and Intention). The instrument was subjected to validity and reliability check. The reliability of the four constructs were above .70 Cronbach Alpha, this signify that the instrument demonstrated high internal consistency since it is above .60 threshold (Nunnaly, 1976).

Analysis of the Result

In line with the objective of the study, the data collected were subjected to correlation analysis in other to ascertain the degree of the interrelationship that exists among these variables. Other analysis involves computing for mean and standard deviation of each variable, (Belief, M=31.42, SD-6.76, Intention, M-25.70, SD-6.99, Attitude, M=42.47, SD-9.77; Technology Preparedness, M-46.88, SD=10.57).

The next stage in the data analysis involves the checking for the direction and the strength of the relationship between the constructs. To interpret the analysis, the strength, relationship and the amount of shared variance were computed in (Table 1)

Table 1: Pearson Product-Moment Correlation Between Measures of Technology Preparedness, Belief, Attitude, Intention of Pre-service Teacher use of Information Technology.

		Belief	**Intention**	**Attitude**	**Preparedness**	**Mean**	**SD**
Belief	Pearson correlation	1					
	Sig. (2-tailed						
	N	179				31.42	6.76
Intention	Pearson correlation	.660**	1				
	Sig. (2-tailed	.000					
	N	179	179			25.70	6.99
Attitude	Pearson correlation	**.691****	**.521****	1			
	Sig. (2-tailed	.000	.000				
	N	179	179	179		42.47	9.77
Preparedness	Pearson correlation	**.581****	**.409****	**.575****	1		
	Sig. (2-tailed	.000	.000	.000			
	N	179	179	179	179	46.88	10.57

**. Correlation is significant at the $p < 0.01$ level (2-tailed).

Results

RQ 1: What is the relationship between technology preparedness of technical pre-service teachers and their belief of using IT for teaching?

The relationship between technology preparedness of pre-service technical and their belief in Table 1 showed that there is a strong positive correlation between the two variables, $r = .58$, $n = 179$, $p < .005$, with shared variance (33.75) of 34%.

RQ 2: What is the relationship between technology preparedness of technical pre-service teachers and their attitude toward use of IT for teaching?

The relationship between technology preparedness of pre-service technical and their attitude in Table I showed that there is a strong positive correlation between the two variables, $r = .57$, $n = 179$, $p < .005$, with shared variance (33.06) of 33%.

RQ 3: What is the relationship between technology preparedness of pre-service technical teachers and their intention toward IT for teaching?

The relationship between technology preparedness of pre-service technical teachers and their intention in Table 1 showed that there is a strong positive correlation between the two variables, $r = .41$, $n = 179$, $p < .005$, with shared variance (16.67) of 17%.

RQ 4: What is the relationship between the belief of pre-service technical teachers and their attitude toward use of IT for teaching?

The relationship between the belief of pre-service technical teacher and their attitude towards IT use in Table 1 showed that there is a strong positive correlation between the two variables, $r = .69$, $n = 179$, $p < .005$, with shared variance (47.74) of 48%.

RQ 5: What is the relationship between the attitude of pre-service technical teachers and their intention towards IT use for teaching?

The relationship between pre-service technical teachers' attitude and their intention towards IT use in Table 1 showed that there is a strong positive correlation between the two variables, $r= .52$, $n = 179$, $p < .005$, with shared variance (27.14) of 27%.

Discussion

The important goal of the study was to understand the strength of the relationship that exist between technology preparedness of pre-service technical teacher and some personality traits such as beliefs, attitude and their intention toward uptake of modern education tool (IT) when they get to the field of practice. Interestingly, the finding has confirmed and refuted some of what other researchers has reported. For instance, the first research question that sought to understand whether there will be a positive correlation between technology preparedness and pre-service teachers' beliefs revealed that the more they are technologically prepared the more they increase in their beliefs system in the efficacy of IT for teaching. What this suggests is that pre-service teacher belief about IT for teaching can be located in the manner they undergo their training with technology.

This showed that pre-service technical teacher beliefs will tend to increase as

long as they are taught with IT resource which will invariably influence their decision toward its usage. The finding of this study supported the finding of Frel and Carboni (2002) that the more pre-service teachers are taught with technology the more the increment in their belief on it for pedagogical practice. Also, the study support Lambert, Gong and Cuper (2008) finding that pre-service teacher educational technology course would enhance student belief of technology use as well as prepared them for technology use for classroom instruction. However, the present study was in disagreement with Harris and Grandgenett (1999) study that found no significant correlation between teacher belief and use of technology for pedagogical practice.

Another interesting finding of this study is the significant correlation between technology preparedness and pre-service teacher intention toward technology use. The finding supports the earlier study of Shittu et al, (2016) that submitted that technology preparedness is a predictor of student and teacher intention toward IT use for teaching function. Similarly, the finding of the study showed that technology preparedness strongly correlates with pre-service teacher attitude. This finding supported the finding of Kumar and Kumar (2003) that pre-service teacher attitude toward IT use would improve as long as they are taught with technology. Another interesting finding of this study was that there was a strong correlation between pre-service teacher beliefs and their attitude toward IT use for teaching. What this suggests was that the stronger the student beliefs the more the increase in their attitude to use IT for teaching functions. Also, the study revealed that attitude strongly correlate with intention, this finding validate Zhao, Tan, and Mishra (2001) finding that provide evidence that attitude of teacher would directly related to their intention to use IT for teaching.

Conclusion

In conclusion, the study has brought to fore the interrelationship that exists among group of variables that would influence technology use among pre-service technical teacher when they are at field of practice. The study indicated that how pre-service technical teacher are train through technology would to a greater degree increase their attitude, beliefs and intention toward use of IT resource at the field of practice. The function of teacher in the present changing world is sacrosanct and these make them the change agent in the contemporary education system. They are supposed to take the driver seat when it comes to technology integration for curriculum implementation. It is important therefore, that training them with modern tool should be make compulsory since the more they are prepared for technology use the stronger their attitude, intention and beliefs system toward integration of IT.

Recommendations

In summary, this study suggests an urgent need to reinvigorate teacher education program and encourage teacher educators to cultivate habit of using digital tool for pre-service teachers training. The school authority should create an enabling environment

for teacher educators and the pre-service teacher to experience technology use unhindered so as to increase the pre-service technical teachers' beliefs, attitude and intention toward technology use. The study has proof that what influence pre-service teacher uses of the modern tool reside in how they are trained, and the more they are train via technology, the higher and stronger their attitude, beliefs and intention toward use increase. Conversely, the lesser the training they received via technology, the lesser their attitude, beliefs and intention toward the use of technology for classroom instruction.

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An Evaluation of Factors That Enhance Teachers' Competence in Teaching Computer Science in Nigerian Secondary Schools

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Abstract

This study was conducted in order to evaluate the factors that enhance teacher's competence in teaching computer science in some selected secondary schools in Zing local government area of Taraba state. The sample used for the study was 18 computer science teachers drawn from the population of the study. Copies of a 20 items questionnaire were used for data collection and data was analyzed using statistical mean. The study found out the factors which enhance teachers competence in teaching computer science include; motivation of computer science teachers, adequacy of teaching and learning facilities aid teachers competency in the teaching of computer science subject and provision of incentives also boosts teachers morale and competency. The study recommended that seminars and workshops should be organized periodically for all computer science teachers to enhance their productivity. Also, teachers should be motivated as it will help reduce the mobility of teachers to other jobs or sectors.

Introduction

Evaluation in education is an assessment of student's performance taking into cognizance both qualitative and quantitative aspects of students performance or amount of knowledge or skill possessed by students. Nworgu (2003) viewed evaluation as a process by which a variety of instruments can be used to assess the goals and objectives associated with systematic management of learning experiences. It also reveals areas where students are weak and exposes incompetence of the teachers. Evaluation can be used to determine the extent to which the student has acquired the technical knowledge and skills taught. It can also be used to determine the strength or weakness of a student or programme. According to Okoro (1993), evaluation can be viewed as a process of collecting and processing data relating to an educational programme, on the basic of which decision can be made about the programme. The data may be objective description of goals, environment, personnel methods and content and recorded personal judgment of the

quality and appropriateness of the goals, input and outcomes.

The search for teacher competency has been the goals of educational research for quite some decades in the developed and developing world. A developing nation like Nigeria needs to produce teachers that are competent in the teaching of computer science at upper basic education level. Technology represents the sum of knowledge, skills and methods related to the production, distribution and consumption of goods and services including the organization thereof. Technology is the systematic and integrated organization of men, machines, ideas and procedure to achieve a desired goal (Abimbade, 1997). Computer science is the study of computers and computing, including their theoretical and algorithmic foundations, hardware and software, and their uses for processing information (Federal Republic of Nigeria, 2004).

Teachers' competence in pedagogy and skills for teaching computer science will increase students' interest and enhance their performance in the subject. A thorough and competent teacher is one who is able to present information clearly and logically to students, help students put their ideas into words, help students improve their communication skills, and provide appropriate analogies to assist learning (Andrew Cabb & Giampietro, 2005). It is therefore necessary to identify those factors that can motivate and enhance teacher competency in the teaching of computer science.

The incompetence of teachers in the teaching of computer science is alarming nowadays as had been indicated by the students' performance in Secondary School Certificate Examination, particularly during National Examination Council (NECO) and Junior Secondary Certificate Examination (JSCE). This poor performance is an attribute of students' poor performance in West African Examination Council (WAEC) and NECO examination, a statistical break-down of the release of the 2018 May/ June West African Senior Secondary Certificate Examination (WASSCE) results revealed that 49.98 percent of the candidates were considered to have recorded the minimum of five credits required for admission into institution of higher learning (Ogundimu, 2018). Also, Adenipekun (2018) expressed the council's displeasure at the students' poor performance, noting with regrets that the number of students who passed reduced by 10 percent compared to 59.22 percent in 2017.

However, can the students' poor performance in computer science be as a result of lack of competent teachers and effective classroom management and discipline, school facilities and teacher motivation? Based on the above concern and question, this study evaluates the factors that enhance teachers' competence in teaching computer science.

Research Questions

The following research questions are formulated to guide the study:

- What are the factors that enhance teachers' competency in the teaching of computer science?
- To what extent do school facilities aid teachers' competency in the teaching of computer science?

Methodology

Survey research design was used for this study. According to Best and Kalin (2003), survey design is used in a situation where the study employs questionnaire to determine opinions, preference, attitude and perception of people about an issue. This study was carried out in Zing local government of Taraba state. The population of the study comprised of 25 computer science teachers in all the secondary schools in the Local government. The sample of the study was 18 teachers. These comprised of two (2) teachers from each of the nine (9) selected schools within the area of study. The instrument for data collection for this study was a four – point rating type scale questionnaire.

Data collected for this study were analyzed using mean score and the real limits of response to make decision on the factors that enhance teachers' competence in teaching computer science. The real lower and upper limits of the four point rating scale were as follows:

0-1.49 SD strongly disagree/very low

1.5-2.49 D disagree/low

2.5-3.49 A agree/high

3.5-4.49 SA strongly agree/very high

Table 1 shows that factors that enhance teachers' competency in the teaching of computer science as indicated by item 1,2,3,5.6,8, 9 and 10 agreed while item 4 and 7 disagreed that the above stated items are factors that enhance teachers' competency in the teaching of computer science.

Table 2 shows the mean response of participants that school facilities aid teachers' competency in teaching computer science as indicated in items 2, 3, 4, 5, 9 and 10 while items 1, 6, 7 and 8 disagreed that school facilities do not aid teachers' competence in teaching of computer science.

Table 1: Evaluation of Factors that Enhance Teacher's Competency in the Teaching of Computer Science

S/n	Items	Mean	Remarks
•	Teachers qualification affects the competency in teaching of computer science	2.88	Agreed
•	Motivation of computer science teachers enhances their competency in teaching	2.88	Agreed
•	Knowledge of subject matter determine teachers competency	3.03	Agreed
•	There are adequate number of computer science teachers in your school	2.03	Disagreed
•	Good remuneration improves teachers competency in teaching computer science	2.70	Agreed
•	Incentives always boost teacher morale and competency	2.50	Agreed
•	Inappropriate time management affects teachers competency	2.45	Disagreed
•	One of the skills that determine teachers' competency is good communication skill	3.10	Agreed
•	Students participation in lessons determines teacher competency	2.70	Agreed
•	Effective teaching method enhances teachers competence	3.20	Agreed

Table 2: Evaluation of Extent to Which School Facilities Aid Teachers' Competency in the Teaching of Computer Science

S/n	Items	Mean	Remarks
•	There are adequate teaching aids in your computer lab	2	Low
•	Functional teaching facilities helps teachers competency in the teaching of computer science	3.13	High
•	Poor facilities affects teachers competency	2.93	High
•	Teachers are more committed to work when facilities are made available	2.93	High
•	The availability of school facilities enhance teachers competency	3.00	High
•	Computer science teachers handle computers competently	2.08	Low
•	Teachers know how to use computer software effectively	2.40	Low
•	Lack of proper management of facilities enhances teachers competency	2.20	Low
•	Equipped computer lab improves teachers competency	2.80	High
•	Provision of enough teaching facilities enhance teachers competency	3.33	High

Discussion

This study revealed that there are factors that enhance teachers' competency in the teaching of computer science as shown in table 1. Today people are not talking just of education but functional education that enables children to use their hands in the creative way that lead to self-reliance and promotes technological development. Table 2 shows the mean response of respondents that school facilities aid teachers competency in teaching computer science as indicated items 2, 3, 4, 5, 9 and 10 while items 1, 6, 7 and 8 disagreed that school facilities do not aid teachers' competence in teaching of computer science.

Considering the nature of computer science, there is a need for training and retraining programme for the teachers to be able to teach it successfully (Ibrahim, 2010). In line with this, the finding in table 1 revealed that teachers' qualification affects their competency in teaching of computer science, knowledge of subject matter determines teachers' competency, good remuneration improves teachers' competency in teaching computer science, incentive always boost teachers' morale and competency. Diala, (1995) found out that poor conditions of service and lack of motivation scare most of the science and technical teachers from the school system. Proper incentive for science and technical teachers, no doubt, will help to reduce the mobility of this category of teachers from classroom to industries and other sectors. Also, among the determinant of teachers competency are good communication skills, students participation in lesson enhances teacher competency and effective teaching method while items 4 disagree that inadequate number of computer science teachers in schools affects teachers competency. According to Haladu (2005), effective and qualified teachers, scientists, technicians, mechanics and maintenance workers of all skills must be trained. Most importantly there is the need for effective teachers to be able to train skill engineers to design and install new and improved equipment.

Also, the study in table 2 revealed that respondents agree that school facilities aid teachers competency in teaching of computer science as indicated by the following items; functional teaching facilities help teachers competency in the teaching of computer science, poor facilities affects teachers competency, teachers are more committed to work when facilities are made available, the availability of school facilities enhances teachers competency, equipped workshop improve teachers competency and provision of enough teaching facilities enhance teachers competency while the following items disagreed; inadequate teaching aids in computer labs, computer science teachers handle computers competently, teachers know how to use computer software effectively and lack of proper management of facilities enhances teachers competency in teaching computer science. According to Torruam and Abur (2013), though Nigeria is also making efforts to join the information and communication technology (ICT) fray, these efforts appear to be ineffective. Computer laboratories are largely non-existent in many public schools across the country, and where they exist, they are nothing

to cheer. Due to this general neglect and other factors, comprising corruption, outdated curriculum, ill-motivated teachers, materialism and academic laziness on the part of students and teachers, the nation has been reaping mass failure in public examination.

Conclusion

This study shows that for computer science teacher to be effective in his work, the teacher should be properly trained and competent in both the theoretical and practical aspect of the subject matter. The teacher must also be innovative, imaginable, creative and resourceful to identify and use teaching methods effectively and improvise when the need arise. However, to improve and enhance teachers' competency, teachers should be motivated with proper incentives that will boost their moral and effectiveness.

Recommendations

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

- Schools should conduct seminars and workshop periodically for all computer science teachers to enhance their productivity.
- Motivation and incentive should be provided by the government to teachers as it will help reduce the mobility of science and technology teachers to other jobs or sectors.
- More instructional materials should be provided by the government in the computer labs.
- Government should employ more computer science teachers and those in service should be encouraged to go for further studies.

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The Role of Mathematics in Enhancing Technical and Vocational Education for National Development

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Abstract

This paper focuses on the role of mathematics in enhancing technical and vocational education for national development. The level of development of any nation is defined by its intellectual, scientific and technological achievements. Technical and vocational education is regarded as a sure way to the industrial and economic development of the nation. Mathematics, which is an established basis and an instrument of language for science and technology, plays a very important role to improve students' skill in technical and vocation education. The paper discuses explicitly, the concepts of education, mathematics, technical and vocational education and their roles in national development. In spite of their key role in national development, the teaching and learning of mathematics and technical and vocational education are attended by numerous challenges at all levels of the educational system. The paper recommended among others, the provision of adequate facilities and materials for teaching and learning; prioritizing the teaching and learning of Mathematics at all levels of the educational system; improvement of the working conditions of teachers and craftsmen so that they will be adequately motivated to stay longer on the job.

Introduction

Education is regarded as a process of developing an individual into a responsible, purposeful, innovative, creative and useful being. Education develops the innate potentials of the individual to the optimal level, helping that person to acquire knowledge, skills and values that will enable him or her function well in the society. It is likewise viewed as a method for communicating information and culture from one age to the next (Ekeh and Oladayo, 2012). Mathematics, which is one of the fundamental subjects of learning in education is a language of ordered thinking. Agbajor (2013) posited that mathematics education is the bedrock of science and technology. Ugbebor (2009) claimed that Mathematics is the language of Science and Technology, consequently prioritization of Mathematics

instruction and learning in the offer for National improvement is unavoidable. Abubakar, Wokoma and Afebuame, (2012) expressed that Mathematics is a basic instrument for the change of mechanical advancement to reality since innovative advancement conveys the possibility of development extension and improvement in merchandise and ventures radiating from reasonable use of science. Moreover, Usman (2002) noticed that in wherever we go, all that we do or propose to do, either the structure of science or its applications assume an essential job and this is the reason most nations, races, and individuals put accentuation in all part of examining, creating, and applying arithmetic. Aguele and Usman (2007) affirmed that the Nigerian economy requires Mathematics that can successfully place science and innovation in the bleeding edge of country building.

It is in this light that Ale and Adetula (2010) expressed that the boundary between the created and the developing countries depends on their degree of Mathematical fulfilment and inventiveness. They posited that Mathematics is an undisputed specialist of public turn of events and abundance creation. Affirming this announcement, Nosa and Ohenhen (1998) expressed that proof proliferates to show that countries that grasp arithmetic, science, and innovation appreciate better way of life and are less reliant on others.

The Role of Mathematics in National Development

Throughout man's history of intellectual growth, mathematics has, at all times, been a peculiar subject both in the role it has played in its practical application in many aspects of human activities and in the development of other areas of learning or academic subjects. The contribution of Mathematics to national development could be seen in many areas such as science and technology, business and industry, banking, building and constructions, etc: Science, Technology and Mathematics has been the back bone of several human endeavours notably science and technology, which is the life wire of national development. This has advanced so much that what is left for man to attain is the creation of man itself. There is no doubt that technology has brought higher standard of living to people both in advanced countries and developing nations. It is this rising standard of living that makes the acquisition of technical competence so attractive to those countries (New Encyclopaedia Britannica, 1981).

Today, the fruits of science and technology are glaring and enjoyable. The invention of satellite, the mobile phones, the high security gadgets etc. are the fruits of science and technology. In Nigeria, science and technology have been applied in every sphere of life. Mathematics is therefore, an instrument for fostering scientific and technological advancement. Internationally, the computer usage worldwide was made possible because of the knowledge of mathematics.

Computer is a facilitative technology and merely allows those who are already doing something to do more of it faster and more accurately. Business and Industry, Quantitative techniques, which are an aspect of mathematics, are those statistical and operations research or programming techniques, which help in the decision-making process especially concerning business and industry. They involve the use of numbers, symbols and other mathematical expressions and structures. Indeed, without quality education system which is rooted in mathematics we invariably have unimaginative and unpatriotic engineers with roads that wash away. A lot of mathematical knowledge is used in modern industries in determining which models of machine (s) would produce greater materials at a maximum profit within minimum time. This phenomenon was demonstrated by Hicks (1955).

Other Areas in banks, basic knowledge of mathematics is needed for effective and efficient transaction between the bankers and their customers. Good knowledge of basic mathematics is essential for the manipulation of building blocks into dams, construction of machines and structures. Indeed, without quality education system which is rooted in Mathematics, we invariably have unimaginative and unpatriotic engineers who construct roads that wash away after the first rains; doctors that kill more than they can cure, pharmacists that can mix inappropriate drugs that can kill thousands. Of course the cumulative effect would be non-development rather than development, and at times national retrogression instead of progression and development.

Mathematical concepts are general ideals that first become apparent in one area and can readily be transferred to another. Examples include new development in Knot theory, arising, from mathematical physics and applied to molecular biology, a musical problem whose solution has illuminated the theory of waves, an optimisation problem that has led to fundamental questions about computability, and a new kind of geometry that originated in classical mechanics and is now of central importance in quantum physics (New Encyclopaedia Britannica, 1968 Vol. 23).

The Federal Government of Nigeria in the National Policy on Education made mathematics compulsory for both primary and secondary school curriculums. It is also needed in every level of education. In over 90% of the courses in Nigerian universities, mathematics is an admission prerequisite. Even after graduation, employers demand good performance in selection aptitude tests. Such tests have heavy dose of mathematics.

As we can see, like a person's shadow, mathematics is applied to every human activity, and virtually every profession expresses some degree of numeracy. Mathematics is used in arts, business, commerce, law, medicine, politics, religion, sociology, war and so on. Since man cannot do without the basic ingredients for survival, coupled with the elementary fact that mathematics is the core ingredient of all these, man must as a matter of necessity, learn,

understand and apply the language of mathematics to sustain and maintain his existence. From the foregoing, the contributions of mathematics to other subjects and hence to everyday life and national development could be seen.

The Concept of Technical and Vocational Education

Several attempts have been made to define Technical and vocational Education. Technical education is seen as that education that deals with the training of technical personnel for the purpose of initiating, facilitating and implementing the technological development of a nation and also to create the basic awareness of technological literacy to our youths (Uwaifo, 2010). Similarly, Technical and Vocational Education and Training (TVET), is understood as comprising education, training and skills development relating to a wide range of occupational fields, production services and livelihoods. It is a comprehensive term that refers to those aspects of education process involving the acquisition of practical skills, attitude, understanding and knowledge relating to occupations in various sectors of economic and social life (Ogbonaya & Ekereobong, 2015)

The National Policy on Education, Federal Republic of Nigeria (2004) defined it as compressive term referring to the educational process involving the study of technologies and the related sciences, and acquisition of practical attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life. Okonkwo (2008) posits that technical and vocational education is that aspect of education and training that bothers on the acquisition of practical skills as well as basic scientific knowledge which are vital to the Improvement of man's material wellbeing

Technical and vocational education is a multifaceted, multidisciplinary and pragmatic field of study, whose aim is to equipped individual with requisite technical and vocational education literary skills which will enhance their relevance and functionality in the society. As a result, it plays a vital and indispensable role in the development of society. Unatu (2008) asserted that technical and vocational education is the acquisition of skill and techniques in chosen occupation or profession to enable an individual earn a living. The federal government of Nigeria (FGN, 2004) viewed technical educational and vocation education as that aspect of the educational process involving in addition to general education the study of technologies and related science and the acquisition of practical skills, attitude, understanding and knowledge relating to occupations in various sectors of economy and social life services.

Osuala (2004) stated that technical and vocational education is a training intended to prepare a student to earn a living in an occupation in which success is dependent largely on technical information and an understanding of the laws of science

and technology as applied to modern design, production, distribution and services, it is conducted as a part of a programme designed to prepare individual for gainful employment as a semi-skilled workers, technician or sub-professions in recognized occupations as well as new emerging manipulative skill/service competencies, basic scientific knowledge and proper work habit/attitudes.

Technical and vocational education empowers individuals by equipping them with skills and knowledge which would enable them to fit into the labour market and earn a successful living. This type of education would help their products to use the knowledge and skill acquired to transform the nation's environment politically, socially, technologically, and economically.

The programme of study at technical and vocational institutions have been clustered into Agricultural, Building craft, Electrical engineering trade, Mechanical engineering trades, wood trades, business trades, computer trades, textile trades, hospitality. Kehinde and Adewuyi (2015) explained that "technical education is the kind of training that concerns a particular aspect of science, occupation or profession which have both theoretical and practical instructions that are given to those who are going to be employed in commerce and industry using tools and machinery for the operation, production, preservation and distribution of goods and services." Ocufirwa in Melaiye, Amuchie and Joseph (2019) stated that technical and vocational education is result oriented. It brings about technological advancement and aimed at fitting new manpower for employment and providing continuous training for those already qualified so that they can keep up with modem working methods. As a matter of fact, technical and vocational education is aimed at developing not only practical skills but also developing a creative, innovative and resourceful person. The development of economy for self-reliance and self-sustainability is the main driving force for acquisition of this type of programme. In the same view Sallah (2008) stated that Technical and Vocational Education is an educational aspect that prepares individuals for saleable skills that allows one fit into the society to make effective contributions for its development. This implies -that practical skills acquisition in various areas or vocation leads to economic stimulation in a dynamic society where individuals who are vocationally knowledgeable embark on production of saleable items. The National Policy on Education of the Federal Republic of Nigeria (2004) postulated that the goals of technical and vocational education among others is to: Provide trained man power in applied science, technology and business, particularly at the middle cadre. To accomplish these goal at science and technical college level, programs of activities have been grouped in the policy document (FRN, 2004). The groups for each programme comprise general education theory and related courses, workshop practice and industrial training/production work. It is thus, expected that graduates from technical and vocational institutions will be equipped with practical after they have, passed through assessment criteria (examination) are certified as having acquired the skills set out by the curriculum. Certificates are awarded to

them as National Technical Craft (NTC) and Advanced National Technical Craft (ANTC). The form of training received by the graduates of this form of education involves lectures and tutorials (for acquisition of factual knowledge) the theoretical knowledge will help them have a firm understanding of their subject area for problem-solving in a work related environment. The practical knowledge helps them learn the skills of hand and leg to do the productive work necessary for the welfare of the nation. The graduates also acquired knowledge industrial based training where real life technical environment and procedures are encountered. The candidates also acquire general knowledge to do the work of the socialization of individuals in the social environment. The professional preparation enables them to know the ethics of their profession. The main focus is to make the trainee fully equipped to meet the varied challenges in his chosen profession after the course of study.

Challenges of Technical and Vocational Education in Nigeria

Despite the contribution made by technical and vocational education in National Development, a lot of problems are hindering the production of low level manpower in technical colleges and other institutions. Ama (2000) observed that technical and vocational education in Nigeria is fraught with problems which militate against its ability to produce adequate qualified skilled and technical manpower required to lift the nation from the abyss of technological irrelevance, and economic depression.

