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Information and Communication Technology Competency Needs Required for Implementing Personalized Action Learning Instruction

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Abstract

The study was to identify the competency improvement needs of teachers for utilization of personalized instruction in action learning strategy using some ICT devices to enhance academic achievement in classroom. The study was carried out in technical colleges in Abia State. The instrument for data collection was 12 item questionnaires used to collect data to answer the research questions. A null hypothesis was tested at .05 level of significance. Mean and Borich's needs assessment model was used to answer the research question. ANOVA was used to test the hypothesis. One of the results of the study shows that teachers should guide students to work at their own pace using one-on-one instructional personal computers in classroom and school workshop learning. ANOVA test shows that there is no significance difference in the mean responses of teachers with varying educational qualifications on the competencies possessed in the use of ICT in personalized action learning teaching strategies in teaching of vocational subjects in Abia State. Based on the findings, it was recommended that personalized instruction through action learning teaching strategies using ICT should be implemented in vocational education to improve students' academic achievement and retention in vocational subjects.

Introduction

Personalized instruction is an instruction that caters for individual differences. Ibraheem (2020) defined Personalized instruction as the tailoring of pedagogy, curriculum and learning environments by learners or for learners in order to meet their different learning needs and aspirations. Typically, technology is used to facilitate Personalized learning environments. Information and Communication Technology (ICT) can be a powerful tool for Personalized instruction as it allows learners access to research and information, and provides a mechanism for communication, debate, and recording learning achievements. Ajagun (2013) defined ICT as a technology which are utilized for processing, transmitting or communicating data and information. Devices such as computers, Internet, interface boxes, email varieties of software and materials form important aspect of ICT tools and resources for implementing personalized learning. Personalized instruction according to Lockee, Larson, Burton & Moore (2015) is based upon programmed learning material, through which students proceed at their own pace with the goal of mastering each step. This programmed learning material can be transmitted using ICT devices. For the student to learn through Personalized action learning using

ICT, he/she works in a medium known as learning environment. Learning environment provides the interaction between the learner and the ICT devices.

The learning environment here includes different methods and media like electronic self-study materials such as software packages on compact disc read-only memory (CD ROM) and web pedagogy. The student obtains an immediate feedback in the practice and drill provided by the CD ROM packages. This would increase their interest in the subject, thereby improving their academic achievement. This helps a slow learner in the sense that they would receive a tutorial repeatedly until they grasp the information before the practice and drill. When the student master each step presented by programmed learning material, it would not be affected by the teacher-oriented process. The teacher-oriented process does not consider sufficiently the individual differences existing in students, maybe due to the insufficient time allotted to the teaching of vocational subjects in order to 'cover' the materials in syllabus, worse still if the teacher is impatient to repeat the concept which the slower students do not understand. The learner who the teacher communicates to individually would have the opportunity to present to the teacher the peculiar area of problem or interest without affecting other students who may have a divergent interest or different problems. This helps the student to be free to discuss some personal problems they may not be free to discuss in a class situation. The teacher at this time would easily administer their function as a counsellor in vocational subjects. This would implicitly save both the teacher and the student's time. This is because the time other students who must have acquired the information a particular student would be seeking to acquire, maybe through questioning in the class, would be used for something more useful. The teacher would be addressing any problem to the student who has the problem, thereby fixing the round peg in a round hole. The Personalized instruction here used teaching strategy known as action learning.

The teaching and learning strategy which encourages problems solution and continuous process of learning is action learning. Olivier (2017) stated that action learning is supported through the provision of opportunities to access information, enhance skills and engage in experimental, collaborative and reflective learning and personal development processes. Action learning has five cyclical processes, some authors (Bertha, 2014, Carol & William, 2017) identified as; initial reflection, planning, action, observation and reflection. The experience can easily be acquired through practice and drills in programmed instruction. Television, video, radio and recorder also play a vital role in this strategy. The technical information acquired in a television and radio can be recorded in a cassette player, video, disc or any other recorder. The information offers what the student has in their repertoire of experience and probably what they do not know. That which the student does not know forms their initial reflection.

The student goes to e-library or any other sources of literature to gain the information of what they do not understand. This forms the planning and action respectively. The observation phase here is when the student goes to the teacher in a classroom situation to observe and explain the information as they understand it. Questions are formulated at this stage. The teacher in answering the question answers it in such a way that they give an assignment to the student. The answer given to the student is taken home to form the reflection phase. There the student reflects whether the answer given treated the context of the question. The student in reflection phase raises other questions from the answers given; and also, in trying to execute the assignment of the teacher may raise other issues still. These questions and issues form the next initial reflection of the next cycle.

Through practice and drills of programmed instruction, the student can generate question/s he/she would ask the teacher. The questions they are unable to answer forms the initial reflection of the cycle. They follow the phase as the former. When such student practices the learning experiences through this action learning he must have retained the information so acquired. These are very necessary when the teachers are competent with these teaching strategies. Teachers should ensure that they continue to abreast themselves in the innovations of their field in order to remain relevant and effective. One of the ways they can ensure this is by updating their competencies through training and retraining while still teaching. This means that when a teacher is found deficient in either technical or professional skill or both, they need enhancement to make up for identified inadequacies.

The difference between a level of educational qualification of same field or subject from a higher one is scope. Promila and Anviti (2019) conceived that higher education imparts in-depth knowledge and understanding so as to advance the students to new frontiers of knowledge in different walks of life (subject domains). The study seeks to determine the responses of the competence possessed by the teachers according to their level of educational qualification. Teachers who teach in technical colleges possess varied level of educational qualification, hence their responses variable are important in determining the validity of the study. The depth of their knowledge would not affect the strategy drastically. This is because any vocational teacher from National Certificate in Education to doctorate level, only needs to have a sufficient level of the use of ICT devices to teach the student using this strategy. However, the inputs of teachers who possess higher level of educational qualification are needed to validate theories of learning and pedagogy involved in the study.

Statement of the problem

There is poor performance of technical college students in Abia State in the National Technical Certificate Examination (NTCE) in recent times (Okereke, 2016). The information the students need to acquire in order to succeed academically demands faster means of acquiring them, because the faster they gain the information, the greater the amount of information acquired. Sara, Brown, David, Enos, Susan, Azra and Leonard (2010); Maria and Maria (2019), and The Scottish Government (2015) found out in their various studies that students acquired greater information in a shorter period of time when ICT devices were used to teach them against convention teaching methods of using charts, textbooks and pictures. The question now is how the teachers would teach course contents using teaching strategies that ICT devices would be applied to impart learning faster to the students. Secondly, Fortune (2019) found out that there is poor performance of technical college graduates due to their inability to retain the information they acquired in vocational subjects. The next question here is how would these students improve their retention in vocational subjects?

These problems aforementioned can better be solved when ICT is sufficiently used in teaching the students vocational subjects. However, the transmitters of knowledge need to be equipped with the competencies so that the learning strategies will be effective. Therefore, this study sought to determine the competency improvement needs of teachers using ICT in Personalized instruction through action learning teaching strategies in technical colleges.

Research Question

1. What are the competencies required of teachers in utilizing ICT in Personalized action learning teaching strategies to improve students' academic achievement in automobile technology?
2. What are the improvement needs of the teachers in utilizing ICT in Personalized action learning teaching strategies to improve students' academic achievement in Automobile technology?

Hypothesis:

There is no significance difference in the mean responses of teachers with varying educational qualifications on the competences possessed in the use of ICT in Personalized action learning teaching strategies in teaching vocational subjects in Abia State.

Methods

The study adopted survey research and Borich needs assessment model. The Borich (1980) needs assessment model requires that a mean weighted discrepancy score be calculated for each item, competency or activity included in the needs assessment. A discrepancy can be calculated by comparing the participants' behaviours, skills, and competencies, with the goals of the programme: "a discrepancy analysis that identifies the two polar positions of what is and what should be". Further, a comparison could be made to determine a group of individuals' perceived level of competence to complete a task, with their desired level of competence to complete a task.

In answering the research question, weighted mean and Improvement Needed Index (INI) was used, while Analysis of Variance (ANOVA) was used to test the null hypothesis at 0.05 level of significance and appropriate degree of freedom. The mean and INI was utilized in answering the research question. Any item with a mean rating of 3.50 and above is considered needed, while any item with a mean rating below 3.50 is regarded as not needed. The weighted mean of each item under the needed category was calculated (xn). The weighted mean of each item under the performance category was calculated (xp). The difference between the two means was calculated (xn-xp). This gave the value that indicated whether improvement is needed or not, and stated as follows: Where the difference is zero (xn-xp = 0) that is neutral, it indicates that there is no need for improvement on the item. Where the difference is positive (xn-xp = +), it indicates that there is need for improvement of teachers on the item. Where the difference is negative (xn-xp = -), it indicates that there is no need for improvement on the item because the mean performance (xp) of the teachers for the scale is greater than the level at which that scale is needed (xn). That is, the teachers can perform the skill to the level at which it is needed and even above. (That is, INI=xn-xp. Where xn means needed and xp means performance) (Olaitan and Ndomi, 2000).

The population for this study comprises of 50 vocational subject teachers in technical colleges in Abia State of Nigeria. Among these 50 teachers, computer studies teachers answered the required category, since they are experts in the use of ICT.The instrument for data collection for this study was structured questionnaire; consisting of 12 items. The questionnaire has two columns of needed category and performance category as follows: Very Highly Needed (VHN)/ Very High

Performance (VHP) - 5, Highly Needed (HN)/ High Performance (HP) - 4, Averagely Needed (AN)/ Average Performance (AP) - 3, Slightly Needed (SN)/ Low Performance (LP) - 2, and Not Needed (NN)/ Very Low Performance (VLP) - 1. Cronbach Alpha method was used to determine the internal consistency of the instrument, which gave a coefficient index of 0.93. This shows that the instrument is reliable.

Results

The results are presented according to the research question and hypothesis that guided the study.

Table 1

Mean responses of Teachers on Competences in Personalized Action Learning Teaching Strategies using ICT

S/N	Item Statement	$\bar{x}N$	$\bar{x}P$	$\bar{x}N$-$\bar{x}P$	Remark
1	Guiding each students to work at their own pace using one-on-one instructional personal computers in classrooms and school workshops	5.00	2.00	3.00	RIN
2	Providing programmed instruction for students to study with after conventional class work	4.98	2.41	2.57	RIN
3	Giving each students personal attention while studying through complex programmed instruction in the computer	4.98	2.41	2.57	RIN
4	Giving students class work from the complex lessons provided by programmed instructions	5.00	2.41	2.59	RIN
5	Guiding students relearn, through programmed instruction, the un- retained technical information	4.90	1.00	3.90	RIN
6	Teaching students practical projects using simulated machines projected from multimedia	5.00	4.90	0.10	RIN
7	Involving students to watch each process of a project several times to ascertain its feasibility before embarking on them	4.36	2.13	2.23	RIN
8	Guiding students surf for related information learnt in the classroom and/or school workshop in internet	4.18	2.22	1.96	RIN
9	Involving students to learn exercises through online pedagogy	4.80	2.00	2.80	RIN
10	Guiding students to structure questions for clarification on technical/vocational information acquired from the web and programmed instruction	4.69	1.45	3.24	RIN
11	Recording instructions for each student to take home in order to learn more	4.17	1.24	2.93	RIN
12	Recording students' excursion and field trip embarked upon to solve a problem	4.42	3.62	0.8	RIN

Note. RIN= Required and Improvement Needed (source: author)

Table 1 shows that all the 12 items are required and improvement is needed on them by the teachers.

Table 2
ANOVA of the responses of the Teachers, based on their Educational Qualifications, on the Competencies needed in the use of ICT devices in Personalized Action Teaching Strategies

Source of variance	Sum of squares	Df	(Mean square)	f-Cal	f-Tab
Between Groups	0.9122	4	0.228		
Within Groups	184.642	45	4.103	0.056	2.32
Total	183.2475	49			

The result in Table 2 indicated that calculated f value is equal to 0.056 which was less than the table value of 2.32 at 0.05 levels of significance and degree of freedom of 6 and 43. This revealed that there was no significance (NS) difference in the mean ratings of responses of the teachers, based on their level of educational qualifications, on the competencies needed in Personalized action learning teaching strategy. The null hypothesis is therefore accepted.

Discussion

The findings as presented in Table 1 showed that all the 12 items are required and improvement is needed in all the items. This signifies that the following are teaching strategies which promote learning in technical colleges: providing programmed instruction for students to study with after conventional class work; giving each students personal attention while studying through complex programmed instruction in the computer; giving students class work from the complex lessons provided by programmed instructions; guiding students relearn through programmed instruction, the un- retained technical information, and guiding students to structure questions for clarification on technical/vocational information acquired from the web and programmed instruction.

This is similar to the findings of Mei-ling (2019) who found out that programme instruction is a teaching technique which seems to be particularly useful for continuing education. The student learns by doing and the student progress through the programme at his own pace. With programmed instruction, the fast learner is not held back by the slow one, and the slow learner is not left behind in a state of helplessness and confusion. There is every indication that programmed instruction will eventually be used to a greater extent in the classroom, especially if good programs become available, and teachers learn to select and use them.

Just as in programmed instruction, online pedagogy diminishes the role of "the teacher" in the teaching/learning equation. The student is, for the most part, in charge of what gets learned. During online discussions, students locate a website which deals with content relevant to the chapters currently being discussed. **Students help each other learn (peer assistance).** In a traditional classroom, interaction requires listening and talking, while online interactivity requires reading and writing. Reading and writing impart better than listen and

talking in sentence constructions and spelling (Maria, 2017). The findings also showed the importance of teaching students practical projects using simulated machines projected from multimedia.

Simulated machines focus on specific tasks. As a technique for instruction, simulated machines allow students to deal in a realistic way with matters of vital concern but without dire consequences should they make wrong choices. For instance, Praise (2019) has noted that in simulated machines, students have opportunities to receive supplemental contact with the variables tested in real experiences or dangerous ones. The pursuit of simulated machines in an educational context is worthwhile for several reasons. Simulated machines potentially offer students opportunities to explore situations that may be impossible, too expensive, difficult, or time-consuming to accomplish with actual laboratory or real-life experiences. Even if real-life exploration is feasible, such experimentation can be supplemented by simulated machines that offer students the opportunity to explore a wider range of variables more rapidly.

Students should go to relevant excursion and field trip. These should be recorded. The recorded excursion and field trip can also help the students who would want to construct a product, machine or facility, or embark on any project at that which they saw during such trip, to ascertain its feasibility (feasibility study) before embarking on them or otherwise look for another project to construct. According to the dual coding theory propounded by Allan Paivio in 1969, visual and verbal information impart better than only verbal information. The greater the number of multimedia in teaching, the greater it imparts in the learning experience. Therefore, using video to record the technical information imparts better learning.

Instructional videos constitute a virtual guide to the experiments that the student will carry out. Approaching workshop practices sequentially in an instructional video can optimize both the available material resources and the available time. Video can facilitate the students' preparation prior to their actually doing the workshop practices by describing the basic theoretical concepts related to the experiment they are going to see. This virtual laboratory does not mean that real workshops should be phased out. Instead, there should be an integration of the two laboratories in teaching practice. Indeed, it forms part of a teaching methodology which foresees increasing use of a wide range of learning tools. The purpose of using video is their application to e-learning platforms as complements to traditional teaching, and not as replacements for real workshops where such workshops are available. Nonetheless, when a real laboratory is unavailable or inaccessible, video can of course be very useful indeed. Computer is another multimedia used in complex instruction which enables retention in Personalized action learning.

In a complex instruction, the computer assists the instructor or the teacher to explain technical information to the students. When these students learn and relearn these technical information and attempt the exercises in programmed instruction and online pedagogy, and discover why they could not answer correctly to the ones they could not; through the law of exercise, they become perfected to the information and thereby retain the previous non retained technical information.

The hypothesis shows that there is no significance difference in the mean responses of teachers with varying educational qualifications on the competences possessed in the use of ICT in Personalized

action learning teaching strategies in teaching vocational subjects in Abia State. This implies that all teachers, irrespective of their teaching qualifications can improve in Personalized action learning teaching strategies using ICT. The educational implication of this study is that Personalized action learning teaching strategies facilitate students' academic achievement and retention in vocational subjects using ICT.

Conclusion

Based on the analysis of data, it is concluded that ICT which has been introduced in Nigerian educational system can be implemented in Technical and Vocational Education(TVE) to improve the study of vocational subjects, which is imparted in Technical Colleges. There is therefore an urgent need to implement ICT, where they have not been implemented, in Nigerian educational system especially in TVE. This is necessary in order to pursue, if not catch up with, the more advanced countries in their educational development. From this study, competency improvement needs of teachers in Personalized action learning teaching strategies using ICT in technical colleges have been identified to enable appropriate in-service trainings, in order to promote the ICT policy of the federal government of Nigeria in schools.

Recommendations

Based on the findings of the study, Personalized instruction through action learning teaching strategies using ICT should be implemented in vocational education to improve students' academic achievement and retention in vocational subjects. These instructional strategies and improvement of study in technical and vocational education using ICT can be implemented through:

1. Providing the teachers ICT devices as instructional materials and tools.
2. Providing free internet facilities in the school system.
3. Information and communication facilities should be provided in school libraries for students.
4. Educational policy implementers should conduct competence assessment of teachers, at various level of academic qualifications, on using Personalized action learning teaching strategy.
5. There should be in-service on-the-job training for practicing teachers using the Personalized action learning teaching strategies as a teaching tool.

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Relationship between Class Size and Students` Academic Performance in English Language

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Abstract

The study deals with the relationship between class size and students` academic performance in the English Language. The study's main objective is to determine the correlation between class size and students` English language outcomes. A combination of survey and correlation research designs was used for the study. The population of the study comprised 2003 SS II students in the selected public schools in Maiduguri Metropolis, Borno State, Nigeria. Four hundred students were randomly selected for the study. Structured questionnaires and proforma were used for data collection. The questionnaire was used to collect self-reporting data. Proforma was used to obtain students` terminal examination results in the English Language. The data collected were analyzed using Multiple Regression Analysis. The finding revealed a strong correlation between class size and students` academic performance in the English Language. Therefore, it is recommended that schools should be provided with spacious classes to accommodate the rapidly increasing population of the students.

Keywords: *Class Size, Students` Performance, English Language*

Introduction

Today, researchers worldwide are showing great interest in studying factors affecting academic performance and achievement. Class size is believed to be one-factor affecting teaching and learning in schools, especially in public learning institutions. In Nigeria, the average class size varies from one level of education to another and at the tertiary level from one discipline to another. The National Policy on Education (National Policy on Education, 2004) recommends a class size of 20 for the pre-primary level, and 30 for the primary level and 40 for secondary level. It then follows that anything over the recommended number is abnormal, and if the excess is more than 10, the class can be regarded as large. A classroom is said to be overcrowded if it exceeds the stipulated number in the benchmark. The International Labour Organization (ILO) and the United Nations Education Scientific and Cultural Organization (UNESCO) recommend 1:30; 1:35 teacher/pupil ratio for primary and secondary schools. From the present researchers` perspective, a class in which the teacher cannot give enough individual attention to students due to the class size can be considered large.

There are numerous reasons why smaller group instructions would contribute to better achievement, such as higher trainer touch with parents and different private relationships among

teachers and college students. As an instance, college students may also pay higher interest whilst there are fewer college students within the room. Instructors who use many small institution paintings might also find their instruction more fantastic in smaller classes because fewer college students stay unsupervised even as the small organization meets with the instructor. In these times, instructors should keep on equal practices; however, success might be an upward push in shorter training because the same guidance might be more effective. The number of learners in a class can affect how much is learned in several ways. For instance, it may affect students` interaction. For example, this may result in rowdy behaviour, which affects the kinds of activities the teacher can promote. It affects the amount of time the teacher can focus on individual students and their specific needs rather than on the group. In the small class size, it is easier to focus and give attention to learners based on need. The class size could also affect the teacher's allocation of time and, hence, effectiveness, in other ways, too—for example, how much material can be covered (Ehrenberg, Brewer, Gamoran &Willms, 2001).

Similarly, an overcrowded classroom refers to a large number of students in one classroom. Crowded classrooms are more likely to have inadequate or substandard teaching materials and lighting systems, safety features, ventilation or air conditioning systems, low floors and foundations, sharing of books, and pupils sitting on the floor. There is no enough space and places for teachers and students to move freely in the classroom. Quist (2000) argues that primary schools typically have 35 to 45 pupils in many countries, but there are some schools where the class size may be as much as double that number. Classes of these sizes present problems to even the most experienced teachers. Common issues include the limited amount of time for curriculum activities and longer time for marking. Teachers resort to using direct teaching methods whenever confronted by big class size situations. UNESCO (2006) estimates that 84 per cent of classrooms have less than 40 students to every teacher. Most of the countries that exceed 40:1 are in Sub Saharan Africa and Asia. Sub- Saharan Africa has the highest median Pupil-Teacher Ratio, with the Congo, Ethiopia, and Malawi having around 70:1. South and East Asia also have high PTRs, with Afghanistan and Cambodia exceeding 55:1. In Nigeria, there has been an overlapping report of a large class size of 40:1, 50:1, and at times 100:1. This trend has been dragging the education system down.

The majority of the existing literature on large classes in English language teaching falls into two categories: surveys of teachers' beliefs about large classes, and teaching tips for how to deal with the problems associated with large classes. Whatever rating scale or yardstick is used to determine the size of the class, teachers perceive large class as seriously problematic. Given that many of the problems identified by teachers have the potential to adversely affect student learning. For instance, LoCastro (2001) suggested that the interaction issues in large classes would lead to less effective learning.

Todd (2012) examined the relationship between class size and learning for 984 classes of students ranging in size from 10 to 103 students for four fundamental English courses at a Thai university. The findings show significant negative correlations between class sizes and grades, both for all students on all courses and for those students who studied in very differently sized classes on different courses.

On the contrary, Mukhtar (2019) examined the effects of class size on students' achievement. He used a total of 60 Middle level English language teachers from various private schools and 10 English language lessons and teachers were also observed for the research. A quantitative questionnaire is adopted for the study and an observed sheet was prepared by the researcher for the collection of qualitative data. It is found that large class size does not have a visible impact on student's achievement in Pakistan. It is against this background; this study tends to examine relationship between class size and academic performance of students in English language.

Research Problem

The recommenced student-teacher ratio in secondary schools is 1:40. This is to enable the teacher as well as the students to interact efficiently. The rapid growth of population worldwide and insufficient funding of the education sector have necessitated the public and some private institutions to slacken on the appropriate class size. The overcrowded nature of classes nowadays has drastically fallen the standard of education in the country leading to low productivity in academic production. The poor performance of students in English language at secondary schools has been explained as the major cause of decline in the general academic performance not only in English language but also in the other subjects offered. The recurrent failure of students in English language in Senior School Certificate Examination (SSCE) and consequently their failure to meet the entry requirement for the Nigerian universities has attracted attentions of the stakeholders all over the nation. Thus, many factors have been blamed as the major cause for this ugly trend; teachers' pedagogical approach, teachers' attitude and students' attitude and generally the laxity in their personal readings have been mentioned as some of the factors responsible. But few studies attempted to look at the class size and how it may impact learning. Therefore, this paper attempts to examine the relationship between class and students` academic performance in English language.

Purpose of the Study

The objective of the study is to determine the relationship between class-size and students` outcomes in the English Language.

Hypothesis

The following null hypothesis was tested at a 0.05 level of significance:

HO_1: There is no significant correlation between class size and students` outcomes in the English Language.

Scope and Limitation

The study deals with the relationship between class size and students` academic performance in the English Language. The study focused on senior secondary school students' academic performance two (SS-II) in the English Language concerning their class size. The study determined the class size's influence on English Language Terminal Examinations` Results of SS II students in selected public schools. The results of the first and second terms of the 2018/2019 academic sessions were collected. The study was delimited to senior secondary schools in Maiduguri Metropolis, Borno State, Nigeria.