Many educationists regard technical and vocational education as the basis of industrial and economic development, and indeed as the pillars of prosperity. Yet, most of the problems hindering its effective teaching and learning are not solved. Awotunde (1993) observed that most of the institutions that engage in vocational and technical colleges lack enough facilities, some lack enough workshops and laboratories. Where workshops and laboratories are available, they are ill equipped with tools and equipment because vocational and technical education is capital intensive. Some institutions are not able to purchase appropriate tools, machines and other equipment for the training of manpower. They make use of obsolete machines and equipment to train people. Consumable items such as wood, iron and steel, plastics are often relegated to the background. Curriculum is a major requirement for carrying out training in Technical colleges and other institutions. This consists of the list of courses and activities for the trainees and the general objectives of the courses. The nature of the curriculum affects the product. In other words, the quality of the products from technical colleges depends on the type of curriculum of the institutions among others. The curriculum of the Technical and Vocational Education has not been updated for long to march development in commerce, science and technology. This affects the quality and relevance of the Technical and Vocational Education. Onwuchekwa (2001) stated

that any worthwhile programme is never static but dynamic and therefore, liable to constant changes in the aims of the nation. Class sizes are abnormally large a situation that adversely affects teaching efficacy. The ideal classroom should accommodate only about 20 students. This class size enhances and facilitates thorough supervision and assessment of the extent of practice of skills. Also it gives room for the teacher to sufficiently access the students. Unfortunately, most classes in Technical colleges are large. Often 50 or more students are found in a class, this affects the quality of learning. Another source of worry is that the industrial Training Programme which was designed to familiarize trainees with the world of work. Olaintan (1996) observed that this programme has become a formality and no longer serves effectively the purpose for which it was set. For one reason or the other, the responsibility for placement has been shifted to students. Students often scramble for places of industrial training. Even some of them that secure places complain of redundancy. While some spent half of the time allocated for the programme looking for places that would suit their selfish interests. Some are even rejected by Government establishment and private sectors (industries). A major problem facing technical institutions is the epileptic nature of power supply where it exists. According to Tower (2001) no technical and vocational subject can be offered anywhere and at any level without regular electricity supply. Some technical and vocational schools are located in rural areas that have no standby generators. Okonkwo (2008) asserted that the human resources situation has not been favourable for technical and vocational education. Some professional that would have made excellent teachers only had a brief stay in schools and then leave for other sectors of the economy. According to Nwosu (2003) the comparatively poor working conditions of teachers is gradually transforming the teaching profession as a stepping stone to other highly esteemed and more attractive professions and other jobs. Teaching therefore has become a profession for fresh graduates as well as unqualified graduates who are ever ready to quit their position as soon as they find greener pasture elsewhere. In support of this statement, the Enugu State Government in 2009 recruited all graduates who have no job into the teaching professions in order to fill vacancies created by those who left their jobs. Those recruited include holders of NCE, First Degree and Master's Degree and those without teaching qualification such as B. Sc., B. Tech., HND. These categories of teachers are likely to leave teaching prematurely since they do not possess teaching qualifications and; they may decide to leave as soon as they secure more lucrative jobs or business. So it is no longer the issue of production of teachers, rather, it is the problem of how to retain the existing ones.

Challenges of Mathematics Education in Technological Innovation in Nigeria

More worrisome is the fact that Mathematicians will hardly be found among this mass group of teachers, and if any at all, will be the first of those leaving for greener pastures, as they are the most sought after by many organizations.

It is on record that Mathematics occupied a central position in Nigerian school curriculum since the inception of Western education and with the changes in educational practices most especially from 6-5-2-3 to 6-3-3-4, and now 9-3-4 system of education. Yet, Mathematics or the study of Mathematics education has encountered several problems or challenges in its integration in Science and Technology and making Mathematics occupy a prominent role which will make Nigeria a country to be reckoned with among the comity of nations. Some of the challenges include;

1. Lack of qualified teachers to teach Mathematics from Pre-Primary, Primary, Junior Secondary, Secondary and Tertiary institutions thereby creating a huge gap in the learning and proper assimilation of Mathematics.
2. Low enrolment of students at Colleges of Education, Polytechnics and University leading to scarcity of Mathematics teachers. This could be attributed to the fact that vast majority of Nigerian students' fear and dread Mathematics because they feel it has difficult concepts. This has made Mathematics one of the least successful subjects in Nigerian schools despite its importance and time allocated for its teaching in the Nigerian school system (Etuk & Bello, 2016; Okafor & Anaduaka, 2013).
3. Lack of pedagogical skills in effective teaching for understanding by existing Mathematics teachers.
4. Most Primary and Secondary schools do not have Mathematics Laboratory where practical aspect of concepts taught are carried out to boost the students' knowledge, aid their understanding and motivate them to choose Mathematics as their career choice.
5. Enrolling frustrated students who failed to gain admission into other course of study like Engineering and Computer Science into Mathematics as a last resort thereby producing graduate who dislike Mathematics as a field of endeavour. This also impedes creativity, innovation, ideas and enthusiasm in performing their official duties, or in the teaching of Mathematics.
6. Lack of incentives to Mathematics teachers to motivate them and encourage students to emulate them and choose Mathematics as a field of endeavour.
7. Lack of policy statement and implementation on employment priority for mathematics graduate to work in Science and Technology sector.
8. Lack of resource centre for teaching aid in Mathematics to enhance learning of mathematics by students.

9. Low quality of Mathematics education teaching personnel constitutes a serious problem (Etuk & Bello, 2016).
10. The curriculum which is the heart and life wire of educational programme is also not all encompassing in relation to Mathematics teaching and learning. The curriculum according to Etuk & Bello (2016) is perceived to be foreign in nature having little or no ability in addressing the adequate needs of Nigerians and the Nigerian system. This results in making Mathematics more dreadful and scarring in teaching and for the learners.
11. Funding which is the bane of qualitative education in Nigeria is greatly affecting prospect of Mathematics teaching and learning. Aside inability to recruit Mathematics teachers, there is no adequate funding to make the teaching and learning of Mathematics encouraging to the learners. No Mathematics Laboratory, no resource centre for teaching aid production, no modern equipment that will make the teaching of concepts in Mathematics explicit enough for students to understand, no training and retraining of Mathematics teachers to get in tune with new innovations and teaching strategies that will enhance learning, no extra allowances as incentive for teaching Mathematics, etc.
12. Bursary allowance, grants, scholarships are not given to encourage and lure students into choosing and offering Mathematics in higher institutions.
13. Societal attitude towards Mathematics is also a factor that impedes learning and studying of Mathematics. There are virtually no role models for students to admire and aspire to study Mathematics and those who accept to study Mathematics are not encouraged by the society.
14. Lack of Mathematics Textbooks is also a bane to its recognition and wide acceptance by teachers and students alike (Aguele & Usman, 2007).

Conclusion

Science, Technology and Mathematics (STEM), has been the backbone of numerous human endeavours especially Science and Technology which is the life wire in the development of any nation. Mathematics which is the basis and language of science is key in the successful development of technical and vocational education. Technical and vocational education is seen as that kind of education with strong job orientations and whose result is loaded with such job-relevant practical content that its products emerge with marketable physical and mental skills. Despite the present economic meltdown, technical and vocational education has the potential to develop our economy. But the problems against the development of technical and vocational education are many. They range from inadequate provision of tools and materials to none retention of

personnel and inadequate facilities. For technical and vocation education to be of benefit to the country, therefore, those problems need to be attended squarely.

Recommendations

Based on the discussion, the following recommendation were made:

- Government and other stake holders in the Education sector should ensure that conducive operational environment and educational facilities are provided to promote the efficiency of the teaching process in general.
- The effective teaching and learning of mathematics should be prioritized by governments at all levels of the educational system to enhance students' creative and innovative skills.
- The regulatory bodies like NUC and NCCE should review and update the curriculum of technical colleges from time to time in order to update students' knowledge and skills for development.
- Government should provide scholarship and bursary allowances for students studying Mathematics at tertiary institutions.
- Government should set up centres for work experience in at Local Government levels and involve students in consumption and maintenance of school buildings to accommodate those who could not for any reason get a place for SIWES.
- Government should provide adequate manpower to enable the implementation of 1:20 teacher/student ratio in technical colleges.
- Improvement in the working conditions of teachers and craftsmen by government should be ensured, so that they will be adequately motivated to stay longer on the job.
- Government should strengthen the technical and vocational education component of the UBE by carrying out a massive and comprehensive rehabilitation of the existing technical colleges.
  Standby generator should be provided by government for each training institutions. It is obvious that technical and vocational education has not been given the priority it deserves by Government, since researches have shown that inadequate facilities, training equipment and personnel have been the bane of these training institutions.
- Mathematics graduates should be given automatic employment by the Federal and State governments into teaching and other science and technology agencies. This will encourage students to choose Mathematics as a career.

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Web-based Digital Technology Skills Required for Online Teaching and Learning of Business Education Courses in Tertiary Institutions in Plateau State

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Abstract

The study examined the web-based digital technology skills required for online teaching and learning of business education courses in tertiary institutions in Plateau state. One research question and one hypothesis of no significant difference guided the study. Descriptive survey design was adopted. The population of the study consisted of 54 lecturers drawn from tertiary institutions offering business education courses in Plateau state. The entire population was adopted as the sample in view of the small size. The main instrument for data collection was a four point rating scale questionnaire. The data collected were analysed using mean and standard deviation. The mean was used to answer the research questions while the standard deviation was used to determine the closeness or otherwise of the responses from the mean. The null hypothesis stated was tested using the independent t-test at 0.05 level of significance. The finding revealed that lecturers in tertiary institutions required web-based digital technology skills for online teaching of business education courses. The findings further revealed that there was no significant difference between the mean response of experienced and less experienced lecturers on the web-based digital technology skills required for online teaching and learning of business education courses in tertiary institutions in Plateau state (t_{47} = -1.265, P>0.05). It was concluded that business education teachers must strive for excellence and quality in order to constantly remain relevant and functional. Based on the findings and conclusion of the study, it was recommended among others that there is need for individual teachers to take proactive steps towards self-development as the era of waiting for school authorities or proprietors for training and retraining is over.

Key words: Digital technology; skill; online; teaching; learning and business education

Introduction

The potential of digital technology to innovate and improve learning experiences has always attracted the attention of educational researchers and practitioners as observed by Onojetah (2014). Hence, educational professionals agree that these technologies have the prospects for improving teaching and learning as well as showing workforce opportunities. It is also evident as agreed by Amiaya (2016) that the traditional educational environments are not suitable for preparing learners to function or be productive in the workplace in today's society. Therefore, educational institutions that fail to incorporate digital technologies cannot seriously claim to prepare their students for life in the 21st century knowledge-driven economy.

Digital technologies denote a wide range of technologies, tools, services and applications using various types of hardware and software. They facilitate services or activities by electronic means to create, store, process, transmit and display information (Ventura, Roca-Cuberes, & Corral-Rodríguez, 2018). Broadly, digital technologies include the use of personal computers, digital television, radio, mobile phones, robots etc. The term is used to describe the use of digital resources to effectively find, analyse, create, communicate, and use information in a digital context. This includes the use of web tools, digital media tools, programming tools and software applications. Digital technology skill therefore involves the ability, confident, critical and responsible use of, and engagement with, digital technologies for learning, at work, and for participation in society. It includes information and data literacy, communication and collaboration, digital content creation (including programming), safety (including digital well-being and competences related to cyber security), and problem solving (European Commission 2018).

Lyashenko (2016) observes that digital technologies are now embedded in our society. Focus has therefore shifted from whether or not to use them in teaching and learning, to understanding which technologies can be used for what specific educational purposes and then to investigate how best they can be used and embedded across the range of educational contexts in schools. It is in view of the above that Ademola (2014) maintains that the knowledge and skills which business education lecturers require at present must reflect the growing use of digital technologies. This will aid in imparting the needed skills to students who can function effectively in a knowledge-driven economy.

Business education is an educational programme, which involves acquisition of skills, knowledge and competencies, which makes the recipient proficient in the area of business. Oladunjoye (2016) views business education as a conglomerate of courses that is concerned with the acquisition, development and inculcation of the proper values for the survival of the individual and the society. Thus business education helps individuals to acquire saleable skills that will enable

them fit into various business organizations or be self-employed in the absence of paid employment. Similarly, Amoor (2010) maintains that the goal of business education is primarily to produce competent, skillful and dynamic business lecturers, office administrators and businessmen and women that will effectively compete in the world of work. Its primary aim is the preparation of people for roles in enterprises, such roles could be as employee, entrepreneur and employer or simply self-employed. A well-articulated business education, if properly implemented with efficiently delivered infrastructure can help bridge the skill gaps existing between the school graduates and the requirements of the corporate business organizations thereby reducing the huge cost of human resource development in business organizations.

Innovations in web-based digital technologies has created a glaring need for business education lecturers to acquire more skills in order to bring up the caliber of graduates that will fit squarely into the modern challenging work trends. Morris (2016) views web-based digital technologies as network applications accessible over the internet (blogs, discussion boards, conferencing sessions tools, online multimedia and mobile technologies, online games etc.) that enable individuals to connect to each other. They are electronic tools and applications used to support and facilitate exchanges between institutions, organizations and individuals (Croteau, Beaudry & Holm, 2010). Lyashenko (2016) defines web-based technologies as "any form of on-line technology or practices through which users create communities to convey information, ideas, independent learning, entertainment, collaboration and personal messages and thus facilitates communication and interaction between individuals and groups". Robin (2011) views web-based teaching and learning tools as online tools and resources that support learning of a specific concept by enhancing, amplifying, and/or guiding the cognitive processes of learners. Web-based learning tools allowed students to experiment, manipulate variables, apply concepts, or answer questions based on formal presentation of material targeting a relatively narrow concept. The term 'web-based learning tool' is used because it clearly communicates many features of the proposed operational definition, namely tools that students and lecturers access from the web to support learning, whereas the term 'learning object' is more general.

Informally, Web-based teaching and learning encompasses all aspects and processes of education that use World Wide Web as a communication medium and supporting technology. There are many other terms for web-based teaching and learning; some of them are online education, virtual education, Internet-based education, and education via computer-mediated communication (Paulsen in Hobbs, 2010).

Online teaching and learning is the education that takes place over the internet or through internet-aided devices. It is one of the by-products of the advancements in information and communication technologies (Eze,

Chinedu-Eze & Bello, 2018). Singh and Thurman (2019) define online teaching and learning as teaching or learning experiences in synchronous or asynchronous environments using different devices (e.g., mobile phones, laptops, etc.) with internet access. In these environments, students can be anywhere (independent) to learn and interact with instructors and other students. Synchronous learning in this case means that two or more learners are connected simultaneously or in real-time using the same platform or communication channel, for instance, a video conference. Meanwhile asynchronous learning means that learners access the same material at different times and locations, for instance, using an online learning websites at different points.

In online teaching and learning, learners can interact directly with the learning content that they find in multiple formats (e.g., video, audio, document, etc.). Additionally, they can also choose to have their own learning sequenced, directed and evaluated with the assistance of a teacher. It is the opposite of traditional classroom face-to-face education. Online teaching and learning complements and in other cases replaces the traditional classroom teaching and learning format. Where it complements the traditional teaching and learning format, it is supplemental and where it replaces the traditional mode of teaching and learning, it becomes a pure electronic learning system.

Regrettably, it appears that most public tertiary institutions in Nigeria have not been able to embrace online teaching and learning to the detriment of their students and the society at large. Various factors might be responsible for these, such as inadequate funding, inadequate digital technology equipment, students' population, training of lecturers and students, sustainable internet facilities amongst others (Adeoye, Adanikin & Adanikin, 2020). Wahab (2020) reports that even with the outbreak of the COVID-19 pandemic which led to the closure of schools among several measure adopted by the Nigerian Federal and state governments to curtail the spread of the disease, the Nigerian education sector is not adapting to the challenges posed by the pandemic and is expected to struggle on that front for the foreseeable future due to certain deficiencies such as the weakness of digital online teaching infrastructure, the inexperience of lecturers, the information gap, the complex environment at home, and so forth.

The issue at stake now is that, as a matter of fact, not all business education lecturers who claim to be computer literate have sufficient competence in the use of digital technologies and can demonstrate proficiency in imparting the knowledge to students. This explains why Adebenjo (2014) observes that apart from the fact that some institutions lack digital technology tools needed for effective teaching and learning which will acquaint the students with the relevant digital skills needed to face the challenges of the world of work, some of the lecturers of business education lack the pedagogical competencies for implementing digital technologies. To buttress this point, Jegede in Ajie-Uche and Jumbo (2016) observe that most Nigerian lecturers lack basic skills and

competencies required for effective use of digital technologies for teaching. There is also low level of online teaching and learning awareness in Nigeria. It is against this backdrop that the study examines the web-based digital technology skills required for online teaching and learning of business education courses in tertiary institutions in Plateau state.

Statement of the Problem

The 21st century has witnessed a seeming downward trend in the traditional method of teaching and learning especially with the global effects of the advent of digital technology. Ile, Odimmega and Azu (2016) note that the pace of change brought about by digital technologies has had a significant effect on the way people live, work and play worldwide including the educational sector. This is the reason why digital technologies are challenging the traditional process of teaching and learning and the way education is managed. The onus is on business education lecturers to acquire the necessary skill, be knowledgeable and be confident of their ability to use digital technologies for effective and efficient instructional delivery.

Regrettably, a nationwide study by Okeke, Ezenwanfor and Umoru (2012) revealed a general low extent of utilization of digital technology tools by business education students and lecturers in Nigerian tertiary institutions. Although there have been series of orientation, awareness campaign and sensitization for business education lecturers especially to acquire skills in the use of digital technologies, the skills acquired by most of them fall short of what is required to be able to utilize digital technologies in teaching (Omeje, 2009). Added to this are the problems of the unequal distribution of ICT infrastructure, instability of electricity supply, digital illiteracy, digital divide between the 'haves and have nots', technological cost and obsolence. Others are limited access to the internet and broadband services, inadequate capacity or skills and inadequate funding of education

The problem of this study therefore is to identify the web-based digital technology skills required for online teaching and learning of business education courses in Plateau state. This is in view of the seeming incompetence of the lecturers in teaching using digital technologies with the implication of professional obsolence on the part of the lecturers and increased graduate unemployment on the part of the products of business education.

Purpose of the Study

The purpose of the study is to identify the web-based digital technology skills required for online teaching and learning of business education courses in tertiary institutions in Plateau state.

Research Question

What are the web-based digital technology skills required for online teaching and learning of business education courses in tertiary institutions in Plateau state?

Research Hypothesis

There is no significant difference between the mean responses of experienced and less experienced lecturers on the web-based digital technology skills required for online teaching and learning of business education courses in tertiary institutions in Plateau state.

Methods

The descriptive survey design was used for the conduct of the study. The population of the study consisted of all lecturers in the departments of business education and office technology and management in tertiary institutions in Plateau state. These institutions include Federal College of Education, Pankshin (24), College of Education, Gindiri (11) and Plateau State Polytechnic, Barkin Ladi (19). There are 54 lecturers in these departments. The entire study population was used for the study since the population was not too large. There was therefore no sampling. The instrument used was the Web-based Digital Technology Skills Required for Online Teaching and Learning of Business Education Courses Questionnaire (WDTSROTLBECQ). The questionnaire consisted of 20 items based on the purpose of the study and the research question. The instrument was validated by one Senior lecturer in the Department of Business Education, Kwara State University Malete and one Chief lecturer in the Department of Office Technology and Management, Federal Polytechnic, Bauchi. A pilot study was conducted at the Federal Polytechnic, Bauchi, in order to establish the reliability of the instrument. Cronbach Alpha was used to determine the reliability of the instrument which yielded a reliability coefficient of 0.76. Each of the items was assigned four response options of Highly Required (HR-4 points), Moderately Required (MR-3 points), Slightly Required (SR-2 points) and Not Required (NR-1 point). A total of 49 questionnaire were filled and returned consisting of 32 experienced lecturers (10 years and above of service) and 17 less experienced lecturers (1 – 9 years of service). The data collected were analysed using the mean and standard deviation. The mean was used to answer the research questions while the standard deviation was used to determine the closeness or otherwise of the responses from the mean. Positive decision rule for this study was established at a mean of 2.50 and above while any mean less than that was regarded as negative. The null hypothesis stated was tested using the t-test at 0.05 level of significance. Hypothesis of no significant difference was accepted when the observed probability value was greater than or equal to 0.05 level of significance. Where the calculated probability value was less than 0.05 level of significance, the null hypothesis was rejected.

Results

Research Question

What are the web-based digital technology skills required for online teaching and learning of business education courses in tertiary institutions in Plateau state?

Table 1: Mean and standard deviation of responses on the web-based digital technology skills required for online teaching and learning of business education courses in tertiary institutions in Plateau state

S/N	Item Statements	$\overline{X}$	SD	Remark
1.	Ability to connection to the internet using different internet connection options.	3.76	0.52	Highly Required
2.	Ability to identify, manage and navigate different type of web pages to obtain or publish teaching contents.	2.59	1.02	Moderately Required
3.	Ability to use the file transfer services to upload or download teaching contents.	3.37	0.73	Moderately Required
4.	Ability to use the electronic mail (e-mail) or list server to mail teaching contents.	3.78	0.42	Highly Required
5.	Ability to use the uniform resource locator (URL) to locate teaching contents online.	3.69	0.55	Highly Required
6.	Ability to use the search engine such as yahoo, google, MSN for research purposes on the web.	3.57	0.50	Highly Required
7.	Ability to use social networking service to post teaching contents.	3.59	0.50	Highly Required
8.	Ability to organize videoconferencing or Internet phone chat (Skype, TeamSpeak, etc.)	2.98	0.90	Moderately Required
9.	Ability to use browsers to support access and navigation on the world wide web	3.37	0.78	Moderately Required
10.	Ability to create e-portfolio or digital portfolio using mobile devices.	2.94	1.05	Moderately Required
11.	Ability to use student response systems (clickers, wireless learning calculator systems, etc.)	3.31	0.68	Moderately Required
12.	Ability to use interactive multimedia and presentation application for teaching.	3.84	0.37	Highly Required
13.	Ability to use web components such as plug-ins, applets or add-on for teaching and learning.	3.10	0.71	Moderately Required
14.	Ability to create blogs and microblogs for publishing written materials.	3.76	0.43	Highly Required
15.	Ability to use hypertext markup language (HTML) editors to create educational web pages.	3.20	0.79	Moderately Required
16.	Ability to use cloud computing for storing and sharing files.	3.49	0.51	Moderately Required

17.	Ability to use online collaborative tools to connect with students and other lecturers.	3.84	0.37	Highly Required
18.	Ability to use interactive forms on the web to create feedback or ask questions.	3.63	0.49	Highly Required
19.	Ability to use interactive on-line survey tools (SurveyMonkey, Zoomerang, etc.).	3.67	0.47	Highly Required
20.	Ability to create online interactive digital audio and video instructions (web and CD based).	3.12	0.75	Moderately Required
	Weighted average	**3.43**	**0.63**	**Moderately Required**

Source: Field Survey, 2020

Table 1 above shows the responses of lecturers on the web-based digital technology skills required for online teaching and learning of business education courses in tertiary institutions in Plateau state. The result revealed that all the web-based digital technology skill items outlined were moderately required for online teaching and learning of business education courses in tertiary institutions with a weighted average mean of 3.43. Items 1, 4, 5, 6, 7, 12, 14, 18 and 19 were however rated highly required with mean scores of between 3.57 and 3.84. All the items have standard deviation scores ranging from 0.37 to 1.05. This means that the responses of the respondents are not wide spread as they are close to the mean.

Research Hypothesis

There is no significant difference between the mean responses of experienced and less experienced lecturers on the web-based digital technology skills required for online teaching and learning of business education courses in tertiary institutions in Plateau state.

Table 2: Summary of t-test of the difference between the mean responses of experienced and less experienced lecturers on the web-based digital technology skills required for online teaching and learning of business education courses in tertiary institutions in Plateau state.

Group	N	Mean	SD	t-cal	Df	p-value	Decision
Experienced Lecturers	32	3.42	0.38	-1.265	47	0.210	Not Rejected
Less Experienced Lecturers	17	3.48	0.43				

Source: Field survey, 2020.
P>0.05

The data in Table 2 revealed that there are 32 experienced OTM lecturers and 17 less experienced lecturers. The experienced and less experienced lecturers' responses showed that web-based digital technology skills are moderately required for online teaching and learning of business education courses in tertiary institutions in Plateau state. ($\bar{X}$ = 3.42; SD = 0.38) and ($\bar{X}$ = 3.48; SD = 0.43). Their responses are close to the mean as the standard deviations are very low. The table revealed that there was no significant difference between the mean response of experienced and less experienced lecturers on the web-based digital technology skills required for online teaching and learning of business education courses in tertiary institutions in Plateau state (t_{47} = -1.265, P>0.05). Therefore, the null hypothesis that states that there is no significant difference between the mean response of experienced and less experienced lecturers on the web-based digital technology skills required for online teaching and learning of business education courses in tertiary institutions in Plateau state was not rejected. This implied that experienced and less experienced lecturers did not differ in their responses regarding the web-based digital technology skills required for online teaching and learning of business education courses in tertiary institutions in Plateau state. Though there was a slight difference between their mean responses with less experienced lecturers having higher mean responses, the difference was not statistically significant (mean difference = 0.06).

Discussion of Findings

The study revealed that lecturers highly required web-based digital technology skills in the use of interactive multimedia and presentation applications, online collaborative tools, different internet connection options, blogs and microblogs and ability to use the uniform resource locator (URL) to locate teaching contents online. Other skills highly required are ability to use interactive on-line survey tools, ability to use interactive forms, ability to use social networking services and ability to use the search engines. Also the study revealed that the ability to use cloud computing, file transfer services, select and use browsers, student response systems, hypertext markup language (HTML) editors, online interactive digital audio and video instructions and ability to use web components such as plug-ins, applets or add-on for teaching and learning were moderately required by lecturers. Other skills moderately required are ability to organize video conferencing or internet phone chat, create e-portfolio or digital portfolio and ability to identify, manage and navigate different type of web pages to obtain or publish teaching contents. The findings further revealed that there was no significant difference between the mean response of experienced and less experienced lecturers on the web-based digital technology skills required for online teaching and learning of business education courses in tertiary institutions in Plateau state (t_{47} = -1.265, P>0.05).

This finding corroborates that of Ademola (2014) who maintains that the knowledge and skills which Business education lecturers require at present must reflect the growing use of

digital technologies. This will aid in imparting the needed skills to students who can function effectively in a knowledge-driven economy. This also explains why Adebenjo (2014) observes that apart from the fact that some institutions lack digital technology tools needed for effective teaching and learning which will acquaint the students with the relevant digital skills needed to face the challenges of the world of work, some of the lecturers of business education lack the pedagogical competencies for implementing digital technologies.

Conclusion

The business teacher profession has come a long way and must strive for excellence and quality in order to constantly remain relevant and functional. This implies that business education lecturers must on their part strive to acquire the relevant digital technology skills aimed at improving the quality of the graduates. If in any case the lecturer is lacking in the relevant skills, then the ingenuity, agility and skills of the students that are critical to their success and competitiveness would be compromised.