Literature Review

Available studies have proven the correlation between school overpopulation, large class size, and pupils' academic performance. Asiyat (2004) and Nyiam (2012) reported that over-populated classrooms lead to overstretching of available school facilities and overcrowded examination halls pave the way for students to indulge in examination malpractice. Agba (2010) asserted that students' overpopulation harms the tone of the school, affecting both teachers and students. On the contrary, researchers have noted that effective teaching and high academic performance can only be achieved when supported by adequate infrastructural facilities and manageable class size. Also, Dillon, Kokkelenberg and Christy (2002) pointed out from their research that large classes negatively affect some students more than others. According to them, the negative effect of class size on grades differs across different categories of students. In his findings, Adeyemi (2008) revealed that schools with an average class size of 35 and below obtained a better result than schools with more than 35 students in senior secondary schools.

Small classes may benefit students more when instruction relies on discussion, by allowing more students to participate and be recognized, than when lecture and seatwork are the main modes of instruction. According to Nye, Hedges, and Konstantopoulos (2000), while small classes benefit all kinds of students; much research has shown that the benefits may be most excellent for minority students or students attending inner-city schools. For these students, smaller classes can shrink the achievement gap and lead to reduced grade retention, fewer disciplinary actions, less dropping out, and more students taking college entrance exams. Olatunde (2010) found that positive outcomes were found for small classes on such factors as time on task, individualized instruction, well-behaved classes, and teacher satisfaction. They further discovered that the results for academic achievement were mixed at times, small classes were found to have superior outcomes, and at times, the large classes performed better. Glass and Smith (1979) conducted a meta-analysis of over 80 class size studies; a relationship between class size and student achievement emerged. While their research was dated, it shows that historically class size has been linked to student academic achievement.

Furthermore, some studies established direct impact of large class size on students' outcome, discipline and classroom management. Over-crowded classes could have a direct impact on students' learning (Shah & Inamullah, 2012). The affected students' performance and the teachers had to face different problems such as discipline, behavioural problems, poor health, students' poor performance, stress on teachers, and increased drop-out rate of students. Carlson (2000) reported that quality learning was not possible when many students were packed into small classrooms. He visited different schools, but it was evident as a severe problem, particularly in many schools located in Florida, Santiago, and in Dallas' Escuela Hogar. He further reported that 40 plus children were stuffed into classrooms designed for no more than 35 kids. They were seated so near together that they were not able to work or move. Ijaiya (1999) found a weak positive correlation between the opinion of teachers and students regarding crowdedness. Findings showed that over crowdedness diminished the quality and quality of teaching and learning with severe implications for attaining educational goals. It was felt that additional buildings and furniture should give priority to educational planning at all levels.

Woessmann and West (2002) conducted a study spanning 18 countries on the effect of class size on students' achievement. They considered each nation separately. The authors found that in six of 18 countries, including Canada, a minimal relationship between class size and test scores in the middle grades could be ruled out. Also, five school systems could rule out large class size effects, but not necessarily small ones. It was only in Greece and Ireland that smaller classes did appear to show superior student performance. In Canada's case then, these results conform to the descriptive statistics, in that class size has no noticeable impact on students' performance in high school. Ding and Lehrer (2004) measured the differences in students' scores on tests in mathematics, reading, and writing, in small or regular classes in kindergarten. The students were randomly placed in small and large classes. The researchers confirm that students benefitted in all subject areas while attending a smaller class in either kindergarten or grade one.

Still, by the time students finished grades two and three, those benefits had diminished, that is, whether students had been in small or regular classes since kindergarten made no noticeable difference in their performance or standardized tests at the end of grades two and three. Eke (1991) researched large class and students' academic achievement in the English Language and mathematics. The researcher sampled ten secondary schools using a stratified proportionate random sampling technique. WASSCE results from the schools served as an instrument. Chi-square was used for data analysis. The researcher found out that class size does not affect student achievement. Still, variables such as the teacher's quality, economic background of parents, school equipment, access to libraries, school location, supervision by inspectors of education to name but a few do affect students' achievement.

Lewit and Bakel's (2000) survey conducted on overcrowded schools in New York City found that 75 per cent of teachers said that overcrowding affected classroom activities and 70 per cent were of the view that overcrowding affected their instructional techniques. Overcrowding and heavy teacher workloads created stressful working conditions for teachers and led to higher teacher absenteeism. Theunynck (2009) carried out research in 14 countries in Africa and found that many classrooms were overcrowded. On the average, across this primary group of countries, each primary school classroom accommodated 63 students within one shift. The lowest average class sizes were found in Niger (1:38) and Ghana (1:37) while Uganda (1:112) and Malawi (1:86) were in the dreadful condition of overcrowded classrooms. Nakabugo et al. (2007) research conducted in Uganda revealed that teachers provided fewer exercises and practice to reduce the amount of marking when teaching in large classes. There was also limited space to conduct group work that would enhance adequate content coverage.

Vandenberg (2012) examined the relationship between class size and academic achievement on 3,812 third-grade students in 204 classrooms collected from nine rural, economically disadvantaged school districts in Georgia's southeastern region. Initial correlation analyses indicated a positive relationship between class size and academic achievement. Regression results showed that the percentage of gifted students, the rate of economically disadvantaged students, and the class size were significant predictors of reading achievement levels. Khan and Iqbal (2012) opined that the teachers' most severe problems are overcrowded classes. The data were given both quantitative and qualitative treatment. The study's outcome indicated that effective teaching was not possible in crowded classes, and the majority of the teachers were facing instructional, disciplinary, physical, and evaluation problems.

Bakasa (2012) studied the effect of class size on academic achievement at a selected institution of higher learning. The research design for this study was mostly quasi-mixed methods as it focused on survey and phenomenology. The descriptive findings that triangulate the data gathered from the various data collection instruments used in the current study pointed towards a conclusion that class size and school factors such as teacher effectiveness can influence student achievement. Owoeye & Yara (2011) examined the influence of class size on students' academic performance in Ekiti state. Data were analyzed using mean and t-test. The result showed that there was no significant difference in the academic achievement of students in small and large classes from urban schools ($t = 1.49$; $p < 0.05$); there is no significant difference between the performance of students from rural large and rural small classes ($t = 0.58$; $p < 0.05$). Zyngier (2014) studied class size and academic results, focusing on children from culturally, linguistically, and economically disenfranchised communities. A comprehensive review of 112 papers from 1979-2014 assessed whether these conclusions about the effect of smaller class sizes still hold. The review draws on a broader range of studies, starting with Australian research, and includes similar education systems such as England, Canada, New Zealand, and non-English speaking countries of Europe. Findings suggest that smaller class sizes in the first four years of school can have an essential and lasting impact on student achievement, especially for children from culturally, linguistically, and economically disenfranchised communities. This is particularly true when smaller classes are combined with appropriate teacher pedagogies suited to reduced student numbers.

Ifeanyichukwu (2009) studied the influence of class size on senior secondary school students' performance in essay writing in the English Language. A quasi-experimental pretest, post-test non-equivalent group design was applied in the study. The research questions were answered using mean and standard deviation, while the null hypotheses were tested at a 0.05 level of significance using analysis of covariance (ANCOVA). There is a significant difference between students taught in large class sizes and those trained in small class sizes favouring students. Gender was not a substantial factor in the achievement of students in essay writing. This is shown by the non-significant influence of gender in the achievement of students in essay writing. There was no significant interaction between class size and gender on the achievement of students in essay writing. Gleason (2000) examined the influence class size on student outcomes in mathematics courses with technology-assisted instruction and assessment. The study focused on how the use of instructional software packages, computer labs with tutoring, and increased electronic student-teacher interaction influences the effects of large class sizes on student achievement and engagement. Using the students' final exam scores as a measure of their knowledge at the end of the course, the study compared the students in the large classes with the students in the medium grades using Mann-Whitney two-sample rank-sum and Kolmogorov-Smirnov tests. Using the Mann-Whitney test, for both the College Algebra and Applied Calculus courses, there was no significant difference between the two distributions, and so the null hypothesis was not rejected.
Anashie, Ebuta & Adie (2013) examined the influence of students' population pressure and class size on public secondary school students' academic performance in Cross River State. The expofacta research design was adopted for the study. A sample of 150 teachers and 450 students were selected through a stratified random sampling technique. Findings of the study revealed that students' population pressure and large class size negatively affect teaching/learning and make it difficult for teachers to administer and mark tests/assignments.

Methodology

The combination of survey and correlation research designs was employed—the population of the study population comprised 2003 SS II students in the selected public secondary schools in Maiduguri Metropolis, Borno State, Nigeria. Four hundred students were randomly chosen to be the target group. Structured questionnaires and proforma were used for data collection. The questionnaire was administered to the respondents in their respective schools to collect their self-report first-hand data on their demographic and school variables. The Proforma was used to collect students` terminal results of the English Language. The first and second terms of the 2018/2019 academic sessions were recorded on the proforma. The data collected were analyzed using descriptive statistics of Mean and Standard Deviation and Multiple Regression Analysis. The null hypothesis was tested at a 0.05 level of significance using descriptive statistics (Mean and Standard Deviation) and Multiple Regression.

Results

$H0_1$: There is no Relationship between Class Size and Students` Academic Performance in English Language

Table 1: Multiple Regression Analysis of Class Size and Academic Outcomes

Model	R	R Square	Adjusted R Square	Std. error of the Estimate
1	.124[a]	.015	.010	8.120

Table 1 presents multiple regression on the impact of class size on students' academic performance in Senior Secondary School. The results indicated that 10% of the students' academic performance variance is predicted and determined by the number of children in the class size. This means that small or big size class has little impact on the academic performance of students. Thus, the null hypothesis was rejected.

Discussions

The study's findings indicated that class size has no significant impact on students' academic performance. The results contradicted Asiyat (2004) and Nyiam (2012) who reported that over-populated classrooms lead to overstretching of available school facilities and overcrowded examination halls pave the way for students to indulge in examination malpractice. In his findings, Adeyemi (2008) revealed that schools with an average class size of 35 and below obtained a better result than schools with more than 35 students in senior secondary schools. Chingo and Grover (2011) found out that positive outcomes were found for small classes on such factors as time on task, individualized instruction, well-behaved classes, and teacher satisfaction. Glass and Smith (1979) also found that class size has been linked to student academic achievement. Shah and Inamullah (2012) found from their studies that over-crowded classes could have a direct impact on students' learning. Carlson (2000) reported that quality learning was not possible when many students were packed into small classrooms. Anashie, Ebuta& Adie (2013) reported that students' population pressure and large class size negatively affect teaching/learning and make it difficult for teachers to administer and mark tests/assignments.

Conclusion and Recommendations

Based on the study's findings, it was concluded that class size positively impacts students' academic performance. This might be because expert teachers employ an eclectic teaching style that suits every given class setting. When class is large and crowded, diverse teachers adopt lecture methods or any other method suitable for such classes to attain the need for such caliber of class Size: Based on the study's findings, it was recommended that school government should provide adequate, spacious classes with adequate equipment in order to meet the needs of the learners and their aspiration.

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Use of Audiovisual Materials to Improve Students` Grammatical Skills

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Abstract

The study concerns with the use of audiovisual materials to improve students' grammatical skills. The objective of the study is to examine effect of audiovisual materials on students' grammatical skills. The study used a Quasi-experimental design to examine the effectiveness of the audiovisual materials in improving students` grammatical skills. The target population comprised SS II students in selected senior Secondary Schools. At the time of compiling this report, there were 1205 SS II students in the school. A sample of 293 (160males and 133 females) were selected using stratified random sampling and simple random sampling techniques. Intact classes were used for the experimental and the control groups. The instrument titled: English Language Grammar Performance Test (ELGPT) were drawn from the Senior Secondary II English language syllabus. The reliability index of the instrument was found to be 0.76. The scores that serve as data were collected through pretest conduct before the commencement and posttest after the treatment. The data collected were analyzed using an independent sample t-test and analysis of variance (ANOVA). The findings revealed that teaching grammar using audiovisual material has a significant effect on students' performance. Students' performance in Grammar does not vary concerning gender and school type. The study concluded that audiovisual materials effectively teach Grammar in the English language in senior secondary schools. Hence, it was recommended that federal, states, and local governments provide more grammar teaching materials in all schools, and teachers should also employ more grammar teaching materials during lessons.

Keywords: **-** English Language, Audio-visual Materials, English Grammar

Introduction

The English language is regarded as the backbone of all other subjects taught in schools. This is because it is the medium of instruction in most secondary and higher learning institutions in Nigeria. The English language is one of the few core subjects recommended for secondary schools as stipulated in the National Policy on Education (FRN 2011). It is, therefore, an essential pre-requite for further education. The English language has typically four basic skills, namely listening, speaking, reading and writing. It is a medium of instruction in our schools and compulsory school subject that must be passed at all education levels in Nigeria (Danladi, 2008).

Audiovisual materials are essential and significant instructional materials needed for teaching and learning school subjects to promote teachers' efficiency and improve students' performance. They make learning more engaging, practical, realistic and appealing. They also enable both the teachers and students to participate actively and effectively in lesson sessions.

They give room for the acquisition of skills and knowledge and the development of self-confidence and self-actualization. Ikerionwu (2000) saw audiovisual materials as objects or devices that help the teacher present a lesson to the learners logically. Fadeiye (2005) saw audiovisual materials as visual and audiovisual aids, concrete or non-concrete, to improve teaching and learning activities. Eniayewu (2005) posited that it is essential to use instructional aid for instructional delivery to acquire more knowledge and promote the academic standard. Mannan (2005) points out that instructional materials' help the teacher clarify, establish, correlate and coordinate accurate concepts, interpretations and appreciations, and enable him to make learning more concrete, compelling, engaging, inspirational, meaningful and vivid'.

Slavin (2010) suggested a catalogue of functional visual instructional materials that are good for teaching the English language like textbooks, pictures, diagrams, flashcards, maps, posters, film strips, chalkboards and two-dimensional materials. He further said that selecting appropriate materials related to the primary content of a course or a lesson promotes better understanding of the students, arresting their attention and thus motivating them to learn. Vikoo (2003) observes that the most suitable instructional materials for effective teaching and learning of the English language at this information age are audiovisual materials. He describes the audiovisual materials as the instructional system, which uses the scientific and technological equipment's operations, combining visual projectors and sound productions to provide tangible experiences to learners. Some of such materials are computer-assisted instructions, videotaped instructions, film shows, tape-recorders and tapes. According to specialists in audiovisual materials, Oyeshika and Ashiru (2003) agreed that teaching materials, particularly over-head projectors with transparencies, televisions and videos, with recorded video cassettes including films and slides are effective in teaching and learning situations.

Another variable considered in this study is gender. There are conflicting reports on whether gender plays a significant role in language achievement. Some researchers like Offorma (2004) and Umo (2001) claim that females perform better than males in language. However, other researchers like Ngonebu (2000), Opara (2003) and Uzoegwu (2004) found that males perform better than females in language. However, others such as Akabogu (2002), Oluikpe (2004), Igbokwe (2007), Agada (2008), Omeje (2008) and Torty (2010) did not establish any significant difference in the achievement of male and female students in the language. Based on the disparity of findings on which gender performs better in language, it seems that the exact influence of gender on language achievement is not apparent.

Another thing, the school type and environment in which school is located is without doubt one of the factors determine not only students` aspiration, achievement but also educational outcome in general. There are several studies conducted to examine effects of school type on academic performance since 1980s but the amalgamated results have been far from conclusive. In a landmark study, James Coleman and his colleagues found that students in private schools outperform students in public schools (Harry, 2016). Sabitu, Babatunde & Oluwole (2012) investigated the influence of school types and facilities on students' academic performance in Ondo State. Proportionate random sampling technique was used to select 50 schools in Ondo state. The study revealed a significant difference in facilities available in public and private schools in Ondo State. It however revealed no significant difference in academic performance of students in the two types of secondary schools. Hence there is a need to examine the influence of the Audiovisual materials on students' academic by comparing the performance on the basis of school type and gender.

Statement of the Problem

Secondary school students' poor performance in the English language in both local and standardized examinations has been one of the significant problems facing Nigeria's educational sector. Afolabi (2009) observed that students usually fail in examinations owing to improper teaching methods and lack of essential teaching aids for instructional delivery. It is observed that the poor utilization of instructional materials, lack of proficiency, lack of laboratories, and technological apparatus such as tape recorders, projectors and film equipment, untrained and unqualified teachers into the teaching profession hampers effective teaching of the English language in secondary schools. Therefore, there is a need to investigate audiovisual materials' effect on students' performance in the English language among senior secondary schools in Maiduguri Metropolis, Borno State, Nigeria.

Research Questions

1. What is the effect of teaching the English language using audiovisual materials on students` performance in Grammar?
2. What is the effect of teaching the English language using audiovisual materials on students' performance in Grammar by gender?
3. What is the effect of teaching the English language using audiovisual materials on students' performance in Grammar by school type?

Research Hypotheses

HO_1: Teaching of English language using audiovisual materials does not have a significant effect on students' performance in Grammar

HO_2: Effect of audiovisual materials on students' performance in English Grammar does not significantly vary by gender.

HO_3: Effect of audiovisual materials on students' performance in English Grammar does not significantly vary by school type

Methodology

The study was based on mediation and socio-cultural theory developed by Vygotsky (1978), which advocates that learning, including second language learning (L2) acquisition, as a semiotic process where participation in socially mediated activities is essential. It regards instruction as crucial to second language development and should be geared to the zone of proximal development (ZPD) that is beyond the learners' actual development level. It believes that learning in a second language context should be a collaborative achievement and not an isolated individual's effort where the learner works unassisted and unmediated for elementary natural processes to develop. The study used the quasi-experimental design of pretest and posttest design. A sample of 293 students (160 males and 133 females) out of the three sampled schools were selected through the stratified random sampling technique used, as shown in the table below. Intact classes were used and randomly assigned to the control and experimental groups through simple random sampling. The instrument titled English Language Grammar Performance Test (ELGPT) was used in the study. The instrument was divided into sections A and B. Section A consisted of demographic information of the respondents, while section B consisted of thirty (30) multiple-

choice items drawn from the scope of the English language SSII syllabus. Some experts from the field of curriculum validated the instrument to obtain a reliability coefficient of 0.76. The data collected were analyzed using an independent t-test and analysis of variance (ANOVA) to test the study's null hypotheses. According to Cohen, Manion and Morrison (2007), the t-test is used to discover whether there is a statistically significant difference between the means of two group using parametric data drawn from random samples with a normal distribution. It is used to compare two groups randomly assigned, for example, on a pretest and posttest in an experiment. Analysis of variance (ANOVA) is used to analyze the differences among group means. According to Kothari (2012), variance analysis is essentially a procedure for testing difference among different groups of data for homogeneity.

Results

The results of the findings are presented and interpreted as in the following:

Table 1. Comparison of the mean score of the experimental and control group in Grammar

	Group	N	Mean	Std. Deviation	Std. Error Mean
Pretest	Control	141	13.50	4.818	.406
	Experimental	152	13.50	4.769	.387
Posttest	Control	141	17.44	4.096	.345
	Experimental	152	20.96	3.164	.257

Table 1 presented descriptive statistics on the performance of students in Grammar. The table compared the mean score of students based on the experimental and control group. The result indicated that *M=13.50* is the control group, whereas *M=13.50* is for the experimental. Hence, there was no significant difference in the performance of students in the pretest. The posttest result indicated that the mean score of control group is M=17.44 and experimental group *M=20.96.* Thus, the experimental group performance is higher than the control group.

Table 2: Independent t-test

		Levene's Test for Equality of Variances		**t-test for Equality of Means**						
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Grammar (Pre-test)	Equal variances assumed	.017	.896	.006	291	.995	.004	.560	-1.099-	1.106
	Equal variances not assumed			.006	288.886	.995	.004	.561	-1.100-	1.107
Grammar (Post-test)	Equal variances assumed	8.722	.003	-8.267-	291	.000	-3.521-	.426	-4.359-	-2.683-
	Equal variances not assumed			-8.189-	263.140	.000	-3.521-	.430	-4.367-	-2.674-

Table 2 presented the calculated mean score of *M=13.50 for* the experimental group and *M=13.50)* for the control group. The result indicated that there was a significant difference in the performance of the students in Grammar. On the other hand, the calculated mean score *M=20.96* for the experimental group and *M=17.44* for the posttest control group was at the significant *P<0.001.* Therefore, the result showed that the students` performance in Grammar varied. Thus, the null hypothesis was rejected, and the alternative hypothesis was adapted.

Table 3: Comparison of the mean score of the participants by gender

	Gender of the participants	N	Mean	Std. Deviation	Std. Error Mean
Pretest	Male	160	13.49	5.151	.407
	female	133	13.52	4.322	.375
Posttest	Male	160	18.88	4.540	.359
	Female	133	19.73	3.301	.286

Table 4.3 presented descriptive statistics on students` performance in Grammar by gender. The pretest result indicated no significant difference in the performance of male and female students by gender. In the posttest, the results showed no significant difference in students' performance in Grammar by gender.

Table 4: Independent t-test

		Levene's Test for Equality of Variances		**t-test for Equality of Means**						
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Grammar (Pretest)	Equal variances assumed	2.392	.123	-.056-	291	.956	-.031-	.562	-1.138-	1.075
	Equal variances not assumed			-.057-	290.971	.955	-.031-	.553	-1.120-	1.058
Grammar (Post-test)	Equal variances assumed	18.090	.000	-1.796-	291	.074	-.848-	.472	-1.778-	.082
	Equal variances not assumed			-1.847-	286.146	.066	-.848-	.459	-1.752-	.055

Table 4 indicated that the students' calculated mean score was not different at the significant P*>0.97*, as indicated in the pretest result in the independent t-test. Relatively, the students' calculated mean score in the posttest showed no statistically significant difference in the performance of the participants by gender at a significant P-value of *P >0.07*. Thus, the null hypothesis was firmly rejected at the significant *P>0.05*.

Table 5 Descriptive Statistics

	School Type	N	Mean	Std. Deviation	Std. Error Mean
Pretest	Male School	96	13.42	5.311	.542
	Female School	99	13.23	4.088	.411
Posttest	Male School	96	18.89	4.766	.486
	Female School	99	19.68	3.377	.339

Table 5 presented the descriptive statistics on the students` performance in Grammar by school type. The pretest and posttest results showed no statistically significant difference in students' performance in Grammar-based on boys' and girls' school.

Table 6: ANOVA

ANOVA

		Sum of Squares	Df	Mean Square	F	Sig.
Grammar (Pretest)	Between Groups	20.259	2	10.130	.441	.644
	Within Groups	6662.990	290	22.976		
	Total	6683.249	292			
Grammar (Post-test)	Between Groups	30.778	2	15.389	.942	.391
	Within Groups	4736.457	290	16.333		
	Total	4767.235	292			

Table 6 indicated that audiovisual materials on students` performance in English Grammar do not significantly vary by school type. Based on that, the null hypothesis was retained.

Discussion

The findings of the study concerning hypotheses were tested; the study revealed that teaching the English language using audiovisual materials has a significant effect on students' performance in English Grammar. The experimental and control group's mean score was compared and was found highly significant in favour of the experimental group. The finding of this study was similar to the findings of Olibie (2010), Alipanahi and Jafari (2014) and Oribabor (2014) that revealed a statistically significant difference between the posttest scores of the experimental and control group. The finding of Basoz and Cubukeu (2014) contradicted the study's finding, which revealed that there was no significant difference between the experimental and control group when taught using audiovisual materials.

On gender difference, the result indicated that the performance of the students in Grammar varies by gender. Mean scores of both groups were compared and found statistically different in their performance. The study's finding agrees with Bani Hani (2014), which revealed a statistically significant difference between male and female students' posttest scores favouring female students. Oyinloye and Ajayi (2011) reaffirmed the finding of Bani Hani (2014) that revealed that female students perform better than male students in suprasegmental features, and the female students develop a positive attitude to the acquisition of speech work by willing to imitate native speaker's model. Furthermore, the result revealed a significant difference between gender and school type as the mean of posttest scores of female school was19.68, male school was18.89 and mixed school was 19.27. The difference was, therefore, in favour of a female school. The study results are in line with that of Anaso and Anaso (2000) that there was a significant difference in the performance of students due to school type. The finding of Ajayi (2005) contradicts the study's findings that there was no significant difference in the performance of students due to school type.