Recommendations

- Teacher training and development must be taken with all the seriousness it deserves. This therefore informs the need for individual teachers to take proactive steps towards self-development as the era of waiting for school authorities or proprietors for training and retraining is over. This will enable them to acquire the necessary digital technology skills for teaching and learning.
- Management of tertiary institutions should be committed to the provision of adequate digital technology equipment, the relevant infrastructure and the creation of an enabling environment that will guarantee teaching and learning using web-based digital technologies.
- The various regulatory authorities should ensure that the curriculum for tertiary institutions are regularly review and revised with inputs from the academia and the industry to reflect the identified digital technology skills. This will help keep both teachers and students up to date with current realities and skills required in the digital work environment.

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Human Resource Management in Technical Vocational Education and Training Programmes in Nigeria: Problems and Prospects

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Abstract

TVET is an educational process which provides knowledge, skills and attitudes relevant for employment and it includes all kinds of formal and non-formal training. Human resource management is a system of activities and strategies that focus on successfully managing employees of all levels of an organization to achieve organizational goals and objectives. This paper examined the problems and prospects of human resources in TVET programmes in Nigeria. Human resource management in TVET programmes were discussed. Problems associated with human resource management were outlined, some of which include poor funding, governance structure and the prospects of human resource management were also discussed. Recommendation as to the way forward were suggested, which are introducing a ministry of technical and vocational education and training, revitalizing of technical teachers training program, procurement technical, vocational education and training materials and the introduction of technical, vocational and training teachers allowances.

Introduction

Technical Vocational Education and Training (TVET) has emerged as one of the most effective human resource development strategies that developing countries like Nigeria need to embrace in order to train and modernize their technical workforce for rapid industrialization and national development. TVET programmes are geared towards production of manpower at the sub professional skilled and highly skilled levels. This can only be achieved if the human

resources are carefully managed in order to achieve the desired objectives. TVET is seen as a means for preparing for occupational fields and for effective participation in the world of work (Dike, 2007). Nwabike (2012) states that human resource development is an aspect of lifelong learning and a preparation for responsible citizenship and also it can be considered as an instrument for promoting sustainable development in an undeveloped environment.

FRN (2013), refers to Technical, Vocational Education and Training (TVET) as a comprehensive term referring to those aspects of educational process involving general education, technologies, related sciences and the acquisition of practical skills, attitude, understanding and knowledge relating to occupation in various sectors of economy and social life.

The goals of TVET shall be:

i. Provide trained manpower in the applied science, technology and business particularly at craft, advance craft and technical levels
ii. Provide the technical knowledge and vocational skills necessary for agricultural, commercial and economic development, and
iii. Give training and impart the necessary skills to individual for self-reliance economically

TVET shall cover all aspects of:

i. Technical Colleges (TCs)
ii. Vocational Enterprising Institutions (VEIs)
iii. National Vocational Qualification Frame Work (NVQF)

TVET is an aspect of education that prepares people for specific trades, crafts and career at various levels from a trade, a craft, technical or a professional position. Vocations are usually based on manual or practical activities academically related to specific trade. Trainees directly develops expertise in a particular group of techniques in career development. Ibezim (2014), looks at TVET as an education, training or learning activities which provides knowledge, skills and attitudes relevant to develop skills for employment and that describes all kinds of formal, non-formal and informal training wherever it occurs.

UNESCO and ILO as cited in Ogwo & Oranu (2006), state that TVET is understood to be:

i. An integral part of general education
ii. A means of preparing for occupational fields and for effective participation in the world of work
iii. An aspect of lifelong learning and a preparation for responsible citizenship
iv. An instrument for promoting environmentally sound sustainable development
v. A method of facilitating poverty alleviation

Technical, Vocational Education and Training (TVET) as an aspect of education has various programmes as stated in Odu (2011). Some of these programmes include:

- Agricultural Education
- Business Education
- Computer Education
- Home Economics Education

- Industrial Technical Education
  Automobile Technology
  Building Technology
  Electrical/Electronic Technology
  Metalwork Technology
  Woodwork Technology

These programmes are made-up of personnel of varying cadre of categories, such as professionals, highly skilled and unskilled laborers. An important characteristics of TVET programmes as observed by Afefti (2006) is that it can be delivered at different levels of sophistication and in different types of institutions and apprenticeship training centers.

Human Resource Management (HRM)

Human Resource Management is a strategic and coherent approach to management of an organization's most valued assets, referring to people working in an organization as individuals or collectively contributing to the achievements of the organization's goals or objectives.

Storey as cited in Armstrong (2006), believes that Human Resource Management can be regarded as asset of interrelated policies with a logical and philosophical underpinning. He suggests four aspects that constitute the meaning and vision of Human Resource Management:

i. A particular constellation of beliefs and assumption
ii. A strategic thrust informing decisions about people management
iii. The central involvement of line managers
iv. Reliance upon a set of "levers" to shape the employment relationship.

Human Resource Management has been in existence since prehistoric times, when there existed consistent methods for selection of tribal leaders in some societies. The practice of safety and health while hunting was passed from generation to generation. So Human Resource Management is as old as mankind.

As observed by Armstrong (2006), HRM from its origin is concerned with achieving objectives in the areas of organizational effectiveness, human capital development, knowledge management, reward management. Coldwell (2004), further articulated some policy goal for human resource management:

> "*Managing people as assets that are fundamental to competitive organization, aligning human resource policies with business policies and corporate strategy, encouraging team work and corporation across internal organization boundaries, empowering employment to manage their own self development and learning, developing reward strategies design to support a performance driven culture, building greater employee commitment to organization.*"

Employees are the human resources of an organization and its most valuable assets. For TVET to be successful, it must male employee productivity a major goal. The level of productivity can vary depending on the skill levels the employee demonstrate in their jobs and the satisfaction levels of the employee with the organization and their jobs.

According to Armstrong (2006), human resource management operates in TVET through human resource philosophies describing the over-reaching value and guiding principles adopted in managing people; human resource strategies defining the direction in which in which HRM intends to move. HRM consist of formal procedures and methods used to put human resources strategies, plans and policies into effect; human resource practices comprising the informal approaches used in managing people human resource programmes, which enable human resource strategies, policies, policies and practices to be implemented according to plan.

Becker and Gerhart (1996), classified these components into three levels: the system architecture (guiding princi-ples), policy alternatives and processes and practices.

Resource for Human Resource Management in TVET Programmes

The overall purpose of human resource management in TVET is to ensure that the organization is able to achieve success through people. As Ulrich and Lake (1990) remark human resource management system can be the source of organizational capabilities that allow firms to learn and capitalize on new opportunities.

According to Jones and Barlett (2014), programme organizers should practice human resource management in the following approaches:

- Establishment of a legal and ethical management system
- Job analysis and job design
- Recruitment and selection
- TVET career opportunities
- Distribution of employee benefits
- Employee motivation
- Negotiation with organized labour
- Employee termination
- Determination of emerging and future trend in TVET
- Strategic planning

Problems of Human Resource Management in TVET Program

There are many problems associated with the management of human resource in TVET programmes in Nigeria. Since delivery system of TVET programmes is done at various levels, the problems become multifarious.

Governance Structure; TVET provision in Nigeria is spread over different ministries, organizations, NGOs and religious organizations. According to Imarhiagbe (1992) states that the diverse TVET management structures and sharing of supervisory responsibilities by various government bodies and ministries account for some of the inefficiencies in human resource management in TVET, like segmentation and duplication of training and absence of a common platform for developing coherent policies and joint initiatives such fragmented governance structure do not promote effective co-ordination sharing of resources and articulation within the system.

Poor Funding

The cost of running TVET programmes is relatively higher than other programmes. There is a corresponding high cost in offering quality training to personnel for effective work. Meanwhile, TVET programmes are poorly funded. There is gerally lack of infrastructure, equipment and materials.

Generally, Nigeria spends less on TVET even though TVET requires reasonable amount of money for its activities/ operation. Poor funding makes it difficult for personnel to be given adequate training and retraining needed to ensure productive workforce. The forces of globalization have not overlooked technical and vocational education and training. Globalization is characterized by the increasing integration of national economies around the world. The process of globalization is driven by the case of information exchange, capital flows and the migration of people, labour, goods and services across boundaries (Ike, 2004). Therefore, the challenge of globalization for TVET in Nigeria is the tension it has created between skills for poverty eradication and the skills for global economic competitiveness.

Inadequate Personnel

Managing inadequate personnel in an organization is a serious problem for the realization of organizational goals. Ojiniba (2012) observed that TVET programmes in Nigeria are faced with a shortage of personnel to such an embarrassing situation that it has become difficult to manage the available ones. In a survey conducted to identify staffing problems in TVET programmes in South Eastern Universities that offer industrial technology education. It was discovered that none of the universities had adequate number of required staff for the programme.

Prospect of Human Resource Management in TVET Programmes in Nigeria

Human resource management in TVET programmes stand a chance of success with increasing awareness given to the public on the importance TVET programme. Afeti (2002), observed that TVET cannot respond only to the needs of different types of industries but also to the different training needs of learners from different socio-cultural backgrounds and prepare them for gainful employment and sustainable livelihood. A skilled workforce is a basic requirement for driving the engine of industrial and economic growth and TVET holds the key to building this type of technical and entrepreneurial workforce. The use of systems of human resource practices is intended to enhance employee's knowledge, skills and abilities, motivation and opportunity to contribute is associated with positive outcomes such as a greater commitment (Gong, Law, Chang & Xin, 2009).

Conclusion

Engineers, Technologists and Managers of TVET programmes should be trained in human resource management concepts to be effective supervisors and leaders of their employees. This in truth is small-scale TVET organization that do not have the complex organizational structure to have a well-defined human resource department that consists of both generalist and specialist in human resource functions that collaborate with engineers, technologist or TVET managers to ensure that they are managing their craftsmen, artisans or apprentices appropriately.

Recommendations

The way forward to the numerous problems associated with the management of human resources in TVET programmes in Nigeria are:

1. Government TVET structures and organizations as Industrial Training Fund (ITF), National Board for Technical Education etc. should be restructured and reorganized. Area offices and training centers opened in all the states and local government areas headquarters.
2. The technical teachers training programmes should be revitalized to supply the required TVET experts required for the ever-increasing needs of TVET programmes at the three tiers of government.
3. A special petroleum trust fund should be kept aside for the procurement of training materials, equipment, instruments and machines/tools for all the TVET programmes at national, states and local government levels.
4. To relent experts in TVET programmes an allowance for hazards (the operation and use of hazardous machines and chemicals) during their levels of commitment in practical works.

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Redefining Technical, Vocational Education and Training (TVET) Teacher Quality and Curricula for Sustainable Development in Nigeria

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Abstract

Technical Vocational Education and Training (TVET) is widely recognized as a vital driving force for the socioeconomic growth and technological development of nations. The paper determined to find out the need to redefine TVET teacher quality and curricular for sustainable development in North Central Nigeria. Four research questions were answered while hypothesis formulated were tested at 0.05 level of significance. The study adopted descriptive survey design. The population of the study was 130 males and 30 females of registered teachers of Nigeria Vocational Association. The entire population was involved hence there was no sampling. The instrument for data collection was structured questionnaire and three validated the instrument Cronbach alpha reliability method was used to determine the internal consistency of the items and over all coefficient of 0.89 was obtained. Mean was used to answer four research questions while Z-test was used to test the null hypothesis at 0.05 level significance. The study reveals the following; male and female teachers accepted that students' attitude affect learning, quality and functionality of TVET programme have marred by several TVET teachers related factors such as poor evaluation process and lack of students counsel services in schools. Also the study shows that challenges of poor provision of facilities and equipment, inadequate personnel, poor funding, defect curriculum content and poor implementation affect the quality TVET programmes in Nigerian tertiary institutions. Thus, it was recommended that Government-stake holders, policy makers and TVET providers in Nigeria should focus on TVET quality that is based practice in countries around the world.

Introduction

Teachers have been identified as a major target audience for environmental education. UNESCO (2009) specifically called for pre-service teacher and in-service teacher education to be included environmental education.

These early recommendations were framed around the belief that all teachers need to understand the importance of environmental education most when they teach. It was emphasized that environmental sciences and environmental education need to be included in curricular for pre-service teacher education. In-service training of teachers in environmental education should be available for all who need it (UNESCO, 1978). However at this time, teacher education was only interpreted as being for school education, not TVET or Higher Educational. Technical Vocational Education and Training (TVET), can be regarded as the most important bridge to the future and a powerful instrument for development

The recognition of the importance of TVET teacher education was cleared by international organizations. UNESCO-UNEVOC (2011) stressed the need on Education for Sustainable Development. TVET Teacher Education towards Sustainable in Nigeria is to specifically focus on identifying ways in which sustainability could be integrated into TVET Teachers Education (TE) and capacity building programmes, (UNESCO-UNEVCO, 2011). TVET teachers are personnel who have acquired the skills of teaching TVET Subjects in the higher educational institutions of learning.

The role of teachers remain paramount and rethinking must take place as to the qualifications required of the TVET teacher of the twenty-first century (21st century), and the optimum balance of training acquired on the campus and in the work place (UNESCO-UNEVOC, 2012). It was also recommended that there should be a new orientation of TVET throughout life in order to meet the new demands of achieving the objectives of a culture of peace, environmentally sound sustainability development, social cohesion and international citizenship of the world (UNESCO-UNEVOC, 2012).

It was argued that; since education is considered the key to effective development strategies, TVET must be the master key that can alleviate poverty, promote peace, conserve the environment, improve the service delivery for all and help achieve sustainable development. Sustainable development is the ability of a nation to grow technologically and economically.

This statement provides a challenge to strengthen the contribution of TVET to sustainable development. This implies an imperative to design, adapt, implement and evaluate approaches to pre-service and in-service training of TVET teacher education to address sustainability (UNESCO-UNEVOC, 2008). UNESCO-UNEVOC has further stated that TVET should act as a vehicle for social reform and to address equality issues in redefining qualities of TVET teachers. UNEVOC (2002) stated that the development of teacher training programmes and the preparation of instructional materials

in indigenous languages is important to remote and rural areas.

UNESCO (2012) stressed that; The expertise in pedagogy of TVET should be linked to the vocational disciplines and to integrative perspectives on school-based and work-based learning, an improvement in vocational skills for employability and citizenship can only be realized if there is an improvement in the quality, effectiveness and relevance of teaching and that, an effective interaction between teacher/ trainers and learners lies at the centre of quality TVET (veal et'al 2005).

(UNESCO, 2009) recommended that there was need to:

- Develop and extend partnerships to integrate ESD into training, vocational education and workplace learning by involving civil society, public and private sectors, NGOs and development partners. ESD should become integral part of the training of leaders in business, industry, trade union, non-profit and voluntary organizations and the public services. Support the incorporation of sustainable development issues using an integrated and systematic approach in formal education as well as in non-formal and informal education at all levels. However, the development of effective pedagogical approaches, teacher education, teaching practice, curricular, learning materials and education leadership development and also by recognizing the significant contribution of non-formal education and informal learning as well as vocational and work-place learning. Sustainable development is a cross-cutting theme with relevance to all disciplines and sectors.

- Reorient curriculum and teacher education programmes to integrate ESD into both pre-service and in-service programmes. These support teacher education institutions, teachers and lecturers to net-working, develop and research sound pedagogical practice. This specifically supports teachers to develop ESD strategies that can work with large class sizes, and to evaluate ESD learning processes.

In the same vein, there is need to shape TVET Teacher Education for the changing world of work (TT-TVET, 2008). This declaration acknowledges social, cultural and economic issues that are challenging nations but over looked environmental issues. It calls for high quality initial teacher education to improve and shape TVET as well as in-service training. It also emphasized that an improvement in vocational skills for employability, which can only be realized if there is an improvement in the quality, effectiveness and relevance of teaching that expertise in pedagogy of TVET to be linked to vocational disciplines.

The declaration also involved, placing in the centre of TVET teacher redefining analysis and evaluation of:

- Vocational learning, educational and qualification process.
- Occupational work and business processes and,
- Technology as an object of work and learning processes as well.
- Critical pedagogy for social change (TT-TVET, 2008).

The Federal Government of Nigeria (FGN, 2014) conceptualized Technical Vocational Education and Training (TVET) as a comprehensive term referring to those aspects of the educational process involving, in addition to general education and related services and the acquisition in various sector of economic and social life.

TVET according to Ayonmike, Okwelle and Okeke (2013) is widely recognized as a vital driving force for the socio-economic growth and technological development of nations. This is because one of the most important features of TVET is its orientations towards world of work and the emphasis of its curriculum on the acquisition of employable skills. Mckan and David (2009) posited that TVET is concerned with the acquisition of knowledge and skills for the world of work to increase opportunities for productive empowerment and socio-economic development in knowledge economic and rapidly changing work environment.

TVET thus equips people not only with vocational skills, but with a broad range of knowledge skills and attitudes that are now recognized as indispensable for meaningful participation in work and life, thus the benefits include self-awareness and self-esteem and strengthened interpersonal, citizenship, communication and entrepreneurial skills (Uwaifo, 2010). Therefore, if TVET poses the highlighted benefits, it is of paramount importance that preparation of her teachers is given due cognizance and materials needed for effective teaching and learning are; and how prepared the graduates are for meeting the challenges of life and for solving the social problems.

In TVET, quality is directly related to the achievement of the learning outcomes (knowledge, skills and competence achieved at the end of the learning processes) that fulfills the key stakeholder's expectations. Students, parents, employers and community in general, continuous enhancement of the quality of TVET system is a key priority to any nation that desires to reap the benefits of this all important aspect of education system.

In order to ensure quality in TVET, it is essential to establish quality assurance (QA) framework applying to all aspect of TVET. Globally, the focus today is on strengthening quality assurance at all levels. There is currently a strong move in many countries towards having rigorous, internationally recognized TVET quality assurance process. Many countries have initiated steps for establishment of quality assurance mechanisms keeping in views the provision of TVET. This initiative is tied to the reforms in TVET sweeping round the globe (King Ombe, 2011).

Quality Assurance (QA) is a generic term that can mean different things in different national and regional contexts. In a broad sense, Manjumbar, Khambayak, Tsesoro-Gayondato and Solta (2010), described quality assurance as the process of verifying or determining whether products or services meet or exceed customer expectations. Quality assurance in TVET is the systematic managements and assessment procedures adopted by an educational institution or system to monitor performance and to ensure achievement of quality outputs or

improved quality (Majumdar, et'al 2010). The main actors to quality assurance in TVET are, teachers, the commission for quality assurance and evaluation, school management, school inspectorates and community (Romanian Ministry of Education, Research and Youth n. d.).

In Nigeria educational system, the quality assurance agencies for TVET include the National University Commission (NUC) and National Board for Technical Education (NBTE), National Business and Technical Education Board (NABTEB). The NUC roles include the accreditation, monitoring and evaluation of universities programmes, infrastructural facilities, teaching and non-teaching staff and also instructional materials. On the other hand, the NBTE performs similar task as that of the NUC to Polytechnics, technical colleges and other certificate awarding TVET provides.

Statement of the Problem

Technical Vocational Education and Training (TVET) programmes are designed for people who can profit and progress by it (Okoye and Okwelle, 2013). In order to accomplish these outcomes quality assurance must be the watch word. Quality assurance is the process of verifying or determining whether products or services meet or exceed customer expectations. Quality assurance in TVET is the systematic managements and assessment of procedures adopted by an educational institution or system to monitor performance and to ensure achievement of quality outputs or improved quality Quality Assurance (QA) is a key component of every successful programmes in terms of internalizations and mechanism for building institutional reputation in a competitive local and global arena and necessary foundation for consumer protection (National University Commission 2007).

However, over the years, Nigerian TVET programmes are bedeviled with numerous challenges that have been affecting the quality of TVET teachers both in output and input. These challenges include inadequate funding of TVET, inadequate infrastructures, poor power supply, and shortage of qualified TVET teachers/instructors, poor supervisions of TVET programmes, inadequate curriculum planning and implementation. Poor in-service training of TVET teachers/instructors to update their knowledge. The government on its part sees as it is doing its best but the effort appears to be in futility because the output is still poor. It appears the effort is being marred by some obstacles which need to be removed for the industrialization of the country as stated above.

To ensure teacher quality in TVET there would be need for adequate funding of TVET teacher programmes, provision of adequate infrastructures, power supply, qualified TVET teachers/instructors, supervisions of TVET programmes, and adequate curriculum planning and implementation. Therefore in-service training of TVET teachers/instructors to update their knowledge is a necessity to curb

with global demands. It is on this premise the researchers sought to find out the reason of redefining TVET teacher quality and curricular for sustainable development in Nigeria.

Purpose of the Study

The purpose of the study is to redefine TVET teachers' quality and curriculum for sustainable development in Nigeria. The study specifically sought to:

- Determine students' factors responsible for quality TVET education for sustainable development.
- Determine TVET teachers' factor for attaining quality TVET education in Nigerian tertiary institutions.
- Determine government's factors that act as challenges of attaining quality TVET teachers' programmes in Nigerian institutions.
- Determine improvement strategies that can be used to address the challenges of attaining quality TVET programmes in Nigerian institutions.

Hypotheses

The following research hypotheses were tested at 0.05-level of significance:

- There is no significant difference in the mean response of male and female students on factors to redefine TVET teacher quality for curricular and sustainable development.
- There is no significant difference in the mean response of male and female students on the TVET teachers' qualification in Nigerian institutions.
- There is no significant difference in the mean response of male and female students on government factors that act as challenges in attaining quality TVET teachers' programmes in Nigeria.
- There is no significant difference in the mean response of male and female students on strategies to address challenges to attaining quality TVET programmes in Nigeria.

Methodology

The descriptive survey research design was used in this study. The researchers considered this design appropriate because the variables were not manipulated. The population consist 160 (130 males and 30 females) registered members of Nigerian Vocational Association (NVA). The populations of the respondents were shared according to the percentage population of males and females in the NVA.

NVA is a body of professional vocational educators in Nigeria. Since the population n of the respondents is manageable, no sampling was done.

Data were collected using a structured questionnaire titled: TVET Teachers' Quality and Curriculum for Sustainable Development (TTQACFSD) developed by the researchers. The TTQACFSD was divided into two parts. The first part sought information on selected personal data of the respondents while the second part which comprises sections A, B, C and D consisting 47 items relevant for answering research questions posed in the study. The response format of TTQACFSD sections were based on a four-point Likert Scale Pattern indicating Strongly Agree, SA=4, Agree, A=4, Disagree, D=2, and Strongly Disagree, SD=1 respectively.

The instrument was face validated by three experts in Technical Vocational Education and Training TVET institutions, University of Nigeria, Technical Education Department, University of Jos, Technical Education Section and Federal College of Education, Pankshin respectively. Their expertise comments added value to some items structured to produce the final instrument. Twenty (20) copies of the questionnaire were administered twice with an interval of three weeks to vocational educators who were not part of the sample of the study. The reliability of the instrument was ascertained by using Cronbach's alpha reliability method and 0.89 was obtained which was high and above the recommended acceptable value of 0.7 for good reliability.

Results:

Research Question 1.

What are the students' factors responsible for TVET Quality education for sustainable development?

Table 1.

Mean responses on students' factors responsible for TVET education.

	Students' factors responsible for attaining TVET Quality education in Nigeria.	Male NVA			Female NVA		
SN		**Mean**	**SD**	**Remarks**	**Mean**	**SD**	**Remarks**
1.	Poor interest to learn.	3.72	0.69	Agree	3.50	0.86	Agree
2.	Poor entry qualification for TVET programmes.	3.63	0.80	Agree	3.33	1.06	Agree
3.	Poor reading culture.	3.13	0.42	Agree	3.33	0.84	Agree
4.	Lack of required learning material such as textbooks.	3.40	1.04	Agree	3.03	1.10	Agree
5.	Poor parental background.	2.53	1.49	Agree	2.83	1.09	Agree

6.	Peer group influence.	3.66	0.64	Agree	3.40	0.56	Agree
7.	Lack of self-confidence.	3.50	0.81	Agree	3.33	0.99	Agree
8.	Examination malpractice.	3.48	0.85	Agree	3.30	0.70	Agree
9.	Disobedience to school rules and regulations.	2.43	1.41	Disagree	2.33	1.47	Disagree
10.	Irregular attendance.	3.10	1.05	Agree	3.03	1.10	Agree

The result shown above in Table 1 revealed that the male and female teachers accepted nine items but rejected one item as students' factors that are responsible for TVET quality education for sustainable development programme in Nigerian tertiary Institutions. This is in line with the view of Anyanwu (2009) who stated that students can make or mar quality teaching depending on their attitude to learning.

Research question 2.

What are the TVET teachers' qualities responsible for attaining quality TVET education in Nigeria tertiary institutions?

Table 2.

Means response on teachers quality factors responsible for attaining quality TVET education in Nigeria tertiary institutions.

	Teachers factors responsible for attaining quality in TVET programme in Nigeria	Male NVA			Female NVA		
SN		**Mean**	**SD**	**Remarks**	**Mean**	**SD**	**Remarks**
11	Poor teaching methods by teachers.	3.51	1.00	Agree	3.13	1.04	Agree
12.	Teachers lack interest to teach.	3.39	0.82	Agree	2.60	1.16	Agree
13.	Poor research attitudes of teachers.	3.55	0.70	Agree	3.47	0.51	Agree
14.	Negligence to duties by teachers.	3,17	1.01	Agree	2.03	1.27	Disagree
15.	Poor preparation of lesson by teachers.	3.23	0.63	Agree	2.77	1.10	Agree
16.	Poor use of teaching aids by teachers.	3.18	0.75	Agree	2.83	1.09	Agree
17.	Poor student-teacher relationship.	3.47	1.01	Agree	3.17	1.09	Agree
18.	Poor evaluation of students' academic performance.	3.04	0.94	Agree	3.00	1.08	Agree
19.	Inadequate classroom blocks.	2.46	1.16	Disagree	3.03	0.93	Agree

20.	Lack of Conducive staff offices.	3.72	0.70	Agree	3.27	1.08	Agree
21.	Inadequate electricity supply.	3.29	0.99	Agree	3.37	1.00	Agree
22.	Lack of water supply.	3.07	1.52	Agree	3.00	1.23	Agree
23.	Inadequate workshop spaces.	3.51	0.76	Agree	3.27	1.08	Agree
24.	Lack of TVET machines and tools.	3.35	0.97	Agree	3.50	0.97	Agree
25.	Lack of school furniture.	2.38	1.44	Disagree	2.30	1.78	Disagree
26.	Lack of TVET textbooks.	3.90	0.47	Agree	3.57	0.68	Agree
27.	Lack of consumables.	3.51	1.00	Agree	3.13	1.04	Agree
28.	Inadequate instructional.	3.39	0.82	Agree	2.60	1.16	Agree

The result in Table 2 above showed that male respondents rated high in 16 items but rated two items (19 and 25) low, while the female respondents rated high in 16 items but two (14 and 25) rated below out point as teachers factors that are responsible for attaining quality TVET education programmes in Nigeria tertiary institutions. This finding is in agreement with the findings of Alfred and Kayoma (2012), Idialu (2012), Olagboye (2004), Onostiak Pokaiye (2012), Onwuegbu (2012), Singer (2012). They reported that the quality and functionality of vocational education programme have been marred by several TVET teachers related factors. Notably, poor evaluation process and lack of students' counseling services in schools.