Conclusion

Based on the findings, it was concluded that the study provided empirical evidence of the efficacy of the audiovisual materials in enhancing students' performance in English Grammar. This implies that students exposed to audiovisual materials performed significantly better than those not exposed to audiovisual materials. It was also concluded that there was no significant effect of audiovisual materials on students' performance in English Grammar concerning gender and school type.

Recommendations

1. Students should be exposed to the use of audiovisual materials in the English language to improve their English grammar performance.
2. The federal and States government should provide adequate grammar teaching materials in all schools, and teachers should employ more grammar teaching material in the English language during lessons.

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Availability and Utilization of Blended Learning Model Technologies of Teaching in Business Education in Colleges of Kano and Jigawa, Nigeria

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Abstract

This study was on availability and utilization of blended learning model technologies of teaching in business education in colleges of Kano and Jigawa states, Nigeria. Descriptive research design was used. 267 business education students from Jigawa State College of Education, Gumel and Federal College of Education, Kano were used as the population of the study. The entire population was used as a sample for the study. The instrument used for data collection was checklist and a structured questionnaire. The checklist contained 15 technologies for data on the availability of the technologies in business education departments in the selected colleges and the questionnaire also had 15 items covering statements on the opinion of the respondents about the utilization of the blended learning technologies by business education teachers in the schools. The questionnaire was trial tested and had a determined reliability coefficient of 0.62 using Cronbach Alphamethod. The findings revealed that the new technologies for blended learning are not available in teaching business education in the selected institutions and thus not being utilized. It therefore recommended among others that, school management, state, and federal governments and public-spirited individuals should provide the needed infrastructure on blended learning for teachers to use them in teaching and learning of business education so as to make the learning easier to students and carry the students along with the current technological trend.

Keywords: Blended learning model technologies, Business education

Introduction

Educational development has reach to an age where normal traditional chalk and chalkboard teaching and learning delivery is somehow becoming obsolete due to advancement of technology. This advancement continues to change the lives of teachers and students. This is because of the increasing use of technological equipment and devices such as computers for teaching and learning. Among such technologies however is blended learning strategy. Blended learning is new term in relation to the development of the 21st century technology (Wright, 2017). There are some definitions of what blended learning is called. Blended learning uses various multi-media applied in an ideal way to solve problems (Keshta&Harb, 2013). Blended learning combines face-to-face method and the use of computer in teaching learning process (Grgurovic, 2011). Blended learning aims at providing effective and efficient learning experience by combining learning environment which suits the students (Chansamrong, 2014).

There are two approaches in blended learning: “program overflow model” and “core-and-spoke model” (Bersin, 2004). In the first model, the teacher designs curriculum by integrating some media in the scheduled syllabus. Each step or discussion is the follow-up of the previous discussion.

To measure the whole learning, a task or test is given in the end of topic discussed (Bersin, 2004). In the second approach, the instructor gives online class or web-based course. Usually, the instructor gives particular activities such as delivering materials, interactivity, learning sources, and material assessment. In this approach a task or test may be given, yet not necessarily to be scheduled in the syllabus (Bersin, 2004).

There are several new technologies that are embedded in blended learning that if incorporated by business education teachers will support the use of these models and boost students' learning ability and make the program to align with the current trend of technology use. These technologies are among others learning stations. Learning stations are methods of both delivering a range of content and giving the students different ways to process it (Guido, 2019). Students sit together at a learning station. With a device (Computer, smartphones) at each station, a business education teacher can provide videos, podcasts, slideshows and other digital media that will help easy delivery and understanding of the preferred lesson as well as giving the students challenging exercises as in accounting, business mathematics, economic analysis, taxation, shorthand and marketing to solve. The students can then solve challenges to build understanding of the material. Other technologies are face-to-face driver model, rotation model, flex model, online lab model, self-blend model and online driver model(sources). Some of the software for blend model are FlashNotes, LessonCast Software, Knewton platform and some accounting software like sage Pitchtree, virtual augmented Reality, mobile-style education and Microsoft excel for economic, business and accounting analyses.

However, Empirical evidences from work of Karzan, Chra, and Nsar (2017) showed that average of students GPA in classroom technology is 83.3%, but in the classroom without technology decrease to 60.4%, the result showed the learning increased 22.9% by using technology. Also, Klimova (2016) found that the use of Blended Learning approach in teaching Business English did not show much effectiveness; nevertheless, the students were satisfied with the Blended Learning strategy and prefer it to the traditional based learning. In the same vein, Khalafullah (2010) found effectiveness of integrated learning in increasing the achievement of students' skills and developing the practical performance of skills. In another study, Isti'anah (2019) found that most students found that online activities help them comprehend and practice the materials. Students' reflective journals also revealed that blended learning was able to improve their understanding and interest in learning English grammar. In a nut shell, Business Education is a program that provides students with skills, attitude and knowledge so as to play part in business arena. To move along the current business and economic trends, business education program should have some reoriented courses for future-oriented challenges, understanding new technologies that play in modern economy and developing a future mindset. This caused the researchers to developed interest on this research to find out whether there are available blended learning model technologies in business education departments in colleges of education in Kano and Jigawa, Nigeria, and if there are, are utilized? These are the main reasons for this study on availability and utilization of blended learning model technologies of teaching in business education in colleges of Kano and Jigawa, Nigeria.

Statement of the Problem

With the advancement of technology especially in almost every aspect of human life, the introduction of electronic learning (e-learning) and electronic teaching (e-teaching) is fast becoming pronounced in most African countries, especially in Nigeria. There are number of research works that have shown a positive impact of the use of computers and internet in aiding the teaching learning process. In fact, our students today are more interested and motivated in learning when it comes to the use of e-teaching and learning facilities. This is because students nowadays are more engaged

with laptops, iPad, tablets, iPhone and Android phones for reading and researching with less concern to reading the manual learning materials. It is also a known fact that the larger percentages of computer/internet users globally are students who are under 30years.

The researchers' preliminary investigation revealed that computer-related activities tend to sustain the attention of the 21st century learners more than ever before. This leads to students' self-dependency in learning and makes teachers to concentrates more on student-centered-method of teaching than the traditional method. Unfortunately, teacher-centered learning is still common among colleges of education teachers in Nigeria. Among factors that may cause such problem is the lack of available and usable facilities in many colleges of education. Mostly, not only the students, but the teachers cannot be able to operate the computers effectively, hence, leading them to prefer more of face-to-face lectures than the online like. Therefore, some college students who are in the first year of college still face difficulty or inconvenience when they use computer or internet in their learning processes (Isti'anah, 2019).

Another challenge faced by teachers and students when using computer and internet in classroom is the students' motivation which results in their passivity and the teachers' loss of control (Godwin-jones as cited in Isti'anah, 2019). If these problems continue, the barrier on the students' autonomy may be cultural (Godwin-jones, 2011). Also, both the teachers and the students may lag behind when it comes to the current trend of technology. This make the researchers to be curious on conducting a study on availability and utilization of blended learning model technologies of teaching in business education in colleges of Kano and Jigawa States, Nigeria.

Specifically, this study set to:

1. Assess the availability of blended learning technologies in teaching business education courses in Nigerian colleges of education.
2. Assess the utilization of blended learning technologies in teaching business education courses in Nigerian colleges of education.

Based on the purpose of the study, the following research questions guided the study.

1. What is the availability of blended learning technologies in teaching business education courses in Nigerian colleges of education?
2. What is level of utilization of blended learning technologies in teaching business education courses in Nigerian colleges of education?

Methodology

The study employed the use of descriptive research design, because the design is found favourable to gather data from questionnaires on the opinion of the respondents. Descriptive research design aims at accurately and systematically describing the population and situation of this study (McCombes, 2019).267 level 300 business education students from Jigawa State College of Education, Gumel and Federal College of Education, Kano were used as the population of the study. The 300 level students of these schools were chosen because the colleges were the oldest colleges in Jigawa and Kano, respectively. Hence, they are assumed to have all necessary infrastructures. The students also were chosen because they are graduating students, and it is assumed that they have used either of such technologies. Because of the small number of the population, the entire population was used as the as sample for the study. The instrument used for data collection was checklist and a structure questionnaire. The checklist contains the 15 new technologies for data on the availability of the technologies in business education departments in the selected colleges was used, while questionnaire with 15 items covering statements on the opinion of the respondents about the

utilization of blended learning technologies by business education teachers in the schools. The questionnaire was pilot tested and had a determined reliability coefficient of 0.62 Chronbach Alpha Method. The sampled students were given the questionnaire to fill according to the instructions contained in the questionnaire. The questionnaire was rated using 4 points likert scale of Strongly Agreed (4), Agreed (3), Disagreed 2) and Strong Disagreed (1). The checklist had a 4 points Likert scale of Highly Available (4), Moderately Available (3), Available (2) and Not available (1). The instrument was validated by two experts in the department of Vocational and Technical Education, Ahmadu Bello University, Zaria. The researchers sought permission from the Heads of business education departments in the two selected colleges of education for going round the normal classes, laboratories and model classes to see whether the blended learning model technologies are available in the departments, also, the researchers with the help one research assistant in each of the Colleges of Education administered the instrument to business education students. The data was collected within two weeks period. The data collected was analyzed using mean and standard deviation to answer the two research questions.

Result and Analysis

Research Question One: What is the availability of blended learning model in teaching Business Education courses inColleges of Education in Kano and Jigawa States, Nigeria?

Table 1: Mean and standard deviation on Availability of Blended learning in teaching Business Education courses in Colleges of Education in Kano and Jigawa States, Nigeria

S/N	Questionnaire Item	N	Mean	Std.Dev.	Decision
1.	Learning stations	267	1.84	0.85	Not Available
2.	FlashNotes	267	1.95	0.96	Not Available
3.	LessonCast	267	1.84	0.82	Not Available
4.	Knewton platform	267	1.99	0.97	Not Available
5.	Sage Peachtree software	267	1.70	0.80	Not Available
6.	Microsoft Excel software	267	2.14	1.16	Not Available
7.	Quickbook software	267	2.32	1.28	Not Available
8.	Freshbook software	267	1.80	0.89	Not Available
9.	Virtual Learning station	267	1.90	0.94	Not Available
10.	Business stimulation	267	1.81	0.68	Not Available
11.	Smart board	267	1.11	0.17	Not Available
12.	Projector	267	2.14	0.66	Not Available
13.	Wireless/LAN	267	2.55	1.73	Available
14.	Video Camera	267	2.37	1.64	Not Available
15.	Large screen Television	267	2.33	1.68	Not Available
	Grand mean		**1.98**		

Mean (1.98) < 2.50 (Blended Learning not Available)

The analysis on Table 1 showed that the respondents have disagreed with availability of items 1– 15, excluding item 13 which is only available. This implies that all the new technologies for blended learning was not available in teaching business education in the selected institutions, having a grand mean of 1.98 which was below the bench mark mean (2.50).

Research Question One: What is the utilization of blended learning model in teaching Business Education courses in Colleges of Education in Kano and Jigawa States, Nigeria?

Table 1: Mean and standard deviation on utilization of Blended learning in teaching Business Education courses in Colleges of Education in Kano and Jigawa States, Nigeria

S/N	Questionnaire item	N	Mean	Std.Dev.	Decision
1.	We are using computers for learning during Office Technology and Accounting lessons.	267	1.84	0.85	Disagreed
2.	Our teachers encourage us to use offline store books and archive videos on FreshNotes educational software	267	1.95	0.96	Disagreed
3.	Most of our teachers use LessonCast software in preparing and recording videos for our lessons.	267	1.84	0.82	Disagreed
4.	Our teachers guide us on how to access text and video lesson programmes in the installed Knewton software.	267	1.99	0.97	Disagreed
5.	We are using Sage Peachtree accounting software for accounting learning in our school	267	1.70	0.80	Disagreed
6.	Our teachers teach us Accounting and preparation of students' score as well as attendance sheets using Microsoft Excel.	267	2.14	1.16	Agreed
7.	Our teachers teach us how to track expenses, create invoice and manage cash flow in accounting using QuickBook software.	267	2.32	1.28	Disagreed
8.	Our teachers teach us bookkeeping and transaction time tracking using Freshbook software.	267	1.80	0.89	Disagreed
9.	We are familiar with the use of virtual learning workstations such as video clips, emails, blogs, chart platforms and video presentations for learning business courses.	267	1.90	0.94	Disagreed
10.	Use of large-sized smartboards for large display is common in our business education classes.	267	1.70	0.80	Disagreed
11.	Our teachers use soft-touch smartboards for lectures.	267	2.11	1.20	Disagreed
12.	Our teachers use projectors for lessons and class discussions.	267	2.32	1.28	Disagreed
13.	We use an installed wireless/LAN for our blended learning.	267	2.80	1.95	Agreed
14.	Our teachers use business video stimulations for most of our lessons.	267	1.90	0.94	Disagreed
15.	Our teachers are using video camera for recording lesson presentations before coming to classroom for lessons.	267	2.35	1.67	Disagreed
	Grand mean		**2.04**		

Mean (2.04) < 2.50 (Blended learning Not utilized)

The analysis on Table 1 showed that the respondents have disagreed with the utilization of the items 1to 15, excluding item 13 which is only utilized. This implies that all the new technologies for blended learning were not utilized in teaching business education in the selected institutions, having a grand mean of 2.04 which was below the bench mark mean (2.50).

Discussion

The finding revealed that blended learning technologies are not available in Colleges of Education in Kano and Jigawa states, Nigeria. The finding is in line with that of Khalafullah (2010) who found that effectiveness of integrated learning in increasing the achievement of students' skills and developing the practical performance of skills. The study also showed the superiority of the integrated teaching group over the e-learning group in terms of achievement of skills and of the e-learning group in terms of performing production skills of models. Also, the finding tallies with that of Nuno (2005) who supported the value and effectiveness of teaching assisted by a computer in a modern classroom. In the same vein, the result agrees with that of Chansamrong, Tubsree and Kiratibodee (2014) who figured out the effectiveness of blended learning and cooperative learning to teach grammar in Thailand.

The finding also revealed that blended technologies are not utilized in Colleges of Education in Kano and Jigawa states, Nigeria. This is in line with the findings of Karzan, Chra, and Nsar (2017) who found that average of students' GPA in classroom technology is 83.3%, but in the classroom without technology decrease to 60.4%, the result also showed that the learning increased 22.9% by using technology. They further found that besides all, students enjoyed in classroom technology and most of them learned more material with technology. The finding also agrees with that of Klimova (2016) who revealed that the students were satisfied with the Blended Learning strategy and prefer it to the traditional based learning. When conducted research on blended learning, Isti'anah (2019) found that most students found that online activities help them comprehend and practice the materials.

Conclusion

Based on the finding of this study, it is concluded that blended learning technologies are not available and not utilized in colleges of education, Kano and Jigawa States. Hence, blended learning technologies if made available and used effectively can enhance students' learning of business subjects.

Recommendations

It is therefore recommended that;

1. College of Education Managements in North-west, Nigeria has to furnish business education department in colleges of education with available blended learning technologies so as to make the teachers go along with the new technological trend.
2. School management, state, and federal governments and public-spirited individuals should provide the needed infrastructure on blended learning for teachers to use them in teaching and learning of business education so as to make the learning easier to students and carry the students along with the current technological trend.

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Vocational and Technical Education Programmes in Nigerian Schools: Challenges in the Implementation

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Abstract

The success of any education is very imperative, if it is carefully handled and implemented. It would be recalled that in Nigeria vocational education has received a lot of attention at both the Federal and State levels. Different institutions were established to offer vocational education. These include Technical Colleges, Polytechnics, Vocational Centres and schools. The Federal Republic of Nigeria (2004), through the national policy on education describes technical education as the "aspect of education which leads to the acquisition of practical and applied skills as well as basic scientific knowledge". Vocational and technical education institutions were designed largely to prepare technicians at occupational levels. Despite these well-articulated objectives, vocational and technical education in Nigeria has been hindered by a lot of problems. In this regards this paper reviews the concepts of vocational and technical education, its place and objectives. The paper also looked at challenges in the wheel of vocational and technical education and lastly makes recommendations for effective handling and implementation of vocational education programmes. Finally, the term "vocational education and vocational and technical education" are used to refer to the same thing.

Introduction

The National Policy on Education (2004) has laid much emphasis on vocational and technical education in view of its important role in technological and industrial advancement of Nigeria. According to Oduma (2008) a well developed and implemented vocational and technical education programmes can enable a developing nation to achieve rapid technological advancement.

However, developing nation like Nigeria exerts great energy and efforts to develop functional system of education, which empowers its graduates with occupational skills and competencies to get fit for living in the society and to contribute towards its economic growth and technological development but her greatest challenges is on its implementation (Ayonmike, 2013). This could be explained by the unprecedented increase in the number of Nigerian graduates without employable skills which could be linked to policy implementation problem.

The purpose of this paper is to describe the challenges of vocational and technical education in Nigerian schools and to make recommendations on the way forward. The paper is set out as

follows; first, the concept of vocational and technical education was discussed; second a discussion of the place of vocational and technical education in Nigeria is highlighted. Thirdly, the objectives of technical and vocational education and challenges confronting the implementation of vocational and technical education in Nigeria were discussed. Finally, recommendations towards ensuring a functional vocational and technical education in Nigeria and conclusions were made.

The Concept of Vocational and Technical Education

Despite the conceptual misrepresentation of vocational education due to differences given to its interpretation by many, some scholars defined the term "vocational" as being restricted to areas like business, agriculture, home economics etc (Patrick et al 2013). The role of vocational education in any country is to prepare people for skilled work. It is a form of education that involves a specialized training or retaining that enables the beneficiary been properly equipped with skills, attitudes, valves, and knowledge to become more productive and efficient. Also, UNESCO (2002) defines vocational and technical education as those aspects of educational processes involving in addition to general education, the study of technologies and related sciences and the acquisitions of the economy and social life. The writers define vocational and technical education as learning directed towards developing in young people those skills, competencies, attributes and understanding which equip them to be successfully. Williams (2007) defined vocational and technical education as education designed to prepare skilled personnel at lower levels of qualifications. He maintained that when offered at the higher educational level, it includes career education, practical training for the development of skill and related competencies.

Iheanacho (2006) defined vocational education as that aspect of education that deals with business education, farming, bookkeeping, bricklaying, among others with aims of acquiring vocational skills in these fields. Puyete (2008) opines that vocational and technical education E is a form of education whose primary aim is to prepare persons for employment in recognized occupation and this encompasses field of study (Agricultural education, Fine & Applied Arts education, business education and vocational trades in soap making, hair dressing, computer training among others). Osuala (2004) opines vocational education as that area, which emphasizes job competency, career, preparation and work adjustments. Similarly, Oduma (2007) stresses that vocational education aims at supporting peoples understanding, capacities and attitudes.

According to him, the above array of definitions indicates that vocational and technical education enhances self-reliance and promotes national development. The current massive unemployment of both youths and adults as a result of global economic hardship has caused the emphasis need for all Nigerians to strive to be self-reliance through vocational education.

The Place of Vocational and Technical Education in Nigeria

There are arguments in the literature that vocational and technical education can help nations perform better during bad times depending on its severity (Manfred and Jennifer, 2004; FRN, 2004). Vocational education aims at the development of human abilities in terms of knowledge, skills and understanding so efficiently in carrying on the activities in the vocational pursuits of his choice (Thompson, 2002).

In the view of (Lawal, 2010) vocational education is designed to develop skills, abilities, understanding attitudes, work habits and appreciation encompassing knowledge and information needed by workers to enter and make progress in employment on a useful and productive basis. Therefore, vocational technical education is an integrated education programme for knowledge, attitude and skill development of individuals for effectiveness and efficiency in the world of work and functionality in the dynamic technological age.

Vocational and technical education therefore, is a homegrown medium-term development and poverty reduction programme. It is directed towards developing citizens who are versatile, self-reliant and can fit into any situation. Thus, the very essence of vocational education is to assist in laying a solid foundation for a technological take-off. In spite of the fact that vocational education will help prepare Nigeria to meet the demands and challenges of modern society, it will also enable the nation deviate from a subservient type of education system meant only to provide and serve the needs of the colonial administration (Oduma, 2012).

Objectives of Technical and Vocational Education in Nigeria

The objectives of technical and vocational as costive in the National Policy on Education (2013) shall be;

1. To provide trained manpower in the applied science and technology and business particularly at craft, advanced craft and technical level.
2. To provide the technical knowledge and vocational skills necessary for agriculture, commercial and economic development.
3. To give training and impact the necessary skills to individual who shall be self-reliant economically.

A close look at the above listed objectives of technical and vocational education crystallizes government felt that vocational and technical education is very necessary to make this large scale of youths' self-reliant. This shift from general education to specifically vocational and technical education becomes necessary in the present realities of the need to provide her people with necessary skills and knowledge (Awajobi, 2006).

There is seeming consensus on the importance of vocational and technical education in ameliorating some socio-economic problems especially poverty, unemployment, and all sort of social vices in the society. Thus, the focus of teaching and learning particularly in developing nation like Nigeria where these problems are predominant appear imperative. This clearly indicates the need towards the introduction of vocational and technical education programmes in our schools at various level of education.

Challenges in the Implementation of Vocational Education in Nigeria

Vocational and technical education has been faced with a lot of implementation challenges. This discourse considers a few challenges and suggests specific ways to surmount them.

1. Inadequate Funding: This is a serious challenge with circular effect. Government budgetary allocation in the last decade is grossly below UNESCO recommendation. As a result of this poor funding, basic equipments are lacking in our various vocational education system.

For effective implementation of vocational education programmes in our schools in particular technical institutions, basic tools need to be procured, workshops, classrooms, and laboratories built (Agbionu, 2003; Momoh 2012, and Olaitan, 2007). Therefore, if this specialized form of education is considered crucial for our technological and industrial advancement, then the ugly trend must be reversed to give vocational education the place it deserves.

2. Government Policies: Some government policies are responsible for the poor performance of vocational and technical education in Nigeria (Osam, 2013). For instance, there is no dignity in opting for vocational education, if it is meant for academic failures (Ojimba, 2012).
3. Lack of Indigenous textbooks: This is another factor that is facing the effective implementation of vocational and technical education programmes in Nigerian School system. To handle this factor militating against effective implementation of vocational education, qualified teachers should be encouraged to write textbooks and build a good resource centre.
4. Lack of facilities: Facilities requirement of a functional vocational education include; classrooms, equipment, laboratories', workshops, therefore, it is a fact that without suitable facilities in place, the implementation of vocational education would be very difficult if not impossible.
5. Lack of motivation: The teachers in the vocational education are ill-motivated as a result of poor service condition in various levels. Odu, (2011) and Ojimba (2012) respectively observe that this affect teachers in their response to request for further education and retraining.
6. Shortage of qualified vocational Teachers: Though the vocational education programme is also an education programme. The input from non-education service is still needed for effective implementation of vocational education. These non-vocational education personnel are needed for wholistic functioning of vocational education. This obviously has affected the outcome of services provided in the vocational education programmes. Other challenges include: lack of proper planning, poor public attitude and awareness, poor management and supervision and weak support structure for Students Industrial Work Experience Scheme (SIWES).

The above array of challenges indicate that vocational and technical education are more than ever before. Government efforts aimed at achieving functional vocational and technical education in Nigeria is left with no other option than professionals (Onweh, 2010).

Recommendations

To guard against these challenges and as well achieve a functional vocational technical education programme in our educational system, the following are recommended:

1. Government at all levels should be more pro-active through her budgetary allocation to vocational education. The 26 percent budgetary allocation recommended by UNESCO should be strictly adhered to.
2. Government should come up with policies that will contribute to achieving functional vocational education.

3. Government at all level as well as the private schools should ensure that adequate vocational education teachers should be employed and constantly retrained to enhance better performance.
4. Adequate infrastructure for vocational education should urgently be made available for the schools by all level of government as well as donor agencies.
5. Adequate implementation of vocational education should be enhanced through proper and effective community engagement.