Results on Research question 3

What are the government factors that act as challenges for attaining quality TVET teachers programmes in Nigeria tertiary institutions?

Table 3: Mean responses on government factors as challenges of quality TVET.

	Government factors as challenges of quality TVET attainment in Nigeria.	Male NVA			Female NVA		
SN.		**Mean**	**SD**	**Remarks**	**Mean**	**SD**	**Remarks**
29.	Poor supervision of TVET programmes.	3.84	0.58	Agree	3.50	0.90	Agree
30.	Poor provision of instructional materials.	3.73	0.70	Agree	3.57	0.82	Agree
31.	Poor provision of facilities.	3.67	0.80	Agree	2.90	0.99	Agree
32.	Poor funding of TVET programmes.	3.68	0.70	Agree	3.33	0.99	Agree
33.	Poor curriculum planning	3.73	0.67	Agree	3.43	0.97	Agree

	in TVET.						
34.	Poor implementation of TVET curriculum.	3.40	0.94	Agree	3.53	0.73	Agree
35.	Poor welfare packages for TVET teachers.	2.82	1.21	Agree	2.97	1.27	Agree
36.	Poor training and retraining programme for TVET teachers and instructors.	2.50	1.36	Agree	3.50	0.94	Agree
37.	Poor scholarship scheme for TVET teachers/instructors.	3.37	1.05	Agree	3.40	0.97	Agree
38.	Poor curriculum review by relevant authorities.	3.42	0.82	Agree	3.57	0.86	Agree
39.	Politicization of employment of TVET teachers/ instructors,	3.17	0.76	Agree	3.73	0.69	Agree

Table 3 results revealed that both male and female respondents agreed with all the items as government factors that are referred as challenges of attaining quality TVET programmes in Nigeria tertiary institutions. The finding is consistent with Okoye and Okwelle (2013), Onachunna and Nwachukwu (2012) and Singer (2012) who posited among others that, poor provision of facilities and equipment, inadequate personnel, poor incentives, poor funding, defect in curriculum content, supervision as well as delivery system, poor implementation of government policy are challenges to the attainment of quality TVET programmes in Nigeria tertiary institutions.

Research question 4

What are improvement strategies that can be used to address the impediments of attaining quality TVET programmes in Nigeria tertiary institutions?

Table 4: Responses on improvement strategies for attaining quality TVET programmes in Nigeria tertiary institutions.

Improvement strategies for addressing impediments of attaining quality TVET programme.		Male NVA			Female NVA		
SN.		**Mean**	**SD**	**Remarks**	**Mean**	**SD**	**Remarks**
40.	Adequate funding of TVET programmes.	3.63	0.80	Agree	3.47	0.51	Agree
41.	Training and retraining of TVET teachers/instructors.	3.40	1.04	Agree	3.27	1.08	Agree
42.	Adequate provision of required TVET infrastructures and facilities.	3.50	0.81	Agree	3.57	0.68	Agree
43.	Adequate internal and external	3.23	0.63	Agree	3.50	0.90	Agree

	supervision.							
44.	Public private partnership.	3.04	0.94	Agree	2.90	0.99	Agree
45.	Adequate planning implementation of TVET programmes by government.	3.29	6.99	Agree	3.43	0.97	Agree
46.	Adequate provision of instructional materials.	3.35	0.97	Agree	3.00	1.23	Agree
47.	Adequate provision of scholarship/grants for TVET teachers/ instructors training.	3.72	0.70	Agree	3.57	0.68	Agree

Table 4 results revealed that both male and female of NVA respondents rated all the items high as improvement strategies that can be used to address the problems of attaining quality TVET programmes in Nigeria tertiary institutions. This result is in concordance with the views of Anyakwo (2012) and Aworanti (2012) who asserted that factors such as adequate and functional facilities, appropriate class size, the right number of qualified and competent TVET teachers, funding of the programme will promote and redefine the quality of TVET teachers and curricular programmes in Nigeria.

Hypothesis 1

There is no significant difference in the mean response of male and female of NVA on students' factors that are responsible for quality TVET education for sustainable development programmes in Nigeria tertiary institutions.

Table 5: Analysis of mean response of male and female NVA on students factors responsible for attaining quality TVET programmes in Nigeria tertiary institutions.

Group	N	Mean	SD	Df.	Zal.	Zcrit.	Decision
Male NVA	130	3.28	0.48	148	0.689	1.645	Accepted
Female NVA	30	3.15	0.37				

N=160, df=148, P<0.05 Accepted

The results in Table 5 above showed that the calculated Z-value (0.689) is less than the critical value (1.645) at 0.05 percent level of significance. The null hypothesis was therefore accepted. This implies that there is no significant difference between the mean response of male and female NVA on students factors that are responsible for attaining quality TVET programmes in Nigeria tertiary institutions.

Hypothesis 2

There is no significant difference in the mean response of male and female NVA on TVET teachers. Qualification in training quality TVET programmes in Nigeria tertiary institutions.

Table 6: Analysis of mean response of male and female NVA on TVET teachers qualification in attaining quality TVET programmes in Nigeria tertiary institutions.

Group	N	Mean	SD	Df	Zcal	Zcrit	Decision
Male NVA	130	3.26	0.40				
Female NVA	30	3.02	0.26	148	0.545	1.959	Accept

N=160, df=148, P<0.05 Accept

Table 6 shows that the calculated Z-value (0.545) is less than the critical value (1.959) at 0.05 percent level of significant difference between the mean response of male and female NVA on TVET teachers factors in attaining quality TVET programmes in Nigeria tertiary institutions. This null hypothesis was accepted.

Hypothesis 3

There is no significant difference in the mean response of male and female NVA on Government's factors that act as challenges in attaining quality TVET teachers programmes in Nigeria tertiary institutions.

Table 7: Analysis of mean response of male and female NVA on Government's factors that act as challenges of attaining quality TVET programmes in Nigeria tertiary institutions.

Group	N	Mean	SD	Df	Zcal	Zcrit	Decision
Male NVA	130	3.26	0.40				
Female NVA	30	3.02	0.43	148	0.545	1.959	Accept

N=160, df=148, P<0.05 Accept

Table 7 disclosed that the calculated Z-value (0.545) is lower than the critical value (1.959) at 0.05 percent level of significance. The null hypothesis was therefore accepted. The implication of of the result is that there is no significant difference between the mean response of male and female NVA on government factors that act as challenges of attaining quality TVET teachers programmes in Nigeria tertiary institutions.

Hypothesis 4

There is no significant difference in the mean response of male and female NVA on improvement strategies for addressing problems of attaining quality TVET programmes in Nigeria tertiary institutions.

Table 8: analysis of response of male and female NVA on improvement strategies for addressing problems of attaining quality TVET programmes in Nigeria tertiary institutions.

Group	N	Mean	SD	Df	Zcal	Zcrit	Decision
Male NVA	130	3.39	0.22				
Female NVA	30	3.31	0.26	148	1.552	1.645	Accepted

N=160, df=148, P<0.05 Accepted

The results in table 8 showed that the calculated Z-value (1.552) is less than the critical value (1.645)9i at 0.05 percent level of significance. The null hypothesis was therefore accepted. This implies that there is no significant difference between the mean response of male and female NVA on improvement strategies for addressing problems of attaining quality TVET programmes in Nigerian tertiary institutions. However, gender was not an issue to divide the opinion of the respondents on improvement strategies to enhance quality TVET education programmes in Nigerian institutions. This will also foster in developing knowledge based workers for the knowledge drawn economy.

Discussion

The funding of the study were organized and discussed in accordance with the research questions answered and null hypotheses tested.

The funding shows that there is significant difference on the students' factors responsible for TVET quality education for sustainable development. It also revealed that the male and female teachers accepted that nine items but rejected one item as students factors that are responsible for TVET quality education for sustainable development programme in Nigerian Tertiary Institution. This is in line with the view of Anyanwu (2009) who stated that students can make or mar quality teaching depending on their attitude to learning.

The result of the means response of teachers' quality factors responsible for attaining quality TVET education in Nigeria Tertiary Institutions revealed that there is no significant difference in the null hypotheses of the male and female students on the issue.

It showed that male respondents rated high in sixteen (16) items but low in two of the items below out point as teachers' factors responsible for attaining quality TVET education programmes in Nigeria Tertiary Institutions. This funding is in

agreement with the funding of Alfred and Kayoma (2012), which stated that the quality and functionality of vocational education programme have been named by several TVET teachers related factors.

The result also showed that there is no significant difference in the response of male and female students on government factors as challenges in attaining quality TVET teachers programmes in Nigeria.

It revealed that both male and female respondents agreed with all the items as government factors responsible as challenges to attaining quality TVET programmes in Nigeria Tertiary Institution. it revealed that government's poor funding training of teachers, poor supply of facilities and politicizes employment of TVET teachers are responsible for lack of quality TVET programme in Nigeria Tertiary Institution.

This funding is consistent with Okoye and Okwelle (2013), Onachuma and Nwachukwu (2012) and singer (2012) who posited among others that, poor provision of facilities and employment, inadequate personnel, poor incentives, poor funding, defect in curriculum content, supervision as well as delivery system, poor implementation of government policy are challenges to the attainment of quality TVET programmes in Nigeria Tertiary Institutions.

The result also revealed that there is no significant difference in the mean response of male and female students in Nigeria Tertiary Institutions. It revealed that both male and female student respondents rated all the improvement strategies that can be used to address the challenges high. This funding is in concordance with the view of Anyakwo (2012) and Aworantu (2012) who asserted that factors such as adequate and functional facilities, appropriate class size employment of the right number of qualified and competent TVET teachers, funding of the programme will promote and redefine the quality of TVET teachers and circular programmes in Nigeria.

Conclusion

TVET is the bed rock to national development. In order to provide TVET programmes in Nigeria that can create impact on the development of human resources who can be the driving force for technological and economic growth of the nation, TVET teachers quality must be given top priority. The various factors such as; students, teachers and government have been identified as the challenges to attaining quality TVET programmes in Nigeria tertiary institutions. However, strategies for addressing the factors were also identified in this study.

Recommendations

Recommendations were made based on the findings of the study.

- The government, stakeholders, policy makers and TVET providers in Nigeria should focus on TVET

quality assurance best practices that have worked in countries around the world.

- The government should adequately fund, plan, implement and manage TVET programmes in tertiary in Nigeria.
- The quality of input TVET programmes must be considered. This can be achieved through the provision of adequate facilities, equipment, consumable materials and hand tools, provision of qualified personnel, adequate provision of instructional materials, and provision of in-service training for TVET personnel.
- Provision of scholarship/grants for TVET teachers/instructors, credible employment of TVET teachers into the system, proper supervision and monitoring of the implementation of TVET programmes by government.

The introduction of competency based TVET education programmes in Nigerian tertiary has become necessary for sustainable development.

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Child-Friendly Schools: A Panacea for Out -of-School Children in Nigeria Amidst Covid-19.

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Abstract

The youth and children are the greatest assets of every nation. The education of this group determines the prospects, success and progress of a nation. The economy, politics, workforce and the stability of a nation also depends on the education of the youth and children. In a situation where about 13.2 million children are out-of-school (UNICEF 2020), calls for concern, attention and action. The above statistics is further increased by the coronavirus (COVID-19) pandemic which has worsened access to education. The virus forced schools to be closed over a long period, as a measure to slow down the spread of the disease. Child-friendly schools strategies will help in encouraging children to attend school and also help in reducing the number of out-of-school children in Nigeria. Child – Friendly schools strategies have blue prints that will minimize school drop outs and encourage school attendance of children during the COVID 19 pandemic. The study reviewed the historical background and concept of CFS as a panacea for mitigating out of school children amidst COVID-19 in Nigeria. The paper recommends that the education system at federal, states and local governments should be strengthened to deliver quality basic education. Schools in the rural areas be given priority through posting of teachers, adequate supply of materials, provision of quality leaning in protective and safe environment. Proprietors and school authorities to provide training for teachers in conformity with the CFS models and Governments at all levels should increase funding to schools in order to procure and build necessary CFS facilities, such as standard structures, materials and sanitary equipment.

Key Word: *Child Friendly Schools, COVID-19, Out-of-School Children.*

Introduction

A country which has not ensured the education of its children will have a bleak future, chaos, underdevelopment, violence, crime and other vises. Findings by UNICEF (2013) indicates that children aged 5-14 years are out of school and only 61% aged Six to Eleven years regularly attend primary school in Nigeria. This is a cause for concern and concerted effort should be made to minimize the rate of out-of-school children and encourage school attendance. Further compounding the problem of out-of-school children in Nigeria is COVID-19 pandemic, which forced schools to be closed for a long time, as a result more number of out-of-school children is added to the afore-mentioned statistics. The Child-Friendly School (CFS) model if fully implemented, could be a panacea for curbing out-of -school children in Nigeria because it is broad and holistic in nature. Other factors that increased out-of-school children are insecurity and insurgence.

Out-of-school has long been a night mare in Nigerian education system. This has been further compounded by the outbreak of COVID-19. School children were forced to stay away from school for a long period, due to the advent of the pandemic.

The UNICEF (2020) Nigeria equity report fact sheets reports that about 13.2 million children are out-of-school. This sharp increase compared to a previous report by UNESCO which was 10.2 million, is as a result of COVID-19 pandemic. The school closure due to COVID-19 affects children in many ways. This assertion is supported by WHO (2020) which says: School closure affects equity, education, child health, development and hence, children drop out-of-school. In addition, WHO emphasized being out-of-school for long increases the risk of teenage pregnancy, sexual exploitation, child marriage, violence and other threats that Nigeria is not an exception due to insufficient health services for proper prevention and management. The risk involved could lead to the high level of out-of-school children because some children may be unwillingly forced out-of-school.

What Child-Friendly Schools Ensure

I. They offer practical measures that enhance quality in standard towards improving education. They do not stop at blue-prints but ensure proper execution and implementation.
II. CFS is a heuristic model that offers opportunity to move towards quality standard through modifications and improvements on previous educational standards.
III. The model ensures serious reflection on the basic principles and issues relating to the child as a sole beneficiary of all learning outcomes.
IV. They aim at providing practical guidance on the design, construction and maintenance as safe, welcoming environments in which children can learn effectively in partnership with community.

V. CFS provide practical guidance on classroom process, specifying the roles of schools

heads, teachers, non teaching staff, pupils, parents, communities, federal, state and local authorities.

VI. They lay major emphasis on the following;

- The role of teaching and learning aids and materials in creating stimulating environments.
- Cordial interaction between the teacher and learners with the teacher as an authority figure and facilitator of learning and the learner as an active participant in a democratic process that enhances mutual respect.
- Is both structured enough to facilitate measurable learning progress, flexible enough to facilitate the use of variety of techniques and methods which promote achievement of quality learning.
- It encourages school feeding programme (FFE) – Food For Education.

Concept of Child Friendly Schools

The concept of Child-Friendly Schools (CFS) was adapted from the UNICEF 'Save the Children' and the World Health Organisation (WHO) in the mid 1990's as equivalent of the 'Baby Friendly Hospitals' that contributed to quality standards in health delivery. The concept expanded beyond that of health to education. In 1995, the UNICEF Innocenti Research Centre (IRC) held an important workshop with the theme – What is a Child-Friendly School? This workshop gave rise to the requirements for the CFS concept.

By early 2000, the definition of what makes CFS expanded and this led to a more complex quality package by UNICEF. This was adapted by different countries to suit their needs and peculiarities. This model gained grounds from an estimated 33 countries in 2004 to 56 countries in 2007.

Child-Friendly Schools model and concept is holistic in nature. It encompasses child's rights and inclusive education, effective teaching and standard learning environments, safe supportive and protective learning environments, gender sensitive environments and others. It aims at child centeredness and equal participation. It encourages inclusive-ness, mainstreaming and construc-tivism teaching methods (UNICEF 2009).

A Child Friendly School is a school that is conscious of children's basic rights; the right to education, the right of participation in all affairs that concerns him/her, the right for survival and protection from all forms of abuse. According to UNICEF (2006), quality education is the education that works for every child and enables all children to reach their full potentials.

UNICEF (2009) states the following as concepts of Child-Friendly Schools – (CFS):

- All boys/girls in the world are entitled to the right to education.
- All children are entitled to protection from abuse, neglect and exploitation.
- CFS aims at improving the quality and standard of education by placing the child at the centre of all reforms, which include participation, inclusion, gender and responsiveness, health, safety and protective environment.
- CFS ensures learning effectiveness through the quality of teachers, materials and the environment.
- The principles of constructivism are adhered to.
- Buildings and structures are erected for the comfort of the learners.
- All materials, human resources, facilities are circumambient on the child as a sole beneficiary of learning out comes.

How CFS can mitigate out-of-School Children and Improve School Enrolment Amidst COVID-19.

CFS policies emphasis conducive and standard learning environment. Therefore, structures that are built in accordance with CFS standard will reduce overcrowding and provide enough space for learners. One of the enforced non-pharmaceutical measures of COVID-19 is physical distance (social distance). This conforms with one of the strategies towards preventing contracting and the spread COVID-19. Learners are encouraged better in a conducive environment and as a result, they are attracted to develop interest in the school.

CFS emphasis the well-being and health of learners both at home and in school, it encourages synergy between parents, school and the entire community. If learners are in good health, school attendance will not only improve but will mitigate drop-outs. This entails that the policies of CFS conform with that of COVID-19 preventive measures.

Food and nutrition is a necessity in education because when learners are mal-nourished or un-fed, they will be frustrated to learn thereby leading to withdrawal from school. CFS has emphasized such feeding programme because of the importance of feeding. It encourages that children be fed well while in school and proffered the FFE – Food For Education programme. It is a known fact that people who eat balanced diet have better immunity against diseases including COVID-19.

Poverty has been observed as a major set-back in education. Since some parents cannot afford the expenses in education, this result in their children and wards dropping out-of-school. In furtherance to this, the CFS concept advocates for free and compulsory education for all children. The advent of COVID-19 which led to the closure of businesses and schools, added to the poverty level of most Nigerian families. This affected the family's economy and as a result, cannot afford to send their children and wards to school any longer.

The teacher is a dealer of hope, fountain of aspiration and a catalyst in human development and therefore the

place the teacher is of enormous importance in encouraging learners not just to acquire knowledge but to develop interest in learning and have the 'thirst' to attend school. The CFS model encourages the need for well trained teachers who have pedagogy that induce and motivate learners. The CFS model citing the Child's Rights Convention (CRC), emphasizes democratic participation, therefore the learner is given some level of freedom to contribute in affairs that affect him or her during the learning process. Furthermore, teachers are supposed to be trained on how to control the spread of COVID-19 and are expected to re-cycle what they have acquired for the benefit of the learners, hence the measures towards curbing the spread of COVID 19 are taught to the learners.

Water Sanitation and Hygiene (WASH) is a major emphasis of CFS. It stresses not just the provision of water but very clean water and hygienic water. It also emphasizes standard, neat and water system toilets in order to reduce the spread of diseases, including COVID-19. This conforms with the COVID-19 standards put in place to mitigate the spread of the virus.

Out- of- School Children

Out-of-School Children is a menace confronting the educational sector which Nigeria is not an exception. The term out-of-School in its common sense is known as school dropout (untimely withdrawal from school). In Nigeria, the issue of dropouts has been of great concern, as a result, educationists and other stake holders are making efforts to ensure that this is minimized. As noted by Fafunwa (1983) that: Out-of-School is one of the most serious problems that have continued to bedevil our educational system since independence in 1960. Fafunwa further buttresses this fact with the remark made by Nuffied Foundation in 1953 that in the West African Coast of Africa, a considerable proportion of students drop out-of-school each year. Unfortunately, this trend has continued until today.

Patrick, (2012) observed that a survey by both the print and the electronic media tends to indicate that over 85% of the criminal activities perpetuated in Nigeria are done by youths who dropped out-of-school. This agrees with the fact when children and youths are not properly educated they become miscreants and also constitute a nuisance to the society.

UNICEF (2012) categorizes out-of-School Children into three mutually exclusive sub-groups on school exposure as;

- Those who attended school in the past and dropped out (dropouts)
- Those who never attended school but will enter in future. (late entrants)
- Those who will never attend school by this categorization.

Therefore out-of-school can be defined as children who never attended school or attended school in the past but are not attending in the current school year.

According to UNICEF (2019) report, the current number of Out-Of School Children (OOSC) stands at over 10 million and 60% of that number are girls, many of whom enrolled in school but dropped out along the line. As a pro-active measure, Adedigba (2019) said Nigeria had announced plans to enroll 10.2 million out-of-school children. Similarly in the same paper, the then permanent secretary, Federal Ministry of Education Sonny Echono urged all the state commissioners to take serious action to contain the menace of out-of-school children.

Overview of COVID -19

Coronavirus are a family of viruses that range from common cold to severe Acute Respiratory Syndrome (SARS). The most recent Coronavirus (sometimes referred to as the novel Coronavirus) is called COVD-19, and was first dictated in Wuhan, China, in December of 2019. Since its first cases in China, COVID-19 has spread to almost every country worldwide, including Nigeria. According to World Health Organisation (WHO), 167,515 cases were reported globally, including 6,606 deaths, as at March 16, 2020.

Statistics as at 26th October, 2020 indicates that the disease has infected 43,140,173 worldwide, with 1,155,235 deaths. While in Nigeria, the total number of people infected were: 61,992 with 1,130 recorded deaths and 57,465 recoveries as at 26th October, 2020. The Nigeria Center for Disease Control (NCDC), 26th October, 2020.

Meshak (2020) reiterates that the disease disorganises the immune system and respiratory tract of an individual and makes it difficult for the infected individual to breath. That there are three groups of respiratory infections as follows:

- Acute Respiratory System Infection,
- Lower Respiratory tract infection, which the Coronavirus infection falls into.
- Upper Respiratory tract infection

Research is still on-going to determine the cause of COVID -19, the vaccine, medication and other measures that will curb the disease. Meanwhile, different countries have devised measures to cure those found to be positive.

In countries affected by the pandemic, stringent measures were put in place to curtail and slow down the spread of the pandemic. Such measures include testing of individuals to identify those infected, quarantine, washing of hands with soap and clean running water, lock-down, restriction of movement, closure of public places, including schools, wearing of face masks, use of hand sanitizers, social distancing (physical distance) and avoidance of shaking of hands as non pharmaceutical measures.

Conclusion

COVID-19 has changed the landscape of education globally and specifically in Nigeria. It has changed the way learning will take place hence forth. The outbreak of the disease has affected school attendance and the way forward in education. The precarious situation of education in Nigeria worsened by the advent of COVID-19 pandemic, which already has about 13.2 million children out-of-school. The CFS model is a model that will cushion the effect of the COVID-19, through the standards advocated.

Poverty being a major setback in the education of children has been compounded by the COVID-19 advent and worsened the economic status of most families. The suggestion proffered by UNESCO to provide free and compulsory education for learners is greatly going to assist in this direction. Providing food for the learners while in school and at home will greatly improve school attendance and mitigate school dropout as children will be given meals in schools and also to take home. This programme will also ensure healthy children who will fully concentrate on their studies. Food for Education (FFE) is a CFS policy which will greatly assist in encouraging children to attend school, especially those from indigent families.

Provision of standard toilets and building are cardinal requirements in the CFS policy. CFS encourages safe, clean, protective toilets for learners. This will help in preventing the spread of the disease and also ensure regular school attendance as learners will not fall ill regularly.

Recommendations

1. The education system at federal, states and local governments be strengthened to deliver quality basic education through providing additional classrooms, teachers and materials in accordance with CFS models.
2. Quality learning in protective and safe learning environment be provided through a synergy between the federal, states, local government and PTA's, so as to ensure the safety of the learners as enshrined in the CFS requirements.
3. There is need for governments at all levels, proprietors and school authorities to provide training for teachers in conformity with the CFS models.
4. Governments at all levels should increase funding to schools in order to procure and build necessary CFS facilities, such as standard structures, materials and sanitary equipment.
5. Similar researches could be replicated when schools fully re-open to ascertain the real effect of COVID-19 on adding to the number of out-of-children in Nigeria.

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Strategies for Enhancing the Girl-Child Education in the COVID-19 Era in Nigeria

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Abstract

Education remains a major tool for the development of any nation. It occupies a central position in the economy, politics, social strata, religion, and contributes to the democratic equality of every nation. Girl child education plays a major role in the development of a nation, therefore, impediments that will decelerate girl child education must be addressed and solutions be proffered. The girl child has suffered set-backs such as political, religious, early marriage, violence, intimidation, socio-cultural and traditional marginalization. Coronavirus (COVID-19) exacerbated and compounded to the educational set-backs of the girl child. The paper examined the impact of COVID-19 on girl child education and proffered solutions towards cushioning these impacts. The paper recommended that the federal, states and local governments should ensure that more classrooms are built so that learners will not be over-crowded (physical distance), that technology will greatly enhance and facilitate the education of the girl child through E-learning, provision should be made by all schools for clean running water and toilets should be of good quality and adequate to the population of the learners. The paper also recommended that standard girls' toilets must be constructed and to be convenient to the girls, and provision for sanitary pads and toiletries be provided.

Key Words: *COVID-19, Education, Enhancing Girl-Child Education, Girl Child.*

Introduction

Education has been and is still a driving force in empowering individuals economically, socially and politically, while contributing meaningfully to the development of the individual and the society at large. A girl is the center page of the society; consequently, neglecting the impedements on the girl child education is detrimental and devastating. The

COVID-19 pandemic brought a set-back in the educational pursuit of the girl child. This unfortunate situation calls for strategies that will be put in place so as to mitigate the complete deterioration of the girl child's educational dreams.

Statistics indicate that the female population of Nigeria is about half of the entire population. According to Nigeria population (2020), the male population stands at 105, 316, 523, while the female population stands at 102, 484, 482. Therefore the education of about half of Nigeria population amidst COVID-19 is important. E-learning is recommended for the education of the girl child amidst COVID -19, even when schools re-open. Laws should passed in other to protect the girl child from intimidation, violence, rape, early marriage and forceful marriage should be fully enforced and ensure she is educated without much stress.

One of the most recent trending global events is the Corona-virus pandemic, otherwise called COVID-19. This novel disease has shaken and devastated every aspect of human endeavour, especially education. The pandemic forced schools at all levels to close hurriedly with the un-certainty of when they will be re-opened. The COVID-19 crisis has forced global markets to shut down, social life to halt, schools and factories to suspend operations Masara (2020). As at March 2020, schools all over Nigeria were un-promptly closed down to contain the spread of the dreaded pandemic which spread rapidly. Examinations were suspended, lectures and lessons stopped at all levels. Schools partially opened in September, 2020 to enable graduating students write their examinations, while observing and maintaining strictly the non-pharmaceutical requirements of containing the disease from spreading. In October, 2020, the Federal Government of Nigeria endorsed the re-opening of Unity schools all over Nigeria, while some states had also directed the re-opening of schools (by mid and ending October, 2020), with strict observance to COVID-19 measures.