Conclusion

Vocational and technical education is a specialized type of education. It is therefore, desirable for self-reliance and economic development of a developing nation like Nigeria as it enable the recipients to acquire skills and competence that make them gainfully employed. Vocational education is a system characterized by varied occupational skills and field of specialization. Thus, if properly organized can lead to the emergence of desired technological advancement to lunch Nigeria into the next level of industrial development. In realization of this, the National Policy on Education (2004) emphasized a need for an effective educational programme to improve the system, to enhance both technology education and industrial development in addition. Despite these well-articulated objectives, vocational education in Nigeria today is challenged by numerous problems. The issues of concern include lack of government assistance in form of scholarship, low public image accorded vocational education in Nigeria. Also, neglect of vocational education, counterproductive government policies, lack of facilities equipment and workshop as well as lack of adequate fund. Vocational education is not just the acquisition of knowledge but action. In this thinking, it is obvious that the non-implementation of vocational education programmes can be largely avoided through adequate allocation of resources. Such resources would be the most potent remedy for vocational technical education to worth its place in the society.

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Effects OF WebQuest Online Learning Strategies on the Narrative Essay Performance of Senior Secondary Students

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Abstract

The purpose of this study was to investigate the efficacy of WebQuest online learning strategies on the narrative essay of senior secondary school students. Purposive sampling method was used to select one hundred and twenty (120) students out of four hundred and eighty (480) students from SS11 students of Government Senior Secondary School, Hunkuyi, and Government Senior Secondary School, Bomo. For the collection of data, one hundred and twenty (120) sampled students from GSSSH, YASSSS and GSSSB, GSSSK were given a pre-test in order to ensure homogeneity in their ability level and to find out if they are compatible and comparable. After the pre-test, the entire sixty (60) control students were given the opportunity to continue the conventional class and the entire sixty (60) experimental students were given three weeks preparatory practice of Internet browsing activities which involved searching for information using Google, linking the students to treatment site and exposing them to procedures of using WebQuest before the proper WebQuest treatment. After the preparatory practice, all the sixty experimental students were registered in the programme by the teacher to study narrative essay. The students were given usernames and passwords to login. To establish a cause-and-effect relationship between independent and dependent variable, quasi experimental design was used. For the statistical analysis, Analysis of Covariance (ANCOVA) was used. The overall study results revealed significant differences between the narrative essay mean performance score of the experimental and control groups. The study proved that use of technology in language learning can lead to greater writing achievement among students. It is, therefore, recommended that at the secondary school level, writing should be emphasized as an act of communication. The students should be given opportunities to share and discuss with other students using modern technologies. Government should provide adequate online learning materials in the Nigerian secondary schools. WebQuest activities should be integrated in the curriculum, relating them to the goals and objectives of the course.

Key Words: WebQuest, Asynchronous, Email, ICT, Narrative essay, Students' performance

Introduction

In order to meet the target of the 21st century, the Federal Ministry of Education in conjunction with National Communications Commissions (NCC) used Universal Service Provision Fund (USPF) and sponsored School Access Programme (SAP) which provided adequate computers and Internet connectivity to some secondary schools in Nigeria. Training and re-training on how to use the computers were carried out in almost all the secondary schools in Kaduna state, and after the training, customized laptops were issued to the teachers. This project was carried out to

encourage the learners to embrace digital learning. Learners may have access to technology in educational settings in two distinct ways: learning from and learning with technology (Reeves, 1998). While the former implies a relative passivity from the learner, the latter infers an active participation (Hill, Wiley, Miller Nelson, & Han, 2004).

WebQuest as one of online learning tools is selected for this study. This is because in using WebQuest students are allowed to a quest for knowledge online. They are directed to online resources within the context of specific curriculum mission rather than accessing textbook which may be outdated. It exposes the students to a wide range of online resources such as subject experts, directories of information, current news, well edited articles, and different structures of essay writing.

Writing is the most difficult skill among the four language skills which are: listening, speaking, reading and writing (Hoewisch,, 2001) Arguably, narrative essay is the most demanding because it always formed part of the external examination such as West African Examination Council (WAEC). Holder (2006) claimed that despite the fact that students are motivated to learn writing, they are still writing with much difficulty, and the achievement is critically low.

In order to improve skills of the students, Lee (2002) suggested that teachers should integrate information technology (IT) into their classes. McCormick (1993) opined that (IT) can assist to diversify, develop and improve the pedagogical relation of teaching and learning. Beebe (2004) added that ICT can be used interchangeably with "Internet". When it comes to using the Internet, there is concern that if students have free access to the Internet; they may stray and access inappropriate materials (Vidoni, 2002). However, WebQuest online learning can effectively address these concerns.

Online learning is considered as instructional environments supported by the internet which comprises a wide variety of programs that use the internet within and beyond school walls to provide access to materials as well as facilitate interaction among teachers and students. Online learning offers the ability to share material in all kinds of formats such as videos, slideshows, word documents and PDFs. Technology provides the learners with the ability to fit learning around their lifestyles, effectively allowing even the busiest person to further a career and gain new qualifications. It has simplified the way of teaching all the subjects.

WebQuests are well structured, well organized, with time efficient tools used by educators to provide the students with a wide array of relevant Internet information that can inspire critical thinking skills. The use of search engines in WebQuests, allow the students to explore issues, find their own answers, and acquire all the necessary skills (Zheng et al., 2007). Thus, the present study is aimed at conducting school-based research in order to establish the efficacy of WebQuest on narrative essay.

Objective of the Study

The objective of this study is to find out the difference between the narrative essay mean performance score of students exposed to WebQuest online learning strategies and those not exposed to the treatment.

Research Question

What is the difference between the narrative essay mean performance score of students exposed to WebQuest online learning strategies and those not exposed to the treatment?

Hypothesis

There is no significant difference between the narrative essay mean performance score of students exposed to WebQuest online learning strategies and those not exposed to the treatment.

Literature Review

WebQuest and Teaching of Narrative Essay

Written essay is known as composition especially at the primary and secondary schools. It is putting down one's thought in graphic symbol and pedagogical writing under the guidance of a teacher. Essay writing could be narrative, descriptive, argumentative or expository. This present study is limited to narrative essay. Narrative essay tells a story about a memorable event that happened at a particular time.

The language use in narrative essay tends to contain past tense, sequence connectors, action verbs, adverbs to give clear picture of events, precise tone and figurative language may be used. Narrative essay is written using first person singular (I). However, the third person singular (he/she) can also be used (Catherine, 2012).

To narrate a story in a WebQuest online learning, the students need to tell a story usually about something that happened in such a way that the audience understands and benefits something (Cohen, 1994). Narrative essay relies on concrete, sensory details to convey the points. These details should create a unified, forceful effect, dominant impression and they should include the story convention of plot, including setting and characters, a climax and an ending (Goddard, 2002). The story is presented following a particular structure to ensure that the plot is clear. Just like in the traditional approach, WebQuest online learning strategy follows the three most frequent structures which include Chronological order, Flash back order and Reflective order to teach narrative essay.

In teaching narrative essay through WebQuest online learning, the essay is broken into three main parts which include introduction, body and conclusion by following the links to study the techniques. The subjects are to study the processes carefully and search all the rules of narrative essay using the selected web sites (Goddard, 2002). Young (2000) provided three principles of writing narrative essay: involvement of reader of the story being told, finding a generalization which the story supports and giving carefully selected details to support and explain the story. All these are also found in the WebQuest online learning as arranged in the websites selected.

For teaching the setting, Reynolds (2000) suggests that the narration should be in a specific time and place at the beginning of the story and for characterization. Amztis (1995) & Langan (2001) suggested using three dimensional characters for the protagonist and/or antagonist with introduction containing the setting, characters and opening situation. All of these conventions can

be best taught through interaction and exchange of ideas offered by conferencing where students would deliberate until consensus is reached. Interaction and conferencing are among the strategies proposed in the present study.

Moody (1970) explained that inability of students to manipulate the grammatical structures of the English language with confidence and accuracy affects their narrative skills, even using WebQuest, because they do not have sufficient control patterns of English to be able to write what they want accurately. This encourages abnormalities in the narrative skills and the WebQuest learning strategies take cognizance of it. Many relevant websites are provided for consulting the grammatical structures of English language.

According to Olaofe (2010), sector analysis is designed for writing of English, since second language learners are more concerned with the written system of the language. It provides different mechanisms for generating different kinds of operations on the positions in a sentence layer. Some of these operations include: leaving some positions filled and unfilled to produce varieties, shifting some fillers of a particular positions to different positions that can accommodate such fillers, and postponing some positions by pushing such positions forward for emphatic purposes. These are also some of the components of WebQuest online learning strategies.

The body of literature reviewed above did not particularly address the issue of WebQuest online learning strategies on the written English in the area of narrative essay. This encourages the researcher to carry out this research work by using WebQuest online learning to teach narrative essay. The students are expected to utilize the materials and resources to produce a draft after series of online consultation. Students would be linked to rubric areas to re-order words in sentences and also re-arrange given sentences in paragraph. They would be linked to areas of punctuation marks in order to write good narrative essay.

The point raised by Moody (1970) that inability of students to manipulate the grammatical structures of English language with confidence and accuracy affects their narrative skills is convincing because writing requires mastery of the basic grammatical rules. The WebQuest online learning strategies make provision for learning grammatical accuracy and collaborative work as designed in the study which can boost the students' morale. The present study appreciates the view of Goddard (2002) that learning narrative essay through WebQuest is three stages which include introduction, body and conclusion.

Methodology

Research Design

The design adopted for this research is quasi-experimental research design. The design made use of existing classes in a given school not to create classrooms through random selection and random assignment (Campbel& Julian, 1963; Gibbons & Herman, 1997). The study examined the effects of WebQuest online learning strategy on the written English performance of selected Senior School Students.

Population

The population of this study comprised all the 2015/2016 registered SSII students of the seven (7) public senior secondary schools with ICT facilities in Giwa Zone. The schools registered one thousand six hundred and sixty (1660) students with two hundred and forty two (242) computers and online facilities.

Sample and Sampling Procedure

In this study, one group with thirty (30) SSII students out of ten groups with three hundred (300) students of GSSH and one group with thirty (30) students out of six groups with one hundred and eighty (180) students of GSSB. Sixty (60) students formed the experimental and sixty (60) students formed the control group, out of four hundred and eighty (480) students.

Instrumentation

The study utilized both qualitative and quantitative techniques in data collection and analytical procedure. The experimental group were given test I, test II, test III and final post-test. The questions for test, test I, test II, test III and final post-test were of WAEC standard. The instrument used for data collection was narrative essay.

Result

Research Question

What is the difference between the narrative essay mean performance of the students exposed to WebQuest online learning strategies and those not exposed to the treatment?

The scores of the students in the two groups were graded into high, average and low level in order to find out the differences between the written English mean performance score of the students exposed to WebQuest online learning strategies and those not exposed to the treatment. The grading was used to enable the classification of the effect and comparison between the two groups. Table 1.1 below is the total number and percentages for the experimental and control groups.