As a result, the girl child educational pursuit is greatly hampered and further crippled by the COVID-19. The United Nations Children Education Fund (UNICEF, 2014), affirmed that the global population of children is estimated at 121 million, out of which 65 million are girls, with over 80 per cent of these girls are living in the Sub-Saharan Africa, which includes Nigeria. Therefore any impediment to the girl child education is of great concern. The girl child education in Nigeria has been truncated by a lot of factors such as traditions and customs which negate the girl child from being properly educated; early marriages, girls forced to dropping out of school before completion, dropping out of school due to un-wanted pregnancy, rape, sexual harassment, intimidation, among others. The domestic burdens on the girl child can weigh her down and slow her educational ambition. COVID -19 has exacerbated the girl child's educational pursuit. Kiki (2020) affirms that the low enrolment of girls has compounded the problem as he declared: that in a school of 150 students in Northern Nigeria, only 2-3 students are girls. Even though this scenario may be better in other parts of

Nigeria, the fact still remains that the girl child education still has some major challenges and is further compounded by the novel Corona Virus (COVID -19) pandemic.

The girl child education has multiple advantages as it will equip the girl child to be independent in facing the challenges of life, take care of her family, contribute to the economy of the Nation and also participate meaningfully in political matters.

COVID-19 has brought to fore a lot of educational challenges, including that of making adjustments and adapting strategies that will maximise and promote to the fullest the educational pursued of the girl child.

Concept of the girl-child

The national Child Welfare Policy (1989) as cited by Ada (2011) defines the girl child as:

A person below 14 years of age, while Offorma (2012) defines the girl-child as biological female off spring from birth to eighteen (18) years of age. This period is made up of infancy, childhood, early and late adolescence stages of development. The girl-child is a young female person, who would eventually grow into adulthood (woman) and probably get married. She is expected to look after the young ones, the home and all domestic cores. The description of the girl child by the two authors seems divergent, but the main concern is on the age bracket of who a girl child is. During this period, the child is 'malleable', builds and develops her personality and character. She is dependent on others; those on whom she models her behavior, through observation, repetition and imitation. Her physical, metal, social, spiritual and emotional developments start and progress to get to the of peak adulthood.

The girl child is a female, from infancy, to childhood and then to adolescence. The age bracket ranges from 1-18 years.

Concept of Education

The Webster's New Encyclopedia Dictionary defines education as the field of study that deals mainly with methods of teaching and learning in schools, it further says education is the knowledge and development resulting from an educational process. On the other hand, Nduka (1964) refers to education as the process of transmitting the peoples' culture from one generation to the other. Here, culture means the ways of life of a people. That is the way of eating, dressing, including our language, religion, arts and crafts, etc. All these things which we learn from people around us help us to know how to do certain things. It has always been so in all parts of the world including Africa before modern civilization.

Another definition is that Here, education is defined as any process, formal or informal that shapes the

potentialities of the maturing person (Colombian Encyclopedia 2020). This simply means that whatever helps a person to develop his abilities so as to be useful to himself / herself and the society is education.

Education according to Proshare (2018) is the process of providing information to an inexperienced person, to help him / her develop physically, mentally, socially, emotionally, spiritually, politically and economically. And added that education is the process through which an individual acquires knowledge and realizes his / her potentialities and uses them for self-actualization, to be useful to him and others.

Education is therefore the aggregate of experiences and the knowledge acquired by an individual, either formally or informally.

Concept of Girl-Child Education in the COVID-19 Era.

Girl child education is the education given to the girl child in other to enable her be independent, rationale in thinking, contribute in nation building, participate and contribute in all activities of human endevours. The girl child education has enormous advantages to her and the society in general.

(Ada, 2011) emphasized that:

> The importance of education in the life of an individual can never be overemphasized. In both spiritual and temporal or mundane aspects of human existence, education is paramount. Hence, access to education implies the right to the opportunities provided for the girl-child to be educated.

The girl child as earlier observed is cardinal in the society in several ways. The education of the girl child is not only useful to her alone, but she also contributes her quota to the society in general.

The Federal Government through the Universal Basic Education (UBE) programme, is making effort at accelerating girl-child education. The programme has made some progress in increasing school enrolment for girls in northern Nigeria (Ndeokwelu, 2010). In November, 2009, the UBE commission unfolded plans to collaborate with the Police Officers Wives Association (POWA) on girl-child education and children with special need (Compass, 2015).

Girl child education also includes areas of gender equality, access to education and its connection to the alleviation of poverty, good governance, which are major ingredients in averting crimes against women. However, current efforts including national and global programmes have been to ensure increased enrollment of the girl-child into the different levels of education in Nigeria. The federal government introduced the Universal Basic Education Programme to provide cheap and affordable education to all and sundry. Most if not all the state governments in Nigeria have also

introduced free and compulsory primary and secondary schools for both male and female children in various states.

Most state governments have also passed the child rights and protection acts that will eliminate (or at least reduce) the withdrawal of the girl-child from school and to prevent parents or guardians from using their school age children to hawk or do endless labour activities (Omede & Etumabo, 2016). This is so important because it promotes girl-child education which enhances nation building While emphasizing on the rights of the child to education, UNICEF (2009) declares that all girls and boys all over the world are entitled to the right to education, protection from all forms of abuse, neglect, and exploitation at home, in school, neighbourhood and the entire society. The girl child requires equal rights at home, in school and in the society. Many women have contributed to the growth of their nations, and in Nigeria, a lot of educated women have proven that they are capable of bringing transformation through education.

Challenges of Girl-Child Education in the COVID-19 Era

The girl child education in Nigeria has multiple challenges. Girl child education is sidelined by traditional beliefs which make her subservient to the male child, her domestic duties are always more cumbersome and hectic. The society rates her as second class, while in the true sense, she is the 'back-bone' of the society – as a saying goes 'educate a woman, and educate the nation.' This means that the education of a woman [girl] has multiple advantages, to her, her family and the society in general.

UNICEF (2014) unfolds the following as challenges militating against the girl child education:

- ***Economic Factors:*** Nigeria as an independent entity is undoubtedly characterized by very harsh economic conditions. This has resulted into scarce resources. As a result of this, choice has to be made between whom to send to school. Most often, it is the girl-child that remains at home. Due to poverty, girls get withdrawn from schools so as to help to supplement family income through hawking, trading or even working on the farm so as to support the family. In some cases, the girls are given out as house helps or even sent into early marriage because of the huge bride price.
- ***Sexual Violence and Abuse:***

This also hampers the girls from going to school due to the fear of sexual violence; as a result, most parents deny their girl-children access to school.

- ***The School Environmental:***

Often most parents are scared of sending their female children to school in distant places and would rather keep them at home. And stresses further that right from

childhood; girls are channeled into stereotyped traditional carrier in form of textbooks illustrations and stories. Consequently, leading to poor self-image and psychological depreciation at a tender age. Sexual harassment during educational pursuit creates serious emotional and psychological strain on the girl-child.

In addition, Salako (2009) observed that:

The Nigerian girl-child has so many huddles to jump in her effort to receiving basic education. Therefore, as a mother of tomorrow which by implication makes her the mother of Nigeria's future presidents, politicians, scholars etc, and her education should be viewed as a planned and organized tool which she is equipped with such knowledge and skills so she is capable of reflective thinking for herself and effective participation in the family and the community at large.

Furthermore, the author emphasizes the following as huddles militating against girl child access to education:

- Religious factor
- Socio- cultural factor
- Early marriage
- Historical and community factor
- Societal perception of girl child role
- Parental attitude towards the girl child education

Similarly, in Nigeria, gender discrepancy in education is a cultural factor that is a set-back to the girl child education. The wrong notion that her place is in the kitchen, to be seen and not to be heard has very serious implications on the girl-child's ability at self-actualization. Other factors are: cultural and traditional practices like female circumcision, early marriages etc., because they lead not only to absenteeism and distraction, but also to the eventual drop out of the girl child from school.

Overview of COVID -19

Coronavirus are a family of viruses that range from common cold to severe Acute Respiratory Syndrome (SARS). The most recent Coronavirus is called COVD-19, and was first detected in Wuhan, China, in December of 2019. Since its first cases in China, COVID-19 has spread to almost every country worldwide, including Nigeria. According to World Health Organisation (WHO), 167,515 cases were reported globally, including 6,606 deaths, as at March 16, 2020.

Statistics as at 26th October, 2020 indicates that the disease has infected 43,140,173 worldwide, with 1,155,235 deaths. While in Nigeria, the total number of people infected was: 61,992 with 1,130 recorded deaths and 57,465 recoveries as at 26th October, 2020. The Nigeria Center for Disease Control (NCDC), 26th October, 2020.

Meshak (2020) reiterates that the disease disorganises the immune system and respiratory tract of an individual and makes it difficult for the infected individual to breath. That there are three groups of respiratory infections as follows:

- Acute Respiratory System Infection,
- Lower Respiratory tract infection, which the Coronavirus infection falls into.
- Upper Respiratory tract infection

Research is still on-going to determine the cause of COVID -19, the vaccine, medication and other measures that will curb the disease. Meanwhile, different countries have devised measures to cure those found to be positive.

In countries affected by the pandemic, stringent measures were put in place to curtail and slow down the spread of the pandemic. Such measures include testing of individuals to identify those infected, quarantine, washing of hands with soap and clean running water, lock-down, restriction of movement, closure of public places, including schools, wearing of face masks, use of hand sanitizers, social distancing (physical distance) and avoidance of shaking of hands as non-pharmaceutical measures.

Impact of COVID-19 on Girl Child Education

COVID-19 has affected every facet of our lives, especially females [women], children and other vulnerable populations. This is because it is a global pandemic which has destabilize every aspect of human endeavor, especially the girl child education.

Awulor (2020) citing UNESCO buttressed that:

> 89% of children are currently out of school as a result of the COVID 19 closures. The percentage represents about 1.54 billion children and youth in primary, secondary and university. This includes nearly 743 million girls. While some girls will continue with their education as soon as the pandemic is over and the gates of the schools reopen, others may never be opportune to return to school as a result of the effects of the global pandemic.

McDonald (2020) stresses that COVID -19 has negative impact on girl's health and well-being, risk of not returning to school even if it re-opens. As girls stay at home because of school closures, their attainment routine health services and household work burdens might increase resulting in spending more time helping at home instead of studying without good health. And that this encourages particularly those parents putting a lower value on girls' education, keep their daughters at home even when schools re-opened. The author further added that during school closures due to COVID -19 pandemic, developed countries switched to E-learning and each student embarked on home studies without stress. However in Nigeria the internet facilities

available for browsing is poor and even worse is the economic status of parents and girls to afford buying data. These impacts set the Nigerian girl child at the danger of falling prey to any wind of violence and molestation in the cause of trying to search for education. Boys can hustle and afford computers and android phones easier and move more freely to learn than girls since they have less domestic work.

The closure of schools over a long period of time was in order to contain the spread of COVID-19. The pandemic has led to some families resorting to marrying off their girls due to the prolonged stay at home. It might seem that education has become an informal escape route to early marriage because 'schooling' is one of the major reasons given for the delay in getting the girl child married early. It is important for the education authorities to consider innovative ways of ensuring education continues for the girl child.

Conclusion

The girl child is observed to be facing various challenges in Nigeria, which include her educational pursued. The emergence of COVID-19 has further threatened the education of the girl child. Schools were closed for a long period of time and as result the girl child is depressed psychologically, mentally, socially and economically. Due to the long stay at home, she is faced with societal vises such as rape, early marriage, forced marriage, un-wanted pregnancy and other challenges. The girl child education in Nigeria has suffered a lot of set-backs which include tradition, culture and religion that suppress her in benefiting from education fully. Such traditions, cultures and religions negate the education of the girl, preference for the male child to be educated because he will be the 'bread winner' and will ensure the transition of the family. That the girl will eventually get married and therefore her education is not useful to her immediate family.

Recommendations

1. The federal, states and local governments should ensure that more classrooms are built to accommodate learners according to the population and in accordance with social distance.
2. Since technology will greatly enhance and facilitate the education of the girl child, the Federal, State and local Governments should provide students and especially girls with mini-laptops or tablets and give proper training to both students and teachers on how to use them and also provide free internet services for to access.
3. COVID -19 measures be adhered to strictly in all schools. Provision should be made by all schools for clean running water; toilets should be of good quality and adequate to the population of the learners. Standard girls toilets must be

constructed and to be convenient to girls and provision for sanitary pads and toiletries be provided in all schools.
4. A forum of parents, traditional rulers, stake holders and teachers should be held regularly at Ward, district, local Government, State and federal levels to give sensitization and counseling on the importance of girl child education.
5. Teachers should be given training at all levels of education on E-learning by the federal, states, local governments and school proprietors, with particular 8.

emphasis on how the girl child will maximize E-learning amidst COVID -19.
6. The Federal and State legislature must pass a law to protect the girl child from intimidation, violence, rape, early marriage and forceful marriage should be fully enforced to protect the girl child.
7. Schools must ensure social distance is adhered to and should adapt the shifting or session method so that some classes will come to school in the morning and the rest in the afternoon on the interim.

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Challenges and Prospects of Using Information and Communication Technology in Teaching and Learning of Metalwork Technology in School of Technical Education Plateau State Polytechnic Barkin Ladi

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Abstract

Technological advancement requires the use of Information and Communication Technology (ICT) in teaching and learning of Metalwork technology to equip the students with the required skills for effective operation of ICT equipment facilities and materials in schools and industries. This implies that a lot is required from lecturers and students to keep pace with the current trend in technological advancement. This paper therefore looked at the concept of ICT. It explained ICT as a process of applying technology in processing and dissemination of in formation ICT equipment and facilities use for teaching and learning of metalwork technology include: radios, videoconferencing CD_ROM, audio graphics among others. There are so many challenges facing the use of ICT in teaching and learning of Metalwork Technology Education, among them are inadequate skills for the use of students and lecturers, challenge on the part of

lecturers include; inadequate skills, lack of confidence, resistance to change, among others. The school based challenges include; lack of time , inadequate resources, lack of recruitment of lecturers in school of Technology Education in particular and the Polytechnic as a whole among others. Challenges on the part of the student include; High cost of equipment and inaccessibility to ICT materials and equipment, epileptic power supply, lack of motivation, among others. Among the prospects of using ICT in teaching and learning of Metalwork Technology education are; Time saving for lecturers and students providing of immediate feedback to students on how they are fairing, making learning interesting, improved educational efficiency, improved pedagogical practices, among others. Conclusion and recommendations were made. Among the recommendation is that there should be in-service training and retraining of Metalwork lecturers in school of Technical Education to equip them with the necessary skills required for use of ICT in teaching and learning. This can also be achieved through financing and funding from public and private institutions, individuals, governmental and non governmental organizations (NGOs).

Key Words: Education, ICT, Learning, Metalwork, Teaching,

Introduction

Metalwork is the process of using machines such as lathes, shapers, drills, grinders, guillotines, folding and rolling machines, it also includes the use of hand tools such as chisels, hammers, stakes, scribers, scrapers, and files among other tools being used for production of metallic objects and components used for domestic and industrial purposed. The processes of Metalwork include welding, fabrication, forging, bench work, foundry, fastening, compaction, sintering, machining, tool and die design, smelting, plumbing and pipe fitting among others. Metalwork is being taught using instructional aids such as diagrams, pictures, graphs, charts and tables involving machines and hand tools. The current method of teaching Metalwork Technology is known as Computer Assisted Instructional Package Method (CAIPM). This is a tremendous achievement in Methods of Teaching Metalwork Technology, as a result of technological advancement. Techno-logical advancement in all fields of human endeavour calls for introduction of the use of Information and Communication Technology (ICT) in teaching and learning, especially in Metalwork Technology Education. Most industries and establishments operate with the use of ICT facilities, equipment and materials. Since the aim of learning is tro acquire relevant skills which will enable the individual to enter and progress in an occupation, it calls for the use of equipment, tools and materials which are similar to those used in industries and establishments in teaching and learning. ICT is a new development that involves the use of technology in processing, encoding and decoding information for Metalwork production processes such as milling, drilling, shaping, turning, boring,

threading, among others. For instance, most of the modern metalwork machines such as drills, lattes, shapers and millers are known as Computer Numerical Controlled (CNC) machines. The process of machining the metals by computerized methods are called Computer Aided Machining (CAM), where the cutting tool and table movement are controlled automatically by a computer device called a punch tape which decodes the information and sends it to the cutting tool. Therefore, the computerized machine operates with minimal or less human intervention. ICT also includes audio and visual aids used in performing tasks and for production purpose.

Bayo (2017) defined ICT as the acquisition, processing, storage and dissemination of vocal, texture, pictorial and numerical information by a micro electronics based combination of computer systems and telecommunication equipment in information process. Moet (2018), defined ICT as a tool that can effectively support the innovation of teaching, learning and educational management and that contributes to improved efficiency and quality of education. Leonard (2015), state that ICT needs to be seen as an essential aspect of teaching's cultural toolkit inn the twenty-first century, affording new and transformative models of development that extend the nature and reach of teachers learning. Wherever it takes place, ICT is necessary for effective teaching and learning.

Teaching is the process of importing knowledge, experience, attitude and skills to the leaner. Othniel (2016), defined teaching as a systematic activity, deliberate activity engaged in by the teacher to facilitate the learning process of the intended worthwhile knowledge, skills and values by another person and getting the necessary feedback. Learning is the process of acquiring experiences knowledge, skills and attitude. It is a permanent change in behaviour which can be as a result of experience. Noah (2014) defined learning as a process which causes change in behaviour of an individual. Learning occurs when students have achieved that they were taught, that is when the intended leaning outcome have been achieved by the learners. Achievement in Metal-work Technology Education can be improved with the use of ICT equipment and facilities in teaching and learning. Anthony (2018) stated that achievement is quantified by measures of students academic standing in relation to those of other students tested with the same instrument.

The need to improve teaching and learning led to the introduction of the use of ICT in teaching and learning. Metalwork Technology is also known as General Metalwork, is one of the courses offered in school of Technical Education, Plateau State Polytechnic, Barkin Ladi. The state is known for great number of industries concerned with production of goods and services in different sectors of the economy, of which Metalwork Technology is among. Metalwork Technology Education at the polytechnic level is designed to prepare students as Technicians, Technologist and Technical Officers in the areas of welding, metal fabrication, foundry and forging work, machining, among others that will work in metal industries after graduation from school.

Technical Education is an aspect of vocational education Oman (2019), defined Technical Education as a post-secondary vocational training programme whose major purpose is the Production of technicians is a special type of vocational education programme because more mathematics and science are required in the training programme. Federal Republic of Nigeria (2004), defined technical education as that aspect of education that leads to the acquisition of practical and applied skills as well as basic scientific knowledge. Audu and Usman (2016) stated that technical education is a fractional segment or an integral part of vocational education. Technical education facilitates acquisition of practical and applied skills as well as basic technical education does not target any particular vocation, but gives general technical knowledge.

The Importance of Information and Communication Technology (ICT) equipment and materials in teaching and learning cannot see over emphasized. It is an instrument for technological advancement and economic growth in the 21st century. It equips students with current trends in technological advancement.

Due to the increasing number of metal industries in Plateau State, the need for middle level technical manpower becomes imperative. Since this trained manpower is going to work with ICT and equipment in the industries, there is need for them to be trained with those ICT equipment and facilities. Despite the important nature of the use of ICT in teaching and learning of metalwork technology education, its use in teaching and learning process is grossly inadequate (Gilbert, 2018). The use of ICT is saddled with such challenge as high cost of computer software and hardware, weak infrastructure, lack of human skills and knowledge in ICT and lack of software appropriate and culturally suitable to Nigeria (Iyamu, 2015). The current low level of power supply in Barkin Ladi Local Government Area where the Plateau State Polytechnic (Main campus is sited) is a big challenge to electric use of ICT in teaching and learning. Most ICT equipment and facilities require constant power supply for their operation. Also, the number of skilled manpower required to operate the ICT equipment and facilities are also inadequate.

Concept of Information and Communication Technology (ICT)

Information and Communication Technology (ICT) is the application of technology in processing and dissemination of information (Audu, 2019). ICT brings revolutionary change in teaching methodologies. It contributes a lot towards a student – centered form of teaching and learning (Sham, 2014). (Comshaw, 2019), defined ICT as all that is involved in gathering and processing available information using modern Communication Technology, Such as computers and other related equipment, so that the services generated can reach all those who desired them at reasonable cost and in good time to the overall benefit of mankind. (Ado, 2019), defined ICT as

the fastest means of acquisition, processing, storage and dissemination of vocal, textual, pictorial and numerical information by a micro electronic based combination of computer systems and telecommunication equipment in information process. (Leo, 2017), stated that ICT should be seen as an essential aspect of teaching in the twenty-first century, affording new and transformative models of development that extends the nature and reach of teachers learning. Wherever learning takes place, ICT is necessary for effective teaching and learning. Teaching and Learning of metalwork technology education in the school of technical education, Plateau State Polytechnic, Barkin Ladi can be made more effective through the use of the following equipment and materials: computer, projector, interactive white board, electronic star board, Auto-CAD, Audio Cassette tapes, radio, video tapes, CD-ROM, the Internet, analog modems, Web-based training, Audio conferencing, Audio graphics, video conferencing and so on.

Challenges of using Information and Communication Technology (ICT) in Teaching and Learning of Metalwork Technology Education

According to UNESCO (2013), while technology enhanced education holds great promise, its widespread implementation also poses some immediate challenges, equal access to eliminate technological haves and "have-nots", appropriate strategies for integrating technology across animals, copying issues and availability of pedagogically sound materials. Teacher's development is a major challenge for the use of ICT in teaching and learning, since for most teachers, information technologies are both exhilarating in their possibilities and daunting in the uncertainty created by the speed of advancement in technology.

1. **Challenges on the part of the teacher**:
   a. **Lack of Competence:** Some of the lecturers were not taught with the use of ICT equipment, Facilities and materials during their school days, and as such, they do not possess skills in using them.
   b. **Lack of Confidence:** This makes it difficult for so many lecturers to use ICT equipment, materials and facilities in teaching and learning as they are not sure that they can effectively use them.
   c. **Resistance to Change:** Some lecturers find it difficult to such adopt to the current technological advancement, and as such they always reject everything that will make them to stress themselves, even a little.

2. **School Based Challenge:**
   . **Lack of Time:** some school administrators find it difficult to create time for their lecturers to be enlightened in the use of ICT in teaching and learning. According to a study conducted by Silas (2015), the most common problem reported by lecturers was lack of time to plan their lecture notes

explore different internet sites or look at different aspect of educational software.

a. **Inadequate Resource:** Most Technical Education Institutions lack adequate ICT equipment and materials for teaching and learning metalwork. This can be attributed to high cost of ICT equipment and facilities.

b. **Difficulties in Recruiting Qualified Instructors:** some of the Technical Education Institutions do not have adequate number of instructors who possess skills and competencies required for operating ICT equipment, facilities and materials in teaching and learning of Metalwork. The school cannot recruit staff on their own staff because it is the responsibility of government to recruit staff.

This makes the use of ICT in teaching and learning to be a difficult task for some technical institutions.

Other school based challenges according to Zadok (2018), include; Lack of effective training, lack of technical support, lack of equipment and support, difficulties in scheduling, high cost of programme development, instructtional difficulties, difficulties in maintaining reliable technical assistance and support.

3. **Student Challenges:** There are many challenges experienced by metalwork students in School of Technical Education Plateau State Polytechnic, Barkin Ladi, among them are as follows;

a. **Cost of Equipment and Access to Technology:** As a result high cost of ICT equipment and materials for teaching learning, most students cannot afford them and as such are unable to practice the use of ICT on their own convenient time rather they rely only on theoretical knowledge they acquired from their class work.

b. **Motivation:** As a result of the fact that students come from different backgrounds, some of the students linking the use of ICT to those students from wealthy homes. This makes them to lose interest in learning with the use of ICT.

c. **Lack of Immediate Feedback from Instructors:** Students always like to see the result of any task they performed when the results are delayed, the students will not know whether they did well or not and as such will approach next text or learning with little or no concentration.

d. **Lack of ICT Skills:** Most students of metalwork lack skills in the use of ICT equipment and materials in learning, this make learning difficult for them.

Other student barriers according to Zadok (2018) Include: Inadequate Support and Services; alienation and isolation; lack of skills in managing data and time.

4. **Lack of Appropriate Software:** The development of ICT-mediated learning materials for Technical vocational Education and training (TVET) has been slow compared to arte for the general education Sector. This trend can be explained by: **1.** comparatively low enrolment in TVET and **2.** The need for a wide variety of occupational specific software in TVET. Specifically, technology applications used in

various occupational fields are not available to educators (Allan, 2019).

5. **Infrastructure-Related Challenges:** Infrastructure-related challenges to the use of ICT in teaching and learning of metalwork include:

a. Appropriate rooms or buildings to house the ICT equipment and facilities
b. Inadequate source of power supply and telephone.

Prospects of Using Information and Communication Technology in Teaching and Learning of Metalwork Technology in School of Technical education Plateau State Polytechnic, Barkin Ladi

1. **Interesting Teaching and Learning:** It will make teaching and learning to be interesting to the students. Because students like seeing what to be interesting to the students. Because students like seeing what they are being taught is demonstrated, the use of ICT facilitate students paying attention in the class. It will make students to see that computerized metalwork measuring instruments are used for obtaining accurate readings, which ill enable machine operators to measure or align machine parts without encountering much difficulty.
2. **Improved Educational Efficiency:** Through the use of ICT in teaching and learning of metalwork technology education, carefully prepared computer packages can be used to ensure that learners are properly instructed. Software can be developed to teach topics like leather work in which students observed video and audio instruction on how to perform different types of operations on the lathe machine. Computer can enhance problem solving skills of the learners by focusing on thinking skills especially in a course; like metalwork.
3. **Promotes Individualized Learning.** Through the use of ICT, equipment such as computers, students can have hands on experience of what they are been taught even in the absence of their lecturers. This helps them to internalize what they were taught. Audu (2017), stated that computers play the role of tutors and present the leaner with a variety of contents and symbolic modes. This will enable student to design and construct different types of metalwork machines, using computer software like Auto-CAD. Having produced the design of the metalwork machine parts, the students can go ahead to construct the designed machine parts, before assembly.
4. **To Improve Pedagogical Practices:** The use of ICT can change current pedagogical practices in most polytechnics, which depend on the traditional lecture method. It is universally accepted that computer allows more independent exploration, more personally tailored activities, more team-work, and more

significantly, less didactic instruction. Simon (2017) stated that it will make the role of the teacher to change from information dispenser to information manage. It will accord the lecturer the opportunity of using computer software to lecture student on the different types of machining operations being performed on the automated teller machine.

5. **Interactive Leaning:** The use of ICT in teaching and learning of metalwork makes leaning to be interactive as students feel free to ask questions on issues that exite them. Kda (2017), Stated that ICT facilities and equipment in teaching and learning will facilitate integration and collaboration not only among learners, but among teachers as well, both at local and global levels. It will accord students and teachers the opportunity to critically examine Computer Aided Machining (CAM) to ensure a very close dimensional accuracy of computer numerically controlled (CNC) machines, unlike convectional machine.
6. **Improvement in Quality of Teaching and Learning:** The major reason for integration of the use of ICT in the teaching and learning of metalwork technology is to improve the quality of instruction. Kola (2017), Stated that the use of new multimedia technologies and Internet will improve the quality of teaching and learning related activities not only in Nigeria, but also in Sub-Saharan African.
7. **Time Saving:** The use of ICT in teaching and learning of metalwork will help to save time use in teaching and learning of different concepts and operations. It aids explanation of concepts and understanding. Kola (2017), stated that ICT enhances performance of lecturers in terms of course delivery, and provides maximum attention to students as they could meet through e-mail. It accords lecturers the opportunity to prepare lectures in copies. For instance, machining symbols can be prepared and presented with the components, after which the lecturer will administer an online test, which the students will answer and the results will be produced immediately, because the computer records the students answers and produce result immediately after the test (National Centre For Technology in Education and T4-Technology Subjects Support Service, 2009).
8. **Development and Using of Intelligent Tutoring Software:** The use of ICT in teaching and learning of metalwork technology will help the lecturer to be challenged to develop software which can be teach different topics in metalwork technology, such as production of simple engineering components, design and construction of a link mechanism. Intelligent tutoring systems have the ability for making computer based instruction more adaptive and interactive (Henry, 2011).

Conclusion

Teaching and learning of metalwork technology in school of technical education, Plateau State Polytechnic, Barkin Ladi, can be improved through the use of ICT facilities, equipment and materials. This calls for increased funding and financing of metalwork technology and learning through the provision of adequate ICT facilities, equipment and materials. There is also the need for training and retraining of metalwork technology lecturers to update their knowledge and skills to meet up with technologist and technical officers that will work in industries so that Plateau State will not run short of middle-level technical manpower which the polytechnic is saddled with the responsibility of providing.

Recommendations

1. There should be in-service training and retraning for Metalwork Technology lectures in School of Technical Education Plateau State Polytechnic, Barkin Ladi, with a view to equip them with the necessary and learning. This can be achieved through finance from Government or private institutions, individuals and Non-Government Organizations (NGOs).
2. Plateau State Polytechnic should give more allocation for the procurement of ICT facilities, equipment and materials needed for teaching and learning of Metalwork Technology Education in School of Technical Education.
3. The Department Of Education (Technical) should ensure regular inspection on the extent of utilization of ICT facilities, materials and equipment in teaching and learning of Metalwork Technology in School of technical Education, Plateau State Polytechnic, Barkin Ladi.
4. Funding: Funding can be obtained from; wealthy individuals in the society, fund-raising events, provision of funds by Governments at Local, State and Federal levels.
5. Financing: The use of ICT in teaching and learning of Metalwork Technology can be financed through; there should be better funding of ICT in teaching through the private sector and the community.
   a. Grants being obtained from different financial houses and agencies such as; Banks, Institutions, Individuals, Non-Governmental Organizations and so on.
   b. Government Subsides on Metalwork Technology Education
   c. Private donations
   d. Support in kind (e.g. equipment, volunteer).
   e. Community Support (e.g. rent free building)

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Greening Technical, Vocational Education and Training (TVET) for Sustainable Green Socio-Economic Development in Nigeria

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Abstract

There is continuing concerns over global economic and environmental challenges across our planet such as climate change, loss of biodiversity, and land degradation due to rising natural resource scarcities, environmental degradation as a result of fossil energy exploration and production. In Nigeria this has led to a lot of devastating effect in the Niger-Delta region and the so called Farmer-Herder clashes all over the country. These challenges raise greening demands in the global socio economy, resulting in unprecedented shifts in skills requirements. This paper discussed the concept of greening in the socio economy, the areas of jobs that can lead to greening of TVET skills to match the greening concept for a sustainable development. The paper examined and identified the sectors which TVET can fit in to develop the skill demands raised by the green socio economy. Such sectors include clean energy generation, agriculture, industry and productivity. The paper recommends amongst others that Government and training providers should integrate greening skills in TVET programmes for both existing and emerging occupations, and systematically include education for 'greening' economies and societies as part of TVET curriculum, with a view to achieving sustainable green socio-economic development in Nigeria.

Keywords: Greening TVET, sustainable green socio-economic development

Introduction

The greening demands in the global socio economy is causing unprecedented shifts in skills requirements. These changes include shifts in the ways in which jobs are performed which lead to a need to retrain and build up the capacity of displaced workers in order to fit into other sectors. The emergence of new skilled occupations as a result of the greening demands calls for individual need for capacity building in clean energy generation, agriculture, industry and productivity. In line with this idea Strietska-Ilina, (2011) opines that existing jobs and occupations will also need to be upgraded into the green economy and society.

Thus achieving a green economy will require much more integration of skills and employment development policies into a green economic agenda. In some cases, there are skills shortages as a result of people reaching retirement age without new individuals having been trained to replace them; the small number of trained and qualified personnel available; or a lack of specific skills and competencies which hinders technological and market-related expansion. Greening the socio economy promises access to new jobs, but also creates changes in the scope and character of existing jobs. Without an adequately trained workforce, this scenario will give rise to skills shortages in some sectors even though jobs are available in others. Technical Vocational Education and Training (TVET) will thus play an important role in skills development and training.

TVET has always been seen as oriented towards the world of work and the acquisition of employability skills. It is the strategic entry point for ensuring a world of work that contributes to social cohesion and promotes environmentally sound sustainable development. TVET and skills development initiatives play a significant role not only in developing human and social capital, but also in promoting necessary skills, knowledge and expertise needed for more sustainable societies and it has the potentials to produce skills for greener economies. The UNESCO (2015) defines TVET as comprising education, training and skills development relating to a wide range of occupational fields, production, services and livelihoods, with sustainable transformation for development. TVET contributes to sustainable development by empowering individuals, organizations, enterprises and communities, and fostering employment, decent work and lifelong learning so as to promote inclusive and sustainable economic growth and competitiveness, social equity and environmental sustainability.

The Greening Concept

After the 2012 United Nations Conference on Sustainable Development, which took place in Rio de Janeiro, green economy concept has received significant international attention. This is in line with the

continuing concerns over global economic and environmental challenges across our planet such as climate change, loss of biodiversity, and land degradation due to rising natural resource scarcities, environmental degradation as a result of fossil energy exploration and production. In Nigeria this has led to a lot of devastating effect in the Niger-Delta region and the so called Farmer-Herder clashes all over the country. The greening concept therefore gives hope for diversification and sustainability of the economy.

United Nations Environment Programme (UNEP 2011) defines a green economy as one that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. The US National Centre for O*NET Development (2009) describes green economy as those economic undertakings linked with reducing the use of fossil fuels, decreasing pollution and greenhouse gas emissions, increasing the efficiency of energy usage, recycling materials, and developing and adopting renewable sources of energy. It describes a broad spectrum of work within the green economy, clustered into green sectors, each with respective occupational areas. The changing nature of work, the impact of technologies and new occupational demands are within this framework.

On the other hand, the Bureau of Labour Statistics (BLS) (2010b) gives a definition that includes two components, which are consistent with the output, and process approaches:

i. Jobs in businesses that produce goods or provide services that benefit the environment or conserve natural resources.
ii. Jobs in which workers' duties involve making their establishment's production processes more environmentally friendly or use fewer natural resources.

Green jobs are defined as “work in agricultural, manufacturing, research and development (R&D), administrative, and service activities that contribute substantially to preserving or restoring environmental quality. Specifically, but not exclusively, this includes jobs that help to protect ecosystems and biodiversity, reduce energy, materials, and water consumption through high efficiency strategies, de-carbonize the economy, and minimize or altogether avoid generation of all forms of waste and pollution” (UNEP/ILO/IOE/ITUC (2008) p.3).

In its simplest expression, therefore a green economy can be seen as low-carbon, clean and energy/resource-efficient economy and socially inclusive. Strategies must therefore be put in place to develop skills to facilitate the transition.

According to Majundar (2013), Skills development strategies that can facilitate the transition to green economy need to:

- Adapt to the evolution of employment sectors;
- Prepare teachers and trainers who can effectively transfer their knowledge and skills;
- Expand the current scope of TVET and delivery mechanisms;
- Enable the workforce to adjust to technological shifts.

- Prepare a curriculum that will be realistic, relevant and sustainable.

Essentially, skills development strategies demand a great deal of thought that will involve processes, technologies, material flows and their environmental consequences. This will give rise to the need to teach a large number of people who will provide a reservoir of skills. A complete value chain of products needs to be broken down into separate levels where skills and the need for capacity building can be identified and training provided. So it is very obvious that TVET must also be given the greening orientation so that the graduates can be oriented towards ample and decent employment opportunities. Erica (2015) foresees that the greening of the socio economy will put more pressure on the already complex scenarios of multi-level skills shortages and surpluses. Erica further points out at least two challenges related to skill requirements:

1. Countries do not have sufficient skilled professionals for green jobs, and
2. The demand for retraining of those affected by shifts in skill requirements.

To address the challenges of skills shortages, access should be provided to target training for low, medium and high-skilled workers. This generates a greater sense of purpose for nations to transit towards a greener TVET to match the green socio economy.

Matching TVET with the Green Society and Economy for a Sustainable Development

A major component in achieving the global vision of achieving sustainability is the creation of more sustainable production and consumption patterns in line with the greening concept. Therefore, the greening of TVET is an essential element towards achieving this.

According to a UNESCO-UNEVOC (United Nations Centre for Vocational Education) report (2015), Greening TVET (GTVET) is a response to the need to reorient or transform TVET towards green skills for sustainable economic development and align efforts in the greening agendas for education and work. Greening TVET is a concept, which injects modernization into TVET with the goals of lifelong-learning, inclusiveness, global citizenship and sustainability. In other words TVET must be linked not only with the world of work, but also to creating pathways across education streams, to facilitate transitions to work and to life. TVET needs to offer corridors that expand the provision for traditional skills to meet occupational needs and contribute to the creation of solid knowledge-based societies that provide vulnerable groups with equal opportunities by equipping them rather with green skills, which are not limited to menial jobs, but creativity.

For TVET to be engaged and carefully matched with the global environmental challenges there is the need to analyse and understand the occupational changes brought by green economic activities. Occupations can be classified in the context of green economic activities and technologies. The

following classification of occupations by the National Centre for O*NET Development (2009), can act as a framework to greening TVET in order to match the greening demand of the socio economy:

I. Green Increased Demand Occupations (GIDO), this has to do with increase in the employment demand for existing occupations due to green economic activities and technologies. This covers the industrial occupations like:

i. Industrial Engineers; with the task to design, develop, test, and evaluate integrated systems for managing industrial production processes including human work factors, quality control, inventory control, logistics and material flow, cost analysis, and production coordination.

ii. Industrial Engineering Technologists; with the task of applying engineering theory and technical skills to support industrial engineering activities such as quality control, inventory control and material flow methods. May conduct statistical studies and analyse production costs

iii. Industrial Engineering Technicians; the technicians apply engineering theory and principles to problems of industrial layout or manufacturing production, usually under the direction of engineering staff. May study and record time, motion, method, and speed involved in performance of production, maintenance, clerical, and other worker operations for such purposes as establishing standard production rates or improving efficiency.

iv. Industrial Ecologists; With the task of studying or investigate industrial production and natural ecosystems to achieve high production, sustainable resources, and environmental safety or protection. May apply principles and activities of natural ecosystems to develop models for industrial systems

II. Green Enhanced Skills Occupation (GESO), this will cover the shift in the work and worker requirements of an existing occupation (i.e. skills, knowledge, tasks, credentials) with same purpose of the occupation due to green economic activities and technologies; and

III. Green New and Emerging Occupations (GN&EO), this has to do with the creation of new work or occupations and work requirements that may be born out of occupations that already exist.

The first two classifications GIDO and GESO are closely linked with mitigation-oriented occupations that already exist but need to be filled up in greater quantity or adjusted in the context of skills and competency requirements. While the third classification, **GN&EO,** on the other hand, may correlate with adaptation-oriented jobs and occupations that set new trends in creating new occupations that can specifically arrest the impact of global warming.

A sample list of skills projected for the green jobs across many sectors in the context of the green economy would provide a visioning structure for TVET, in the following areas:

1. **Renewable Energy Generation and alternative fuels:** This sector will cover activities related to developing and using energy sources such as solar, wind,

geothermal, and biomass. This sector also includes traditional, non-renewable sources of energy undergoing significant green technological changes (e.g., oil, coal, gas, and nuclear).

2. **Transportation:** This sector covers activities related to increasing efficiency and/or reducing environmental impact of various modes of transportation including trucking, mass transit, freight rail, and so forth.
3. **Energy Efficiency:** This sector covers activities related to increasing energy efficiency (broadly defined), making energy demand response more effective, constructing "smart grids," and so forth.
4. **Green Construction:** This sector will cover activities related to constructing new green buildings, retrofitting residential and commercial buildings, and installing other green construction technology.
5. **Energy Trading:** This sector covers financial services related to buying and selling energy as an economic commodity, as well as carbon trading projects.
6. **Energy and Carbon Capture and Storage:** This sector covers activities related to capturing and storing energy and/or carbon emissions, as well as technologies related to power plants using the integrated gasification combined cycle (IGCC) technique.
7. **Research, Design, and Consulting Services:** This sector encompasses "indirect jobs" to the green economy which includes activities such as energy consulting or research, development and other related business services.
8. **Environment Protection:** This sector covers activities related to environmental remediation, climate change adaptation, and ensuring or enhancing air quality.
9. **Agriculture and Forestry:** This sector covers activities related to using natural pesticides, efficient land management or farming, and aquaculture.
10. **Manufacturing:** This sector covers activities related to industrial manufacturing of green technology as well as energy efficient manufacturing processes.
11. **Recycling and Waste Reduction:** This sector covers activities related to solid waste and waste water management, treatment, and reduction, as well as processing recyclable materials.
12. **Governmental and Regulatory Administration:** This sector covers activities by public and private organizations associated with conservation and pollution prevention, regulation enforcement, and policy analysis and advocacy. (National Centre for O*NET Development 2009: 14)

The United States Bureau for Labour Statistic (BLS), (2010) enumerate the following activities in its conceptual framework for greening the socio economy. In this transition they are classified into two groups namely:

I. Green goods and services;
II. Green technologies and practices

These two groups of conceptual activities can provide skills for jobs in the following groups of activities
a) Energy from renewable sources
b) Energy efficiency

c) Pollution reduction and removal, greenhouse gas reduction, recycling and reuse
d) Natural resources conservation
e) Environmental compliance, education and training, and public awareness

For instance, if consideration is focused on the environmental protection aspect the following activity groups are further suggested by Workforce Information Council (WIC) (2009)

a) Protection of ambient air and climate
b) Waste water management
c) Waste management
d) Protection and remediation of soil, groundwater and surface water
e) Noise and vibration abatement
f) Protection of biodiversity and landscape
g) Protection against radiation
h) Research and development

Other environmental protection activities which could be developed as resource management activities include the following
a) Management of waters
b) Management of forest resources
c) Management of wild flora and fauna
d) Management of energy resources
e) Management of minerals
f) Research and development; and so many other natural resource management activities.

In Nigeria, for example carbon emissions can be reduced from industrial power plants, petroleum gas flaring, water/air pollutions due to waste mismanagement by adopting the strategies enumerated above.

Conclusion

The global environmental and climatic changes call for the greening of the socio economy of nations. Nigeria cannot be left behind if a sustainable economic development is to be attained. The greening of the socio economy comes with emergent jobs that require skills to match. The areas of identified emergent jobs are Green Increased Demand Occupations (GIDO), which has to do with increase in the employment demand for an existing occupation due to green economic activities and technologies covering industrial engineering/ technology, to produce green skills for engineers, technologists, technicians and craftsmen. Others are Green Enhanced Skills Occupation (GESO), and Green New and Emerging Occupations (GN&EO). The last three have to do with new skills to deal with ecological problems. Many jobs that require these skills will thus be created. This calls for the need to also transform TVET in line with the greening concept for a sustainable socio economic development.

Recommendations

The following recommendations will enhance the greening concept to be realistic and of benefit to Nigeria's developmental strides, and to align with the global trend of the green concept:

1. Federal States and Local Governments together with private training providers should integrate greening skills in TVET programmes for both existing and emerging occupations, with a view to achieving sustainable development, poverty reduction and inclusive economic growth.
2. Federal Government and other stake holders should systematically include education for 'greening' economies and societies as part of TVET qualifications, standards, programmes and curriculum.
3. Government and other TVET stakeholders (including the private sector) should take steps to expand the professional capacities of TVET teachers and trainers to deliver training in skills to promote sustainability in the workplace.
4. There is need for the government body in charge of development of TVET in Nigeria to introduce a continuous upgrading system in TVET programmes through curriculum development, training/ retraining of teachers/instructors and special researches in the TVET sector; with room for practical research and development in line with the global greening concept,
5. Government should put in place proper legislation to ensure adequate financing and funding of TVET institutions/programmes in the country; Stakeholders, especially those within the private sector, should provide more funds for the purchase of instructional facilities. The Educational Tax Fund should consider TVET programmes a priority area for funding.

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Peculiar Educational and Cultural Conditions Inhibiting Successful Technical, Vocational Education and Training (TVET) in Nigeria

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Abstract

This paper is an effort to unveiling educational and cultural factors that have constituted an obstacle to the success of Technical Vocational Education and Training (TVET) in Nigeria, and to proffer solutions to overcome such factors for effective teaching and learning of TVET in Nigeria for national development. The method of the research is qualitative in nature, as such it started with analysis of the key concept that provide the work with a theoretical framework, namely; meaning and nature of TVET; and an examination of Nigeria's policy statements on the objectives of attaining functional education through TVET. The paper then listed and explained such educational and cultural conditions have in turn constituted drawbacks to national development. The paper found out that when the aforementioned obstacles are adequately dealt with through education, effective teaching and learning of TVET can take place which can invariably propel Nigeria faster towards development. It is on this basis that the paper concludes by recommending amongst others, the introduction of reflective-thinking fostering subjects such as philosophy of education, logic, and indeed general philosophy in curricular of learning at all levels of education in Nigeria as a way out of the quagmire.

Key Words: *Educational and Cultural conditions, Meaning and Nature of TVET, and Nigeria and TVET.*

Introduction

It is disturbing that despite the huge human and material resources Nigeria is endowed with, the country is still firmly handicapped and unable to wriggle her way out of entrenched developmental quagmire. Due to low levels of development in Africa, the West had regarded Africans as a people who were not capable of a scientific mode of inquiry.

Looking at the issue raised above on the surface sounds tricky, for on first consideration, one may be tempted to dismiss it as racist. On deeper reflection however, from the source of the issue, and more importantly from the questions involved, one appreciates the fact that the question "how rationally competent is the Nigerian with regards to Technical Vocational Education and Training TVET (TVET)?" as purely academic and not racial. Both rational and less rational minds can be found in all races, admittedly to varying degrees. It should be conceded however, there might be an educational and cultural dimension to it, in the sense that certain educational approaches and cultures appear to be predisposed to encouraging it.

Concept of TVET

According to the Federal Republic of Nigeria (FRN. 2004), TVET refers to the professional education of teachers implemented according to the policies and procedures designed to equip prospective teachers with the knowledge, attitude, behaviour and skills they require to effectively perform their tasks in the classrooms, schools and the wider community. TVET includes the education and training occurring before commencement of service (pre-service) and education/training during service (in-service or on-the-job training). It is a study on programmes that skillfully prepare people for effective performance on practical tasks. It involves the acquisition of skills and competences that can help individuals to function productively in industrial and commercial occupations (Wapmuk, 2011). Skills are needed for sustainable economic development of individuals and the nation at large. Thus, TVET has emerged as one of the most effective human resource development strategies that Nigeria and other developing countries have embraced so as to train and modernize the technical workforce for industrialization and national development (FRN. 2004).

TVET in Nigeria is subsumed under tertiary education. The present educational system, with its emphasis on TVET, if firmly rooted in its implementation can be perceived as the most potent instrument that can be used to bring about desirable changes or development of the nation's economy in this ever global world. TVET nurtures skills that are necessary for agriculture, industrial, commercial and economic development and thus builds a self-reliant nation. TVET would enable the recipients to be

better, more useful and more productive citizens of the nation. It would bring about the development changes as envisaged in the National Policy on Education (FRN. 2004) which emphasizes "the equipment of individual with appropriate skills, abilities, and competencies as necessary for them to live in and contribute to the development of the society.

The biggest indictment comes from a failing educational system. The educational problems are never about the absence of policies because there are indeed a handful of policies and conference proceedings, let alone the National Policy on Education (NPE). Perusing through the NPE one notices the depth of ideas and ideals that litter the document, addressing critical areas of education from the cradle to the tertiary levels. It also contains advisory details on funding and partnerships. But then, that is almost where it all ends; good ideas, often not backed with the requisite impetus necessary to bring about transformation. For example, the need for concerted education that can produce self-reliant, innovative and entrepreneurial citizens, the NPE, according to Adamu (2018) enunciated the specific goals of education in Nigeria as follows: ensure and sustain unfettered access and equity to education for the total development of the individual; ensure the quality of education delivery at all levels; promote functional education for skills acquisition, job creation and poverty reduction; ensure periodic review, effectiveness and relevance of the curriculum at all levels to meet the needs of society and the world of work; collaborate with development partners, the private sector, Non-Governmental Organizations (NGOs), and local communities to support and fund education; and promote information technology capability at all levels.

The policy goes on to highlight the necessary measures to be taken to achieve the aforementioned goals. While the propositions are laudable, what is befuddling is that, in many instances, those propositions have rather remained mere statements of intents only, without results. As a strident advocate of fostering reflective thinking of learners, convinced of its capacity to close up the abysmal skill deficit Nigeria currently faces in the economy, it is fascinating that the Federal Republic of Nigeria (FRN. 2004) recognizes fostering of rationality of learners as critical in charting developmental pathways. Hence, from primary education the policy identifies specific skills capable of nurturing self-reliant and innovative competencies in individuals. As a matter of fact, the number one clear-cut objective of junior secondary education enshrined therein speaks of the need to "provide Nigerians with diverse basic knowledge and skills for entrepreneurship and educational advancement" (FRN. 2004).

Peculiar Educational and Cultural Conditions of Nigeria

In addition to the aforementioned problem of adequate implementation of educational policies succinctly encapsulated in the NPE as well as the

conspicuous absence of reflective thinking fostering subjects such as philosophy, logic and critical thinking in primary and secondary school curricular in Nigerian education, other very critical educational and cultural conditions at the heart of fostering reflective thinking of the Nigerian learner which in turn is critical to the success of TVET to consider include among others, the following:

Inappropriate Learning Environment

Throughout history, there has been a general consensus as to what causes people to behave the way they do; what motivates them to learn; what they think and the way they prefer to do things (Idowu, 2002). The environment to a large extent influences learning. The extent to which a child could reach in academic attainment is dependent upon the existence of certain environmental conditions. Each child is born with hereditary potentials and limitations into a set of surroundings and conditions. These factors interact continuously from birth until death. Thus, the child's environment is made up of all the forces that influence his growth and development, his behaviour and the realization of his potentials, intellectual and otherwise. Hereditary sets up the natural characteristics of a child while environment helps to influence it for better or for worse. According to Denga (1986), good feeding, adequate physical exercises and clean habits positively affect the rate of learning. Thus, two children who are born of the same parents and happen to have similar intellectual potentiality but who are reared in different environments, will certainly exhibit a significant difference in the rate of educational achievement in favour of the child reared in a conducive environment. Thus, environment helps the inherited potentialities to mature and actualize. Denga (1986) defined environment as those aspects of the organism's surroundings to which it responds at a given time. Thus, environment can be physical or psychological. The physical environment provides opportunities and may also limit experiences. Everything in the child's world that he can see, hear taste, smell, touch or feel exerts some influences on his development and learning behaviour. Thus, the home in which the child lives, the neighborhood where he plays, the school he attends, the company he keeps and the community in which he grows up bear a lot of influence on his learning behaviour. Thus, the extent to which a child can go in his academic performance is dependent on a couple of variables:

a. Teacher Variable

For the success of any TVET, First, it cannot be over emphasized that teachers should be open and allow critical discussion of their own beliefs, propositions and rules if they are to encourage a critical outlook in their learners. This is the view of authorities like Passmore (1972) "… a child will be encouraged to be critical only if he finds that both he and his teacher can be at any time called upon to defend what they say, to produce in relation to it, the relevant kind of grounds." This is also in line with Scheffler's (1965) position that teaching is "submitting

oneself to the understanding and independent judgment of the learner, to his demand for reasons, to his sense of what constitutes an adequate explanation." It is normal to expect that no matter the methodology employed not every learner will end up developing the reflective attitude considering other minor individual differences such as in learning abilities. However, if in his teaching, the teacher leaves room for his learners to ask questions, or suggest intelligent alternatives to his propositions, he can succeed in developing it in many of them. Admittedly, this is more appropriate at the higher level of education. The regret is that even at the tertiary level, some in Nigeria still approach teaching at worst as dictation and at best as instruction, discouraging free critical discussion. The teacher then counts himself successful when and only when his learners leave the institution holding firmly to those views he had fed them with, without venturing to think of alternatives or proposing any.

Often, teachers in Nigeria, Gomerep (2019) noted, wrongly perceive their role as that of establishing a culture of silence in the classroom and ensuring that everyone gets through the lesson laid down for the day. Such teachers strictly keep to a syllabus that may invariably be geared only towards imparting information and preparing learners for examinations. On their part, the teachers teach by regurgitating imported information. Such teachers are unlikely to encourage critical discussion among their pupils and are therefore also unlikely to develop the critical spirit in them.

It is not being suggested here that subject-matter should be discountenanced or that some sort of integrated approach should be entrenched to develop the reflective spirit. Just as subject-matter without allowance for criticism is intellectually empty, so also criticism without the subject-matter is intellectually blind. At least, any discussion about criticism implies criticism of something. To be educated, at least in Peters (1967) view, one must be 'initiated' into such human traditions of critic-creative thought as philosophy, science, history, and mathematics. The point of emphasis here is that the process of initiation should not be such that forecloses understanding, imagination and initiative on the part of the learners. In addition, there is also need for the teacher to learn to utilize the questioning-method of teaching as he initiates learners to the tradition of whatever his subject is. Through certain techniques learners imaginations are constantly exercised in such ways that they can learn to imagine other ways of looking at specific issues. Such techniques peculiar to teachers for fostering reflective thinking of learners which are lacking in many Nigerian teachers, Otuka (2015) noted includes their inability to, among others;

- accept unusual ideas, questions, and products from learners,
- provide opportunities, including materials, for creative work,
- asking learners to examine causes and consequences in order to make personal evaluation,
- provide environment in which it is safe for learners to take risks, question, experiment, and test,

- allowing learners to make decision and choices,
- allowing learners to decide on closure of an idea, experiment, or trend of thought, and
- allowing learners opportunities to take leadership responsibility.

Secondly, inadequate teacher training and retraining is also an important obstacle. Quality education, as noted above depends on the ability, hard work and dedication of the teacher. If a teacher fails to keep himself in touch with the rapid scientific and educational developments then he would become inefficient and ineffective as indicated in the National Policy on Education (FRN. 2004). The teacher is the most crucial factor in implementing all instructional reforms, especially at the grassroots levels. It is a fact that the academic qualifications, knowledge of the subject matter, competence and skills of teaching and the commitment of the teacher have effective impact on the teaching and learning process. Many factors are responsible for shaping the quality teaching. These include ideological and socio-logical needs, existing structure of education system, and well-defined theories and practices of teaching and learning. Teacher education programme, being an integral part of education system, needs to expand further for catering to the fast emerging needs of the country. Teachers are supposed to be Nigeria's great assets. It is the quality of teachers on which the population of the country mainly depends for excellence. Teachers' credibility depends on how they take up the rights and responsibilities, which are associated with the position. The teacher should be a guide not a dictator, a scholar and a philosopher not a collector and repeater of facts. Teacher training and retraining at all levels is therefore critical in revamping Nigerian education. Although this is being done, regrettably, it is still not adequate. It is supposed to enable teachers reflect critically on their practice and approach new knowledge and beliefs about content, pedagogy, and learners. Training and development can be thought of as processes designed to enhance the professional knowledge, skills, and attitudes of educators so that they might, in turn, improve the learning of learners. Teacher training should mould the personality of a teacher such that their attitudes are reshaped, their habits are reformed and their personality is reconstructed through teacher training.

In addition to the need for training and retraining of teachers in general is the special need for training and retraining of teachers and lecturers in the area of general philosophy and philosophy of education. Although many tertiary institutions of Nigeria now have Departments of Philosophy or at least run philosophy related courses in various departments, it is important that learners and teachers understand how philosophy relates to other educational subjects, to their life, to fostering rationality of learners and to the development of the country. The challenge in Nigerian education system however, is that there are at the moment shortages of qualified man power in terms of teachers and lecturers who can adequately teach philosophy at all levels of education to cater for this basic need across the country. Added to this disadvantage is that many, out of the few committed lecturers rendering their services to the

tertiary institutions did not have foundational training in philosophy as a discipline but are compelled to picked philosophy much later in their educational carrier as a secondary choice. To compound the situation further, many are unqualified to further their professional training in the area.

b. Infrastructural Variable

Another very important condition for effective TVET, according to Gomerep (2019), is that positive classroom climate enhances learners achievement. Educational proprietors and administrators who create conducive classrooms climate develop not only a classroom setting, but also an emotional setting, making the learning environment a key focus in educating learners. The most elaborate lesson plans by teachers cannot compensate for a chaotic classroom. In well managed environments, learners work efficiently, experience less stress and feel secure. By establishing expectations and classroom routine and modeling appropriate behaviour, appropriate classroom environments help learners develop a sense of control, as well as socially acceptable behaviour. A chaotic classroom can never lead to innovation.

Substantial period of a learner's time is spent in a classroom. It is in a class that they learn the various skills and abilities necessary and proper for them to achieve success in life. With the classroom being such an important place, it is important to understand the ways in which to affect this environment in order to receive maximum effectiveness in instruction. Every precaution is expected to be taken to make sure that the learning environment is one that helps learners thrive in reflective thinking. If not approached correctly, a classroom can be set up in a way that stifles reflective thinking and does not promote creativity. There are many things that can affect this environment. There are physical elements such as provision and arrangement of adequate number and sizes of seats and desks, and availability of resources such as instructional materials and teaching aids. There are intangible elements such as established rules and regulations, the sounds within the room and the lighting of the classroom. Each of these can impact learner's focus and achievement in the class. They can also affect a teacher's attitude in the class. The standard for a classroom, where desks and seats are expected to be adequate and aligned in rows within the classroom is not always met by many Nigerian public schools at all levels. Often, classrooms in these schools are undersized and cramped without adequate ventilation and lighting. This failure makes learners lose focus and creates a higher number of disruptions in the classroom which impair learning and especially reflective thinking in them.

According to Idowu (2002), most schools in Nigeria, as a result of the economic down turn of the country, almost by tradition are lacking in accommodation and other physical infrastructure which should boost learning. The reality of most Nigerian schools have inadequate classroom accommodation; poorly-equipped libraries and laboratories; and little or non-existent sporting facilities. The classroom situation is usually overcrowded due to the large enrolments in the schools occasioned

by Universal Primary Education (U.P.E) now christened Universal Basic Education (U.B.E). In most schools, learners are up to hundred in a classroom designed for only forty learners. In such cases the chairs and desks are not enough and the learners are seen sharing chairs, some standing up, some sitting on the floor, windows or broken desks. This type of situation certainly stalls the teaching-learning process and disrupts the learner's mental activities, a situation that generally militates against effective teaching and consequently intellectual development of learners.

Furthermore, for effective teaching and learning, well equipped laboratories and subject rooms are needed but the reality, according to Idowu (2002) is that most Nigerian schools today lack these essential facilities. Many schools and colleges have buildings that they call libraries, but most of these are not equipped with essential books and current journals. Also, many schools and colleges do not have science laboratories while a good number of those that have, do not possess the basic tools. In a situation like this, the teachers, of course, cannot put in their best, and the learners, certainly, cannot derive maximum benefit from the teachers' instruction. In this case again, the teaching-learning process is stalled and the overall development of the learners within the school system is retarded and their learning potentials marred. Omoregie (2015) further identified other components lacking in Nigerian classroom environment which impair reflective thinking of learners to include, among others; lack of adequate security; this include physical and emotional security. Many Nigerian schools are located in crisis pruned environments and the buildings are not according to specified standards. One immediately recalled the reason behind the kidnap of school children in Chibok and Dapchi, both in North East Nigeria due to lack of adequate security.

It is important also to note that with the introduction of wireless devices, the dynamics of classroom teaching is changing. Teachers spend less time at the front of the classroom and more time interacting with learners, guiding them on a more individual level. It is important for Nigerian teachers to note that as teaching continues to change, classroom requirements will also continue to change. Orr and Klein in Gomerep (2009) went so far as to say that "teachers and administrators should systematically evaluate the general culture of their classrooms and schools and should estimate how this culture affects their ability to promote critical reasoning habits among learners." The point made by these writers also added that moving beyond one's mental habits and experimenting with new ways of looking at things, the very stuff of thinking skills instruction involves risks. In order for learners to be willing to participate in such activities, they "…need to feel free to explore and express opinions, to examine alternative positions on controversial topics, and to justify beliefs about what is true and good, while participating in an orderly classroom discourse." These are lacking in most Nigerian public schools. Educators are supposed to have ensured that these conditions are of optimal standards.

Belief in Superstition as a Factor

Learner's socio-cultural environment also has significant consequences on his learning behaviour. Children who develop normally in the social skills in a casual and informal manner, assimilating through incidental experiences appropriate or inappropriate ways of acting. An unsatisfying social experience, therefore, can adversely affect school learning. The society as a whole contributes its own measure towards the academic performance of the Nigerian child. Nigeria needs to consider the adverse impact which superstition has on the development of a rational and scientific attitude on its people. This is because of the very nature of rationality and scientific thinking, especially its concern for provision of evidence which seems to be an antithesis to superstition. Superstition involves beliefs in supernatural and inexplicable beings, whereas rationality takes into account provision of evidence and explanations. Under the influence of superstition, natural phenomena are presumed to be the work directly or indirectly of a Supreme Being acting through the many local deities. Explanations of such phenomena are essentially unscientific and irrational therefore they blind consciousness of people to their potentialities and capabilities in tackling the phenomena.

As long as Nigeria allows superstitious beliefs and values to dominate people's minds, people's subconscious, corporate and individual thinking and attitudes will perpetually be coloured by them. This state of mental comatose will induce people to fail to take responsibility lulled by false consciousness and illusion that their salvation lies not in their hard work, discipline and diligence but in supernatural beings. Deities will continue to be brought into governance, school and business if the people continue to believe that some omnipotent beings or spirits who alone can get everything done and solve even under developmental problems almost without human partnership. Because of the prevalence and heavy influence of superstition on the citizenry, it is common for Nigerian learners not to work hard in school for success but to rely only on prayers and offerings to deities; it is common, for farmers to rely more on prayers and offerings to deities instead of exploring available scientific benefits of genetically modified seeds, pesticides and storage facilities for success; it is also common to find healers concentrating on prayers and supplications to deities for healing of the sick, rather than exploring scientific benefits; it is also common for the people to believe that Human Immunodeficiency Virus (HIV) and order diseases to be transferred from one person to the other without any physical contact but through spiritual means; it is common to see Nigerian athletes concentrating more on prayers and offering sacrifices to deities for success rather than concentrating on training.

Superstitious beliefs have very negative impact on especially the young who are brought up in the culture of the society where people persist in the belief that humans have little or no power over nature or their own destiny, they will be under the illusion that certain

deities and spirits are all they need to invoke to solve their individual and national problems.

Fear Factor

A reaction to a problem is often a bigger problem than the problem itself. Gomerep (2017) observed that many learners avoid challenging problems like Mathematics, Physics, Philosophy and Logic until it is too late, largely because the learners have never learned the appropriate emotional, psychological, and practical responses. A problem is an opportunity to enhance reasoning. A learner cannot know how to swim purely through theoretical teaching in class, he has to be brave enough to try it practically no matter his fear of large water or river even when the risks are real. A learner cannot know how to drive purely through theoretical teaching in class, he has to do it in practice on the roads even though the risks from his mistakes and other road users are real. The wisest people welcome and even seek out problems, seeing them as challenges and opportunities to improve thinking. A problem is, seeing the difference between what one has and what one wants or recognizing or believing that there is something better than the current situation or an opportunity for a positive act. Seeking problems aggressively will build confidence, increase rational ability and give one a better sense of control over one's life and situation.

Secondly, any students who could do well in sciences have carefully avoided opting for science subjects in especially secondary schools because of fear of failure at WAEC. Similarly, many business men and women have also avoided going into certain businesses, which ordinarily they could do well simply because of fear of failure. Thomas Edison is reported in Gomerep (2009) to have remarked that in his search for the perfect Filament for the incandescent lamp, he tried everything he could think of, including whiskers from a friend's beard. In all, he tried about 1800 different things. After about 1000 attempts, someone asked him if he was frustrated at his lack of success. He replied, "I have gained a lot of knowledge; I now know a thousand things that won't work." Fear of failure is one of the major obstacles to enhancing rationality of learners. The cure is to change learners' attitude about failure. Failure along the way should be expected and accepted. They are simply learning tools that help focus the way towards success. Not only is there nothing wrong with failing, but failing is a sign of action and struggle and attempt, much better than in-action. The go-with-the-crowd types may never fail, but they are essentially useless to humanity, nor can they ever enjoy the feeling of accomplishment that comes after a long struggle. Mistakes are not fun, but they are surely educational.

Faulty Analogy as a Factor

Analogy is the act of explaining by comparing with another thing that has a certain likeness. It is the way in which much of people's thinking, not only in Nigeria but across the world, is guided. Analogy therefore proves to be a reasonably good guide to conduct. However, analogy becomes dangerous when the conclusion to which it points to is regarded as certain instead of being probable. Analogy is supposed to be just a guide to expectation, not a proof of a conclusion. Very often analogies are wrongly used to prove conclusions, which is a crooked way of argument. Mwajim (2002), for instance, noted a Nigerian situation where one ethnic group uses analogy to prove their beliefs about another ethnic group is an indication of false analogy. Preachers in Churches and Mosques make use of analogies very often. Such wrongful use of analogy can hinder the development of rational attitudes among the learners of different ethnic and religious groups.

Impact of Assumption as a factor

Assumption, according to Longman's Dictionary of Contemporary English, is something that is taken as a fact or as true without proof. It is a supposition that is taken for granted. It is an adoption of a position without critically examining its variables. It is a belief in something without having rational basis. Consequently, assumption affects decision-making. According to Mwajim (2002), there are two types of assumptions; unconscious and conscious types. Unconscious assumptions are beliefs, values, and ideas that are not consciously recognized or expressed, while conscious assumptions are creative strategies. Sometimes conscious assumptions are used as a guide to new information. For example, a science student may assume that water boils at one hundred degree centigrade above sea level, before going out to check whether or not it is true. Unconscious assumption is a stereotype and unexamined reasoning which leads to faulty reasoning as well as undermining all forms of argument. It is common in ethnocentric and religio-centric situations which when used in educational practice can limit learner's critical spirit which in itself is the basis for rational development.

Other obstacles to achieving optimal rationality by learners could also include problems of perception, habits of thought, and personal vested interest. This is an unsatisfactory state of affairs in the country which is neither natural nor peculiar to Nigerians. It is contended here that this can be overcome through education, especially when such obstacles are systematically dealt with.

Conclusion

This paper is an attempt to identify and reveal, with the aim of proffering solutions educational and cultural factors that have constituted an obstacle to the success of Technical Vocational Education and Training (TVET) in Nigeria so that when addressed TVET can be a veritable tool for national development. The method adopted for the research is qualitative in nature, as such it started with the analysis of the key concept in use, so that it can provide the work with a theoretical framework, namely; meaning and nature of TVET. The paper then examined Nigeria's policy formulations on functional education through TVET to reveal that in terms of policy formulations it is not lagging. The paper then listed and explained some of the so-called educational and cultural conditions that have constituted obstacles to the attainment of the objectives of TVET in Nigeria, and hence, responsible for the drawbacks in national development. The paper in this process revealed that when the aforementioned obstacles are addressed through education, effective teaching and learning of TVET can take place which in turn can facilitate development in Nigeria. It is on this basis that the paper will conclude by making the following recommendations as a way forward:

Recommendations

i. Government should improve school environment and infrastructure

The role of physical environment in learning outcomes is irrefutable. Meaningful teaching and learning can occur only in an academic environment. Consequently, government at all levels should invest more in the improvement of the school environment, provision of adequate teachers who are constantly trained and retrained, and provision of instructional materials.

ii. Nigeria should make the study of philosophy of education, logic and general philosophy compulsory for learners at all levels of education

Reflection is very central to philosophy in general. A learner who behaves mechanically in everyday life is not philosophical; he does not philosophize until he begins to reflect or speculate about himself, about his place in the scheme of things, about theories and policies of education, about his experiences and relations to others. Logic and critical thinking should be taught at secondary and tertiary levels of education across the country irrespective of learners' special areas of interest as a means of fostering their rationality. The subject content of logic and critical thinking for instance, can cover specific aspects such as arguments, premises, conclusions, propositions, classification of propositions, validity of argument and Truth, Soundness of argument, Factual and logical Mistakes in argument, Deduction and Induction, and Fallacies in reasoning, all of which have been discussed in chapter three of this work.

iii. Government at all levels should improve Teacher Training/Re-training

To a large extent, the success of any given programme depends also on a large number of implementation specific factors such as; quality of teaching, administrative support, appropriateness of the programme to the level of the learner, learner versus teacher population ratio, and the extent to which the programme is implemented in the intended manner. It is clear that the important factor to consider in developing a rational outlook is creating an atmosphere conducive to the development and utilization of initiative, independence, courage and imagination. This study therefore, recommends training and retraining of Nigerian teachers at all levels of education by proprietors of schools and government at all levels in order to achieve these needs.

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Enhancing the Teaching Skills of Pre-Service Technical and Vocational Education Teachers through Effective Implementation of Microteaching

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Abstract

Teaching is a conscientious communication in which life transforming capabilities are being transferred from one individual to another. The quality of a teacher is estimated on how much the students understand from his/her teaching. Therefore, the teacher is required to attain new competencies and attitudes which can adequately be attained through microteaching. This opinion paper discusses the concept, meaning, importance and objectives of microteaching, and why it is imperative in the training of pre-service Technical and Vocational Education (TVE) teachers. The authors see Technical education as a skill acquisition avenue for job and economic achievement of its receivers. Hence there is need to train the teachers, who teach these skills to thoroughly acquire the competent skills necessary to impart them. In order to effectively implement microteaching, the Orientation, Modeling, Training and Assessment (OMTA) model of microteaching is seen as the means to appropriate method to follow in the training of TVE teachers. The authors discussed the OMTA model in detail, and, in conclusion, though some modifications and alterations came up along the way since the establishment of microteaching, these changes went down to a non-effective change due to some limitations that occurred in the institutions that operate microteaching process. They therefore made recommendations, such as institutions should implement the OMTA model assiduously, input the necessary facilities for effective microteaching, and group pre-service teachers into fewer numbers to create room for repetitive re-teaching until a skill is acquired.

Keywords: microteaching, pre-service teacher, teaching skills, vocational and technical education and effective implementation.

Introduction

Teaching is generally seen as the art of imparting knowledge from one person to another. It is a conscientious communication in which life transforming capabilities are being transferred from one individual to another, leading to understanding something by example or experience. However, it does not merely involve a simple transfer of knowledge from one to another. Instead, it is a complex process that facilitates and influences the process of learning. According to Pius and Antonia (2014), teaching is doing anything to impart knowledge. Teaching is a process that enhances behavioral changes in learners and involves informing, persuading, illustrating, demonstrating, guiding and directing. The teacher has a key role in any education process. The individual who practices the art of teaching is the teacher.

Due to the complex nature of the art of teaching, not every educated person can teach, but only an individual who has been specifically trained in the science of teaching and that is the teacher. Teaching is natural, necessary and vital to keep the society alive. Every expert everywhere has a terminal end and upcoming learners must be trained to take over from them. The teacher is the personnel saddled with this responsibility. As such the teacher requires the necessary skills in order to discharge this responsibility effectively. The most important role of the teacher in a school is to guide and direct students while providing the requisite environment for the impartation of knowledge, (Koross, 2016). The quality of a teacher is estimated on how much the students understand his/her teaching. The teacher is responsible for shaping the terminal behaviors of the students, helps them to have positive relationships and also makes the students skillful. Unlike the traditional perspective, where the teacher is the source and transmitter of knowledge, nowadays the teacher has become the guide of the students throughout the learning process. Therefore, pre-service teacher is required to attain new competencies and attitudes which can adequately be attained through microteaching. The complexity of a teaching situation can be overwhelming, hence to deal effectively with it, teachers must not only have a good knowledge of the subject at hand, but also some communication skills such as ability to observe, supervise, lead a discussion and pose questions Teachers in training are here referred to as pre-service teachers.

Pre-service teacher is a college student involved in school-based field experience under the supervision of a cooperating teacher. According to Ogbuanya and Lat (2018), Pre-service teacher is an individual in a teacher preparation program who has not yet been certified or licensed as a professional educator. The classrooms learning of a pre-service teacher cannot be used as a platform for acquiring primary teaching skills; rather it is an avenue for acquiring the theoretical information necessary to prepare an individual for teaching readiness. The pre-service teacher is required to acquire skills that will make teaching meaningful to the learner by taking care of the learner's interests and needs

at various stages and to have a good grasp of his subject so as to gain the respect of the learners. One of the means of imparting the skills of the art of teaching into an intending or pre-service teacher is through micro-teaching.

Microteaching

Microteaching could be defined as a system of controlled practice that makes it possible to concentrate on specified teaching behavior and to practice teaching under controlled conditions. Micro-teaching is a teacher education technique which allows teachers to apply clearly defined teaching skills to carefully prepared lessons in a planned series of 5-10 minutes encounter with a small group of real students, often with an opportunity to observe the result on video-tape or any other medium that reproduces the act for the pre-service teacher to review. With the introduction of microteaching, the lacuna of scientifically proven or effective methods that should be followed in the teacher training programs has been overcome, (Remesh, 2013). Prior to the introduction of microteaching into the teacher training programme, there were no specific objectives to guide students' teaching, but a haphazard and undiscriminating supervision of teaching practice, which was ill planned, ill supervised and ill assessed. The feedback was subjective with respect to teacher performance and no research support was there to prove its effectiveness (Ogbuanya and Lat, 2018). These apparent disparity between students' and teachers' theoretical knowledge of education and their practical teaching experience lead to the introduction of microteaching into the pre-service teachers training program. It is aimed at bridging the gap between the theoretical knowledge of teaching and teaching practice.

Microteaching process is done in phases, knowledge acquisition phase, skill acquisition phase and the transfer phase (Lawrence, 2010).The knowledge acquisition phase is the preparatory, pre-active phase during which the teacher is trained on the skills and components of teaching. This is done through lectures, discussion, illustration and demonstration of the skill by the trainer. The skill is also analyzed and discussed in detail.

The skill acquisition phase is that in which the teacher plans a micro lesson to practice the demonstrated skills. The stage includes planning micro-lesson, practicing the skill, evaluating it through a form of feedback, re-planning it and re-feedback until the desired level of skill is achieved. During re-teaching phase, the colleagues and peers act as constructive evaluators. The phase also enables them to modify their own teaching and learning practices. These behaviors and skills learnt are re-enforced by the teacher and those ones not needed would be displaced. During the process, electronic devices such as audio-tape and video recorders are freely used to record the presentations for subsequent re-evaluation by the presenter.

At the transfer stage, the skills learnt from simulated teaching situation can be transferred to a real classroom situation. In the process, all skills practiced are integrated.

Importance of Microteaching

Microteaching is a requirement of the University and Nigeria certificate of Education awarding institutions to graduate students, and contributes to the candidates' ongoing systematic development of their teaching practice and general performance while in later practical life of teaching. According to Ogbuanya and Lat (2018), micro-teaching makes the pre-service teacher to be aware of how students perceive him/her, which may be quite different from the teacher's self-perception, and only colleagues stand in best position to give the teacher feedback on his areas of strength and weakness for possible improvement. Videotaping provides a snapshot of teaching that can be viewed and assessed independently and at a time convenient for the instructor or assessor. It also enables the teachers to view themselves as others see them, (Raph, 2014).

Otsuplus and Antonia (2014) summarized the objectives of micro-teaching as follows:

1. To enable teacher trainees learn and assimilate new teaching skills under controlled conditions.
2. To enable the trainees master a number of teaching skills.
3. To enable teacher trainees gain confidence in teaching.
4. To understand the concept of microteaching.
5. To understand the principles underlying microteaching.
6. To analyze the complex process of teaching into essential micro-teaching skills.
7. To understand the procedure of microteaching for developing teaching skills.

The proponents of microteaching at Stanford university view teaching as a complex skill comprising of the above constituent skills, and that through microteaching the pre-service teacher can safely practice them for future used in the teaching career. The skills mentioned are hereby explained:

1. Set induction: a preplanned act put up at the beginning or middle of the lesson, used by the teacher to capture the attention of the learners. It can be exhibited in many ways, such as joke, whistling, brain teasing, short story or even demonstrating an experiment.
2. Stimulus variation: the skill enables the teacher to keep the lesson interesting right from the beginning to the end. It could be acted in form of movement, gesture, silence, demonstration with objects, changing tone of voice and many other professional displays in order to hold the learners attention to the end of the class.
3. Signs and nonverbal cues: The skill involves using gestures or psychomotor displays to communi-cate a message to the class. Looking intently and quietly at a misbehaving student, pointing

finger at them etc without saying a word is enough to pass a message.

4. Reinforcement of students' performance: a process of increasing the probability that a particular behavior will occur. Reinforcement could also be negative for negative behaviors. The skill could be acted by gesture, verbally, proximity, contact, token criticism, keeping quiet intentionally and others.
5. Questioning: a systematic process of assessing the teaching process. Questions serve two major purposes according to Rukop and Lomak (2007). They are to help the teacher discover how well the pupils have learnt and how well he/she taught the lesson, and, that questions help the learners to develop the ability to think and understand ideas. Questioning skill requires the teacher to have the ability of phrasing, focusing, directing pausing and distributing it for it to achieve the aim of asking it.
6. Recognizing attending behavior or class management. This is a skill of making the class conducive for learning. The skill observes orderly arrangement of the classroom, movements in and out, class interaction strategies, observation of the attentiveness of learners and so on.
7. Illustrating and use of examples. The skill involves using the appropriate illustrations and giving suitable examples, including the appropriate time within the lesson during which the skill is put to use. This also aids the learners to retain whatever concepts taught to them.
8. Planned repetition, used to promote retention. It helps slow learners, controls distraction in class and gives meaning to absent minded students in class. In planned repetition skill, the teacher repeats important points for emphases. The teacher could also ask students to repeat important points in the lesson.
9. Communication: The teacher communicates the learning concept and material to the learner in various ways with the aim of getting them to learn. This could be verbally or non-verbally. The skill of verbal communication involves using tone of voice, clarity of words, language, etc. non - verbal communication involves use of the face, head, eye, using the arm, finger and the body gesture.
10. Closure: This skill is used after the process of evaluation. It is the skill use by the teacher to focus the students' attention on the completion of specific subject or lesson. The teacher achieves closure by summarizing the main points, questions students to elicit the main points, give class assignments on important points, eliciting examples from students and relating the lesson to previous or even future lessons.

Micro teaching is a cycle which starts with planning. The process includes: Planning, teaching, criticizing, re-planning, re-teaching and re-criticizing. In the process the skills mentioned are learned and through repetitive practice. Microteaching however has since been bedeviled by some limitations that lead to some incorrect modifications.

Alterations of the Microteaching Procedure

Many microteaching alterations have come up over the years in the basic training protocol, which detracted from the effectiveness of the training, though perhaps necessary due to the resources constrain. Some of the alterations include

1. High population size of a micro-teaching class: This could be as a result of lack of resources or shortage of facilities for multiple and simultaneous microteaching sessions. Trainees in this case are mostly passive learners because of the large number of lessons involved. Also the students are not opportune to repeat severally the number of teachings and re-teachings.
2. Another modification is the use of longer periods; this is due to lack of understanding of single concept element lesson, where the pre-service teachers are taught to break the lessons into smaller bits concepts to teach each at a time. Microteaching is a suitable medium through which the skill could be acquired by pre-service teachers. Longer microteaching lesson increases its complexity, the duration of training sessions and the number of possible sessions for each teacher trainee, leaving no room for repetitions
3. Conducting microteaching without recording equipment for the pre-service teacher to review and observe the errors made at the first presentation. Without any video or audio tape the teacher trainee would only rely on the suggestions made by peers or the supervisor, which may not be convincing to the trainee. With the recording instruments, the trainee can view them then re-teach in several cycles until a skill is perfected
4. Microteaching trainers being too critical: Pre-service teacher trainers or supervisors need to give more emphasis on the areas of strength than the areas of weakness of the trainee. A situation where a supervisor ridicules or punishes the trainee harshly for errors committed can discourage and confused the trainee. Instead, the trainer needs to motivate the trainee by emphasizing their areas of strength. While pointing out areas that need to be relearned.

Microteaching is indispensable in the training of vocational and technical education teachers. Vocational And Technical Education requires the teachers to be well grounded in teaching skills in order to be able to pass the knowledge to the learners. Due to the haphazard training given to many pre-service vocational and technical education teachers, not much output can be obtained from the products of Vocational and Technical Education. As the popular saying goes “garbage in garbage out”. Where Vocational and Technical Education teachers are not well trained to acquire the requisite teaching skills in addition to the core content knowledge, the teachers will not be able to impart into the learners the knowledge they possess. However, with efficient implementation of microteaching, the vocational and technical education teacher gains confidence, skills and the

charisma to impart knowledge to the learners.

Vocational and technical education has an element of intrinsic capacity building in the learners, whereby, an individual who receives the knowledge can bring in natural capabilities into the skills and knowledge acquired, thereby creating new innovations into it. These students can constantly explore and test out ways of getting to where they want to go. According to Umunadi, 2012, these students can in this process discover new materials relevant to the solution of their problems, and that such materials are intrinsic to them because they discovered them by themselves and find them useful for solving their immediate problems. Where government is able to provide the necessary equipment and facility for Vocational and Technical Education, this will only yield fruits if the teachers that are meant to use them are well trained themselves, otherwise it amounts to waste of resources.

The need for qualified vocational and technical education teachers cannot be overemphasized. Due to the double edged knowledge of science and technology acquired through vocational and technical education, the teachers in the field are always shifting from the teaching field to join other jobs where they see as being greener than the job of teaching. This has led to brain drain in technical and vocational education system and shortage of qualified teachers. According to Okoye and Arimonu (2016), there is a mass movement of technical teachers and lecturers of technical education which are very much needed for the socio-economic 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. They added that about 500 lecturers from Nigerian tertiary institutions have continued to migrate each year, particularly to Europe, America and other African countries, aside those who travel outside the country for studies and refuse to return. Therefore there is an urgent need to roll out other trained vocational and technical education teachers to arrest the situation, and effective implementation of micro-teaching is a suitable way to achieve this goal.

Effective Implementation of Microteaching

Microteaching is imperative for "teaching skills" acquisition of technical and vocational education teachers. As such, it should be diligently implemented in order to generate the "skilled teachers" necessary for the teaching of vocational and technical education. Though teachers often differ in methods to be followed during the supervision of teaching, but there are basic procedures that if followed would get to the achievement of the same objectives. One of the methods for effective implementation of microteaching is the "OMTA" model.

OMTA is an acronym for Orientation, Modeling, Training and Assessment. According to Adnyana and Citrawathi (2019), Orientation is important to provide an overview of the importance of the types of basic skills being

trained. The OMTA microteaching model consists of 4 stages, namely: 1) Orientation, 2) Modeling, 3) Training, and 4) Assessment.

1. Orientation: Orientation can be done to give direction and general description of the teaching skills to be trained on. At this stage, the activities to be carried out include (a) Explaining the importance of the skills to learn, to generate learning motivation, (b) Delivering the learning objectives in the form of specific descriptions to give the direction to be achieved, and (c) Delivering in general the ways to learn the basic teaching skills learned.
2. Modeling: At this stage, recorded video tapes may be used as indirect models to help in presenting teaching skills to pre-service teachers. According to Adnyana and Citrawathi (2019), three activities are carried out in this phase, namely: observation, discussion, and making conclusions. Through modeling activities pre-service teachers are expected to get information and understanding on the goals, principles and components of the skills being taught, and how the components of the basic teaching skills will be applied in the class.
3. Training (Practices): pre-service teachers are expected to be able to apply the basic skills learned. They are given the opportunity to demonstrate the mastery of basic teaching skills. Activities at the practice stage include: 1) planning, 2) implementation, 3) observation and 4) reflection on the little practice done.
4. Assessment can be carried out at the stages of orientation, modeling, and practice. the components assessed at the stages are: orientation (Enthusiasm and participation), modeling (Enthusiasm, participation, and ability to obtain information about the understanding, principles, and components of basic teaching skills from video) and training (Components of emerging skills, use of time, effectiveness of media use, interaction, material mastery, and appearance).

Conclusion

Microteaching is indispensable in the training process of pre-service technical and vocational education teachers. However, this all important teaching skill acquisition activity must be carried out holistically in order to achieve the desired objective. Though some modifications and alterations came up along the way since the establishment of microteaching, these changes went down to a non-effective change due to some limitations that occurred in the institutions that operate microteaching process. Such issues including longer microteaching durations, class size, lack of recording instruments and poor attitude of some teacher trainers. Therefore, the OMTA model is capable of bringing back the microteaching training process to effectively train vocational and technical education pre-service teachers.

Recommendations

The following recommendations are put forward in enhancing the microteaching skills for technical and vocational education pre-service teachers.

1. The OMTA model of microteaching should be diligently followed by TVE Trainers as the process of training of TVE teachers.
2. Facilities like microteaching labs and audiovisual aids should be put in place by government as a necessary condition for micro-teaching in TVE schools.
3. Microteaching trainers should be diligent and committed in their duty by emphasizing more of the areas of strength of trainees, rather than discouraging them by dwelling more on their errors so as to give the trainees confidence.
4. The trainers should put fewer numbers of trainees in each group for the microteaching, for more opportunity to re-teach until a particular skill is learnt.

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A Conceptual Study of Employability Skills for Building Construction Graduates of Polytechnics in Nigeria Towards the Fourth Industrial Revolution

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Abstract

The World at large has so far witnessed three different phases of technological advancement known as industrial revolutions code-named as: 1st, 2nd, 3rd and now we are witnessing the 4th industrial revolutions. The revolutions are said to be complimentary to one another but experts have observed that the 4th industrial revolution may be unique because of Internet of Things IoT. Construction industries have begun to witnessed a dramatic change in the past two decades where building components are constructed off-site by a robot. With this development, skills possessed by workforce are gradually phasing out, newer and diversification of skills have therefor become necessary but, polytechnics in Nigeria still operates with aging curriculum thus, producing graduates with inadequate skills. As a result, number of unemployed is on the increase. Graduates needs to diversify in skills in order to stem the tide of this challenges. The educational system however, need an employability framework. The current framework does not reflect current practices. A framework of Building construction skills with generic skills imbedded in curriculum may make the graduates efficient to compete with their counterparts in the labour market. The study leaned on Boyatzis competency theory to develop an employability skill for Building construction graduates of polytechnics in Nigeria. It was found out that for a graduate to fit in the labour market of the fourth industrial revolution, they must have competency in skills, knowledge and attitudes. The paper concluded by giving a concise summary of the entire study.

Keywords: *Employability Skills, Building Construction graduates, Fourth Industrial Revolution*

1. Background of the Study

In order to achieve as well as to sustain economic growth and productivity, every nation desire efficiency and competency from its workforce. Construction industry occupies a strategic position in the nation's economy. This sector is known for generation of jobs at various levels of skills and professions in areas such as infrastructures and facilities. As technology becomes more penetrating, traditional trades are disappearing and the world of work becomes more globalized, interconnected and collaborative, the skills demand by employers are also shifting. According to Clerk and Wall, (1998) in the face of emerging technology, the demand for craft skills are changing. Demand for an all-round skill worker can therefore, not be overemphasized owing to rapid advancement in technology. Although, Literatures showed that changes in construction sector is slower than in manufacturing sector but; over the recent years the sector has witness significant changes as a result of complex nature of the industry, aging workforce, new technologies, and global competitiveness (Ahn; Pearce; & Kwon; 2012). Khoshnevis, (2004) reports that in the last two decades, automation of various parts of building structures have emerged because the conventional methods of construction cannot afford construction of large structures within a short period of time.

In addition to core skills, it has become pertinent that graduates be equipped with non-technical skills such as: cognitive and non-cognitive or social skills for them to be relevant in today's society. The challenging trend ahead of prospective graduates of today especially building construction graduates is the advent of the fourth industrial revolution (4IR) where most literature has shown that many jobs hitherto done by human will be done by machine (automation), resulting to job losses hence the need for diversification in employable skills in order to be self-reliant or function in areas that are difficult to be taken by machines. The institutions of learning have a greater role to play in training students in skills to be able to reinterpret the world in this regard.

Acquiring employability skills for 4IR in the context of this study lies on the graduates' competency in technical skills related to building construction such as: Estimating, Scheduling project, project management, cost management, effective materials and equipment utilization. In addition is their competency in generic skills or cognitive and non-cognitive which includes; leadership site communi-cation, teamwork, critical thinking and problem solving, cultural dynamic, and professional ethics (Arain, 2010).

Conventional technical skills in practice may no longer be adequate for graduates to fit into the future labour market conveniently partly because of continued use of aging curriculum. Labour market is changing speedily, such that the curriculum being used for training today is insufficient to provide the needed training for future jobs. Transition of graduates from school to work is a herculean task for graduates to cope. Transition from school to work is becoming complex period because of relatively high youth unemployment rates across nearly all states of the

federation. (ILO, 2017), attributed the reason for this among many others to lack of workplace experience opportunities, and on the demand side, employer's perception of graduates lacking the desired employability skills and the needed competency.

In Nigeria Unemployment, is on a steady rise between 2015 and 2017 in a percentage range of between 6.4 to 18.8 percent respectively according to records from National Bureau of Statistics, Nigeria. (2018) see table 1.1 below. The percentage may increase more owing to the advent of fourth industrial revolution which is characterized by mass job losses as a result of outdated skills and demographic factor. The Implication is that Nigeria will then have quite a number of graduates who will become liability to the society. The figure of increased unemployment rate according to National Bureau of Statistics, Nigeria is as shown in table 1.1.

Table 1.1 three years' Quarterly records of unemployment in Nigeria

S/N	Months /Years	Percentages (%) Range of unemployment
1	January-June, 2015	6.4 - 7.5
2	July - December, 2015	8.2 – 9.9
3	January-June, 2016	10.4 - 12.1
4	July - December, 2016	13.3 - 13.9
5	January - June, 2017	14.2 - 14.4
6	July - December,2017	16.2 - 18.8

Source: Tradingeconomics.com. National Bureau of Statistics, Nigeria (2018)

Nigerian may be confronted with more challenges of 4IR because of lack of diversification in skills among the workforce. Saltinski (2015) observed that what undermines the ineffectiveness of higher education in Nigeria, includes the teaching of theory rather than practice; low levels of Work-Base Learning (WBL), inadequate student industrial training programme, lack of internship opportunities; obsolete learning facilities; outdated curriculums; generic certificates rather than industry targeted certificates; lack of framework for building construction employability skills, and archaic assessment models. Potential graduates, however, supposed to forecast skills that are relevant not just today but for the future demands also.

Polytechnic graduates in Nigeria are getting into the work force at a time of demographic increase and predicted mass job losses so they need to be properly prepared with contemporary skills that can make them relevant to the society and to themselves. According to UNESCO (2017), what lies ahead is how to design new approaches to education so that students may be prepared to navigate these disruptive technologies. For Nigeria Polytechnics to meet its National Policy of Education

(NPE, 2013) objectives of acquisition of appropriate skills and the development of mental, physical and social abilities and competencies as equipment for individual to live in and contribute to the development of the society. Curriculum have to focus on newer and contemporary skills.

According to Ideh, (2013) in Oviawe, Uwameiye and Uddin (2017), in spite of several efforts by government through her different policies to make Nigerian educational system more functional, there are still growing concerns among stakeholders and industrialist that building construction graduates of Polytechnic lack adequate practical backgrounds and relevant job-related skills for employment in industries and construction sites. Employers of labour have continued to express concern over the quality of the current graduates of Higher Institutions in Nigeria who are experiencing set-backs due to lack of relevant job skills for employment especially during the 4IR. In the light of this, this study seeks to address the employability skill gap deficiency among building construction graduates of Polytechnic in Nigeria in order to develop a framework embedded with skills required by employers during this fast-growing technological development.

Literature Review

2.1 Impact of fourth industrial revolution on employment

Each Industrial Revolution with a peculiar challenge which impacted either positively or negatively on the society. These revolutions include first, second and third revolutions, the first industrial revolution was characterized by utilization of steam engines, the second centred on used of electricity for mass production; and the introduction of computer heralded the third. Now the fourth code named 4RI, also known as advanced technologies perceived to have the potential to radically change the way we work and live our lives (Suzanne, 2017).

According to MinX and Suk Hi Kim (2018) the speed and value of the changes coming with 4IR is not to be ignored. In a study conducted by Fiona (2017), to ascertain the degree at which 4IR will affect our lives, it was revealed that workers who perform tasks that are easily machine-driven may be forced to find new work which involves tasks that may not easily be automated. Ford (2015) support this by saying that one of the very prominent fear being envisaged as a consequence of this technological revolution is automation, and robots will carry over much of the tasks done by man.

In United States of America, Germany, Japan, United Kingdom, and Australia for instance, the impact of 4IR is already been felt according to the analysis shown in figure 2.1 by Prince Waterhouse Cooper (PWC) (2017). In United Kingdom 30 percent jobs may be at high risks of automation by the year 2030s, 38 percent in the United States, 35 percent in Germany, 21 percent in Japan, and Australia with a high percentage of 40 percent. As a result of robots taking over jobs done manually by human at cheaper cost.

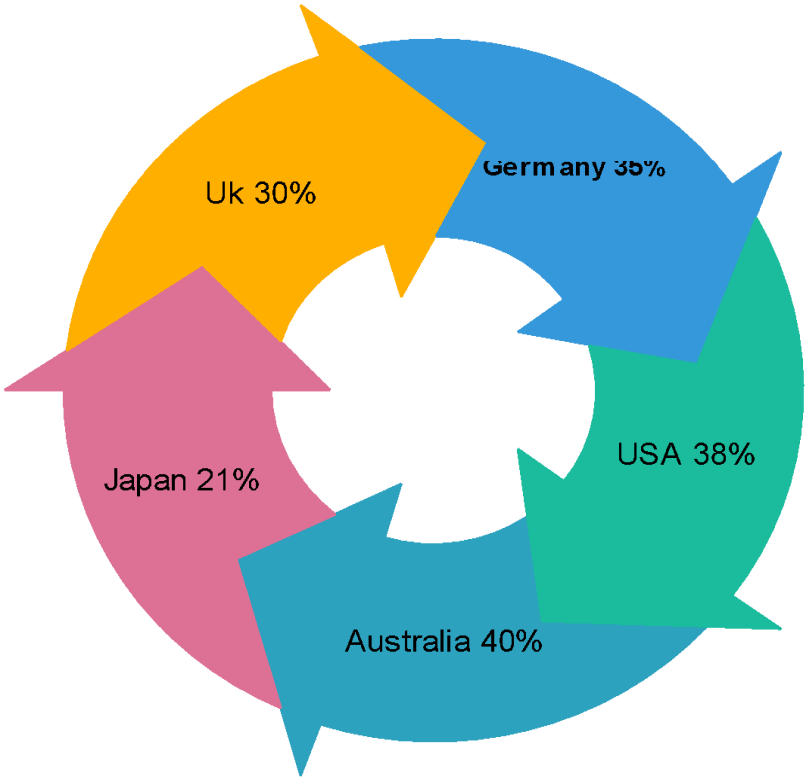

Figure: 2.1 Developed Countries at high job risks PWC (2017

International Labour Organization, (ILO) (2016) conducted a study on the employment risk during 4IR among the five Asian countries known as ASEAN-5 comprised of Cambodia, Indonesia, the Philippines, Thailand, and Vietnam. The result revealed that around 56 percent of all employment has a risk of automation in the next two decades. The scenario in the African region may however be more devastating with the advent of modern technology because of demographic increase and gradual decline in skilled workforce.

The concerned of African countries is the potential impact of the revolution on jobs in the continent. According to WEF, (2017), 41 percent of all job's activities in South Africa, 44 percent in Ethiopia, 46 percent in Nigeria, 48 percent in Mauritius, 52 percent in Kenya, and 53 percent in Angola are at risks because of automation as evidently represented in figure 2.1.2. These percentages are the indicator that majority of the workforce in the region require to upgrade their skills to fit into the anticipated changes.

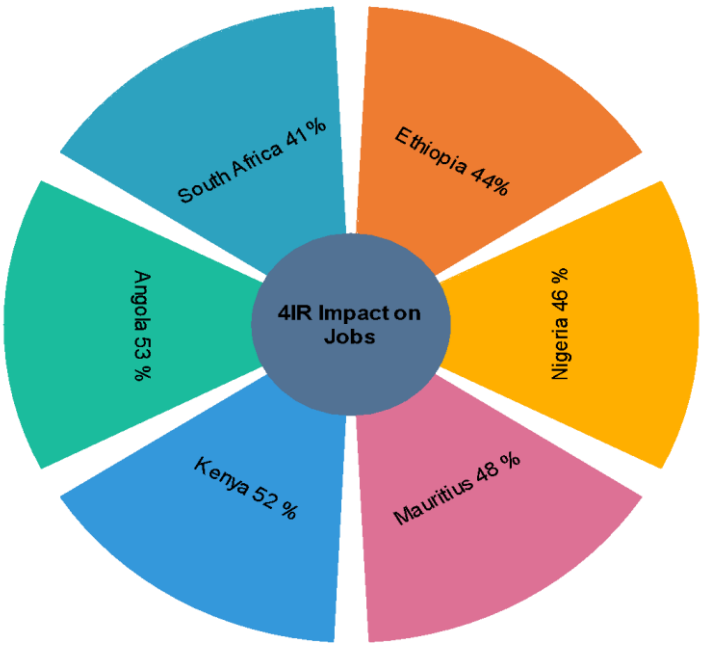

Figure 2.1. 2 Perceived Impact of 4IR on Job in some African Countries (WEF 2017)

In view of this trend Nigeria needs to be proactive in terms of making its graduates acquire 4IR job skills such as; logical thinking and problem solving, social and emotional capabilities, providing expertise, coaching and developing others and creativity among others. (Brynjolfsson & McAfee, 2014)

While the fourth industrial revolution may be disruptive to many occupations, it has been presumed to create a wide range of new jobs in various fields such as Science Technology, Engineering and Mathematics (STEM) that requires new sets of skills, because of strong demand for professionals who will blend digital and STEM skills in addition to core knowledge (The Association of German Engineers, 2015). According to Schwab, (2016) cited in Mumme, (2017), the global labour market is entering a period of unprecedented change due to the advent of the fourth industrial revolution prompted by development in artificial intelligence, generics and automation.

2.2 Building construction industry in the Fourth Industrial Revolution

While automation is fast in manufacturing industry, construction industry is confronted with factors such as: unsuitable available automated technologies; unsuitable conventional design approaches that is difficult for automation; significantly smaller ratio of production compared to manu-

facturing industry; and materials limitation involves in automation; expensive automation equipment; and managerial issues (Warzawski & Navon, 1998). In view of technological advancement, new technologies have been introduced in construction industry in the last two decades such as: Rapid Prototyping (RP) or solid free-form fabrication (SFF) use for materials deposition for fabricating of small industrial parts (Pegna, 1997). Additionally, current introduction of contour crafting (CC) is another layer fabrication technology applicable for construction of large housing structure; which is capable of completing the construction of an entire house in less than two days for a 200m² two-story building instead of several months as commonly practiced with manual labour (Khoshnevis, 2004).

Other activities of CC in performing building construction are: design flexibility; paint-ready surface; automated reinforcement; automated tiling of floors and walls; automated plumbing; automated painting and so on. With the new trends of automation fusing into the construction industry, the global phenomenon that needs to be addressed is how to prepare for the volume of skill shortages and mismatches in the labour market, and in particular employability needs of current and future graduating students For graduate to feet into 4IR work environment, there is need to adequately possess newer employable skills in addition to their academic achievements as revealed in (Yusoff; Omar; Zaharim; Mohamed & Muhammad; 2009).

Graduates employability skills does not just dependent upon the labour market forces alone, but also on other factors like willingness, competency, and job mobility (skill enhancement and functional flexibility) that is, working beyond job description**.** ILO, (2017) has observed that graduates' transition from education to work has become more complex considering high rate of unemployment across nearly all countries. ILO, (2013) Reports on Global graduates' unemployment estimated 12.6 percent; the report further explained that skills mismatch, over skilling, under skilling and increase skilled obsolescence may have been responsible.

Employers across African region identified inadequate skilled workforce as a major constraint to the labour force; this may be one of the contributing factors for the rise in unemployment rate across the region. The statistical index obtained from some selected African countries shows 41 percent in Tanzania, 30 percent in Kenya, 29 percent in South Africa and 46 percent in Nigeria respectively of inadequate skilled workforce. See figure 2.2.

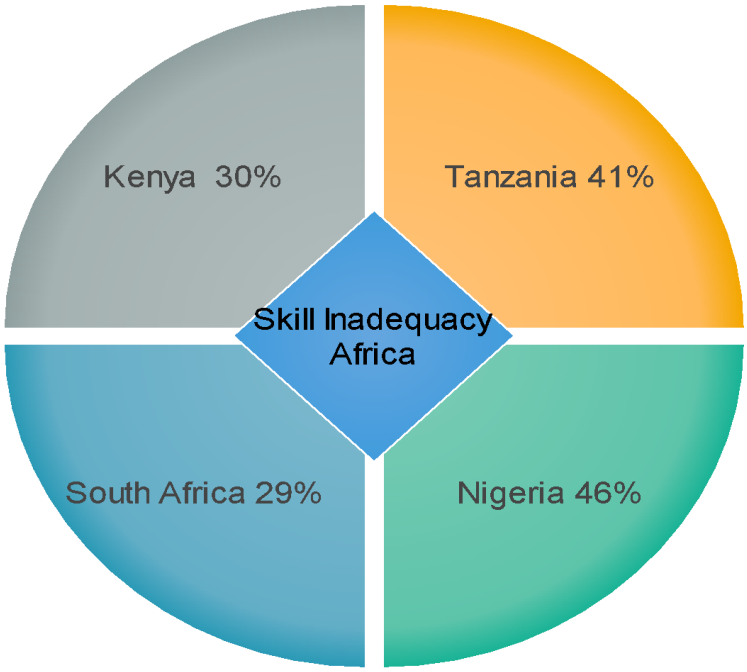

Figure 2.2 Percentage of inadequate skills workforce in Africa (PWC, 2017)

Preparation of polytechnic graduates in employability skills especially building construction graduates may not simply be for white collar jobs but also to make them creators of job rather than job seekers. Since graduates are the ones with the most exposure to the challenges of unemployment, attention should turn to their favour to help them facilitates their transition from school to work. Stakeholders should also be tasked with the responsibilities of identifying the employability skills required to acquire meaningful work.

2.3 Building Construction Graduates Employability skills

In the past, building construction industry has not been an area where robots can be used. But in recent times especially in developed nation like Japan robots are being used for building construction purposes. According to Chu; Jung; Lim; and Hong, (2013) disappearance of skilled workforce as a result of low birth rate, aging or outdated skill, and workers' safety on site necessitates the presence of robots in modern construction sites. However, as technology advances, the demands for quality and diversification in skills in construction industry also changes. According to Yankov and Kleiner (2001); in Andrew, Stephen and Geoffrey (2007), the major priority of construction industry today is the attraction and retention of skilled workers.

Othman, (2014) observed that well-rounded professionals are required in

the building construction industry in order to support economic and quality life in the modern world. In building construction industry, in addition to hard skills (technical skills) such as individual ability to apply construction methods and techniques, display of expertise, translate design to reality, perform materials cost estimates, preparation of tender, ability to use tools and equipment; soft skills (personal attributes) are also very important to have for graduates to succeed in their career. These skills include: self-management skills, emotional intelligence, professional ethics, workplace professionalism; Interpersonal skills; social skills and problem-solving skills, decision-making skills (Mahasneh & Thabet, 2013). Soft skills are nowadays getting a wider acceptance because of the global competitiveness in the construction industry (Shakir, 2009).

To achieve the desires of the building construction industry for competent workforce, construction industry rely on the higher institutions of learning who produce graduates that will compete favourably in a complex environment. According to Ahn, and Kwon (2012) it is important for educators in construction field to provide high quality education aimed at technical competency skills needed by the construction industry. However, this can only be achieved if a framework is developed with these skills and competencies integrated into the school curriculum will go a long way in providing the desire employability skills. With the changing trend in the building construction industry today, graduates who are already practicing will need to update their skills in order to remain relevant. This study therefore, intends to provide the conceptual framework of the flow of the desired 4IR employability skills to building construction graduates.

2.4 Conceptual Framework of the Study

Miles and Huberman (1994) defined conceptual framework as a written or visual presentation base on literature or personal experience either graphical or narrative which explains the main variables and their presumed relationship in a study. The conceptual framework for this study leans on Boyatzis (1982) competency models with three key cardinal attributes known as Skill Knowledge and Attitudes. Hence, the conceptual framework of the study is presented in figure 2.4.

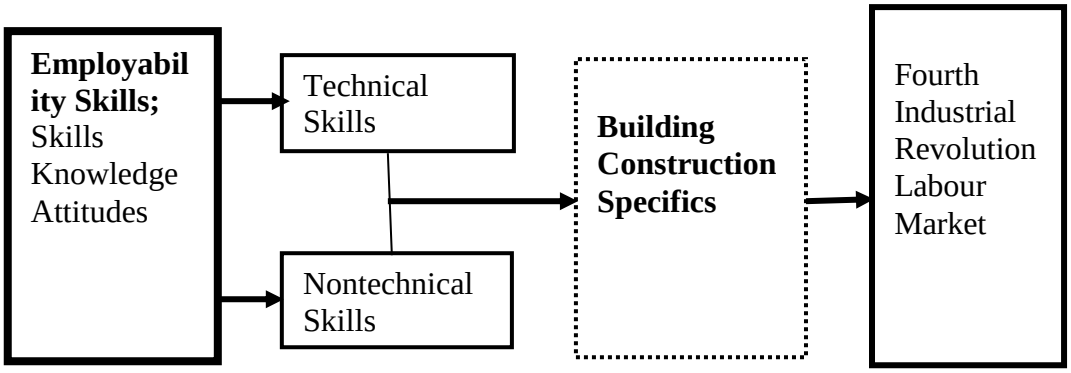

Figure 2.4 The Conceptual Framework for the study

Efficient curriculum imbedded with the identified building construction and generic skills Arain (2010); Mahasneh and Thabet, (2013) delivered to graduates may build employability competency in them to assist the graduates cope with the skills demand of the fourth industrial revolution construction industry.

3. Conclusion

From the study we could realize that the impact of fourth industrial revolution is quite devastating on the workforce and the graduates because conventional skills may not stand the test of time. Current skills need to be upgraded because highly skilled personnel will be in high demand. In construction industry in particular, building components can now be fabricated off-site before taken for assembling on-site. Robot can lay tiles, paint, construct formwork and so on. Graduates however, needs skills to perform jobs that are not within the reach of the machines like site management skills, work scheduling, material estimation in addition to generic skills such as collaboration, teamwork, conflict management, teamwork and so on. These skills cannot be taught in isolation so developing a framework in this regard will guide Nigeria Polytechnic to deliver a quality knowledge to the graduates.

Recommendations

i. The training curriculum should be embedded with specifics building construction skills as the general competency no longer meet the employers' demands.
ii. Students should be exposed to hands-on-training in skills that are beyond machine automation
iii. Internship programme should be introduce for building construction graduates as done in the medical profession so as to expose them to real working conditions.
iv. Institutional and industrial collaboration be given the desired priority.

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