Table 1: Total Number and Percentages for the Experimental and Control in Narrative Essay

	Pretest			**Test I**			**Test II**			**Test III**			**Final Test**		
EXP	**No**	**L**	**%**	**No**	**L**	**%**	**No**	**L**	**%**	**No**	**L**	**%**	**No**	**L**	**%**
	C	**O**	**N**	**T**	**E**	**N**	**T**								
H	60	00	00	60	00	00	60	00	00	60	00	00	60	00	00
M	60	22	46.7	60	24	40	60	31	51.7	60	52	86.7	60	57	95
L	60	38	63.3	60	36	60	60	29	48.3	60	8	13.3	60	3	5
	O	**R**	**G**	**A**	**N**	**I**	**Z**	**A**	**T**	**I**	**O**	**N**			
H	60	00	00	60	00	00	60	00	00	60	00	00	60	00	00
M	60	30	50	60	31	51.7	60	37	61.7	60	51	85	60	59	98.3
L	60	30	50	60	29	48.3	60	23	38.3	60	9	15	60	1	1.7
	E	**X**	**P**	**R**	**E**	**S**	**S**	**I**	**O**	**N**					
H	60	00	00	60	00	00	60	00	00	60	00	00	60	00	00
M	60	30	50	60	30	50	60	36	60	60	52	86.7	60	55	91.7
L	60	30	50	60	30	50	60	24	40	60	8	13.3	60	5	8.3
	M	**E**	**C**	**H**	**A**	**N**	**I**	**C**	**S**						
H	60	00	00	60	00	00	60	00	00	60	00	00	60	00	00
M	60	00	00	60	00	00	60	00	00	60	00	00	60	00	00
L	60	60	100	60	60	100	60	60	100	60	60	100	60	60	100
CON	**No**	**L**	**%**	**No**	**L**	**%**	**No**	**L**	**%**	**No**	**L**	**%**	**No**	**L**	**%**
	C	**O**	**N**	**T**	**E**	**N**	**T**								
H	60	00	00	60	00	00	60	00	00	60	00	00	60	00	00
M	60	25	41.7	60	24	40	60	28	53.3	60	29	48.3	60	33	55
L	60	35	58.3	60	36	60	60	32	46.7	60	31	51.7	60	27	45
	O	**R**	**G**	**A**	**N**	**I**	**Z**	**A**	**T**	**I**	**O**	**N**			
H	60	00	00	60	00	00	60	00	00	60	00	00	60	00	00
M	60	35	58.3	60	31	51.7	60	43	71.7	60	37	61.7	60	38	63.3
L	60	25	41.7	60	29	48.3	60	17	28.3	60	23	38.3	60	22	36.7
	E	**X**	**P**	**R**	**E**	**S**	**S**	**I**	**O**	**N**					
H	60	00	00	60	00	00	60	00	00	60	00	00	60	00	00
M	60	31	51.7	60	24	40	60	19	51.7	60	25	41.7	60	19	48.3
L	60	29	48.3	60	36	60	60	31	48.3	60	35	58.3	60	31	51.7
	M	**E**	**C**	**H**	**A**	**N**	**I**	**C**	**S**						
H	60	00	00	60	00	00	60	00	00	60	00	00	60	00	00
M	60	00	00	60	00	00	60	00	00	60	00	00	60	00	00
L	60	60	100	60	60	100	60	60	100	60	60	100	60	60	100

Table 1.1 indicates that the performance of the control and experimental groups were at the same level before the treatment. At pretest, the number of experimental group in the low performance level was 38 or 63.3% in content, 30 or 50% in organization, 30 or 50% in expression and mechanics remained 60 or 100%. At test I, the number of experimental group in the low performance level reduced to 36 or 60% in content, 29 or 38.3% in organization, 30 or 50% in expression and mechanics remained 60 or 100%. At test II, the number of experimental group in the low performance level dropped to 29 or 48.3% in content, 23 or 38.3% in organization, 24 or 40% in expression and mechanics remained 60 or 100%. At test III, the number of the experimental group in the low performance level dropped to 8 or 13.3% in content, 9 or 15% in organization, 52 or 86.7% in expression and mechanics remained 60 or 100%. At final post-test, the number of experimental group in the low performance level reduced to 3 or 5% in content, 1 or 1.7% in organization, 8 or 13.3% in expression and mechanics remained 60 or 100%.

At pretest, the number of control group in the low performance level was 35 or 58.3% in content, 25 or 41.7% in organization, 29 or 48.3% in expression and mechanics remained 600 or 100%. At test I, the number of control group in the low performance level reduced to 36 or 60% in content, 29 or 48.3% in organization and 36 or 60% in expression while mechanics remained 60 or 100%. At test II, the number of control group in the low performance level dropped to 32 or 46.7% in content, 17 or 28.3% in organization, 31 or 48.3% in expression and mechanics remained 60 or 100%. At test III, the number of control group in the low performance level dropped to 31 or 51.7% in content, 25 or 38.3% in organization but increased 35 or 58.3% in expression and mechanics remained 60 or 100%. At final post-test, the number of control group in the low performance level reduced to 27 or 45% in content, 22 or 36.7% in organization, 31 or 51.7% in expression and mechanics remained 60 or 100%.

This happened after exposure to activities such as vocabulary development, spelling, idiomatic expressions and use of punctuation marks. There was no such improvement among the students that were not exposed to the treatment in all the stages. This clearly revealed the efficacy of the WOLS on the narrative essay of SSII students. Below is a table of number of errors committed in narrative essay:

Table 1.2: Presents the Overall Errors Committed By the Students in Narrative Essay

Experimental Group	**Errors Committed**	**Test I**	**Test II**	**Test III**	**Final Test**
	Spellings	202	156	135	75
	Concords	59	54	40	31
	Determiners	41	39	30	20
	Capitalization	42	41	30	21
	Wrong syllabication	50	40	42	20
	Incomplete thought	54	41	40	30
	Tenses	112	80	72	40
	Repetitions	25	20	19	10
	Pluralism	24	21	15	11
	Comma	35	31	25	12
	Full-stop	31	20	26	9
	Total	675	503	474	279
Control Group	**Errors Committed**	**Test I**	**Test II**	**Test III**	**Final Test**
	Spellings	210	200	201	180
	Concords	58	57	56	56
	Determiners	43	37	38	30
	Capitalization	51	50	50	50
	Wrong syllabication	41	40	39	39
	Incomplete thought	15	16	17	16
	Tenses	111	111	98	81
	Repetitions	28	27	27	27
	Pluralism	25	21	25	20
	Comma	39	40	40	40
	Full-stop	40	39	30	30
	Total	661	638	605	569

Table 1.2 clearly showed that at test1, the experimental group had 675 as total errors committed and 661 as total errors committed by the control group. At test2, the total errors of the experimental group reduced to 503 and the total errors of the control group reduced to 638. At test3, the total errors of the experimental group reduced to 474 while the total errors of the control group reduced to 605. At the final test, the total errors of the experimental control drastically reduced to 279 but the total errors of the control group reduced to 569 only.

Research Findings

To analyze the data of the present study, different types of statistical techniques were used. These include Mean, Standard deviation and one-way ANCOVA test. The findings are present in tables below:

Table 3: Means, Standard Deviations and Std. Error Mean of the Experimental and Control

Status	Group	N	Mean	Std. Deviation	Std. Error Mean
Content	Control	60	3.50	.701	.091
	Experimental	60	4.93	.954	.123
Organization	Control	60	3.75	.751	.097
	Experimental	60	4.95	.811	.105
Expression	Control	60	6.23	1.609	.208
	Experimental	60	8.92	1.406	.181
Mechanics	Control	60	.67	.510	.066
	Experimental	60	1.00	.759	.098
Total	Control	60	14.28	1.795	.232
	Experimental	60	19.82	2.296	.296

This result revealed that the students exposed to WOLS were significantly better in their performance than those not exposed to the treatment. The content of the written English of the experimental students significantly increased after the exposure to the treatment. This is indicated by 4.93 mean score of the experimental group and 3.50 for the control group. In organization of the written English, the mean score of the experimental remained as 4.95 while the control group had 3.75. The mean score of expression of the written English of the experimental group was 8.92 and 6.23 for control group. In the aspect of mechanics of the written English, the mean score of the experimental group was 1.00 and the control group was .67. The total mean score of the experimental group stood as 19.82 and the control remained as 14.28. By these observations, the null hypothesis that there is no significant difference between the narrative essay mean performance score of those exposed to WebQuest online learning strategies and those not exposed to the treatment is therefore rejected.

To prove beyond reasonable doubt that this remarkable improvement was as a result of the exposure to WOLS, ANCOVA analysis for the differences in post-test mean scores tests was also conducted.

Table 1. 4: ANCOVA analysis for the differences in post-test mean scores of contents, organization, expression and mechanical accuracy of narrative essay between experimental and control groups

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1.255[a]	6	0.209	0.822	0.555
Intercept	10.244	1	10.244	40.271	0.000
HIGH	0.304	1	0.304	1.193	0.277
MIDDLE	0.112	1	0.112	0.441	0.508
LOW	1.245	1	1.245	4.895	0.029
STATUS	5.263	3	5.088	5.211	0.379
Error	28.745	113	0.254		
Total	300.000	120			
Corrected Total	30.000	119			

Table 2 indicates that the (F) value was (5.2) and it was significant value at the level (.037). From this finding obtained, it could be said that there is a clear difference between the experimental and control group. This could be based on the number of paragraphs in the experimental group that could not be found in the control group. There was also a difference in spelling of words and also the use of punctuations. It is observed that the sentences of the experimental group seemed to be better than the control group. Below is a table of strategies that led to the improvement

Table 1.5: WebQuest Online Strategies That Led to the Improvement of the Experimental Group in Essay Writing

Essay Writing	WebQuest Online Strategies	Effects on Essay Writing
	Collaboration	Collaboration with teacher and pairs online
	Group editing	Checking for accuracy, and redrafting of ideas to avoid unnecessary errors
	Interaction	Interaction between teacher and students
	Self-editing	Individual checking of spellings, punctuations and grammatical errors
	Conferencing	
	Brainstorming	Outlining, thinking and organization of ideas
	Crafting	Intra-sentential flow of ideas
	Reviewing	Final revision before posting
	Re-structuring	Logical presentation of sentence and ordering of document based on central idea and sentence
	Planning	Logical manipulation of ideas through insertion, deletion and organization
	Sentence combining	Logical transition of ideas and development of paragraphs

Discussion

The present study investigated the effect of WOLS on narrative essay performance of selected senior secondary school students in Giwa Zone. It was obvious that WebQuest strategies involved scaffolding, brainstorming, team work, independent learning, autonomy and support which can be an important issue for explaining the significant improvement of writing skills. A significant difference existed in the written English mean performance score in narrative essay of the students exposed to the treatment and those not exposed. Although, the essay of the students before the treatments was full of errors such as non-fluency of ideas, lack of logical sequencing, inconsistency of tenses and no mastery of sentence construction. The students' performance remarkably improved as a result of the treatment such as conferencing, clustering, role play, drafting, editing, and sequential arrangement of events. The findings of this study is consistent with Hassenien (2006) who claimed that WebQuest model can improve students' writing performance. The findings also, corroborate with Vidoni & Maddox (2002) who claimed that implementation of technology can simplify ways of seeking knowledge for students in an interesting manner.

Conclusion

As a result of the findings obtained in this study, it could be adjudged that WebQuest online learning is effective for enhancing narrative essay performance of senior secondary school students. The room created for interaction between the learner and the learning materials in the electronic environment without the teacher is an evidence of the improvement. The study concluded that WebQuest online learning strategies is effective in the aspect of teaching and learning English narrative essay.

Recommendations

In the light of the findings of the present study, the following recommendations are made:

1. At the secondary school level, writing should be emphasized as an act of communication. The students should be given opportunities to share and discuss with other students using modern technologies.
2. Government should provide adequate online learning materials in the Nigerian secondary schools.
3. WebQuest activities should be integrated in the curriculum, relating them to the goals and objectives of the course.

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Multimedia Instructional Approach and Gender Equity in Mathematics Achievement Among Secondary School Students

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Abstract

The study aimed at promoting gender equity in mathematics achievements through Multimedia Instructional Approach (MIA) in secondary schools in Owerri North Local Government Area of Imo State, Nigeria. The study was a quasi-experimental type adopting the pre-test, posttest non-equivalent control design. The population consist of 5917senior Secondary school II(SS2) students. A sample of 263 senior secondary II (SS 2) students drawn from two (2) purposively selected co-educational secondary schools was used for the study. The instrument for data collection was a researcher made 30 items objective test questions titled "Mathematics Achievement Test (MAT)". It had reliability coefficient of 0.80 determined using Kuder Richardson 20 (KR_{20}) formula. The experiment groups were taught trigonometry using Multimedia Instructional Approach (MIA) while the control group were taught the same topic using traditional method. The data generated were analyzed using Analysis of Covariance (ANCOVA) statistical tool tested at 0.05 level of significance. The result of the study revealed that Multimedia Instructional Approach (MIA) improved male and female students' achievement in Mathematics and there was no significant interaction effect between treatment and gender achievements in mathematics. Based on the result it was recommended among others that multimedia should be employed in teaching Mathematics at secondary school level to enhance students' achievement.

Keywords: Multimedia, Instruction, Gender, Mathematics, Achievement

Introduction

The knowledge of mathematics helps in the development of sound minds and prepares individuals to be functional in the development of any society. Mathematics as a subject prepares individuals to proffer solution to problems associated with daily activities. Mathematics is the study of numbers, symbols, counting, measurement, number patterns and relationships of quantities (Akanmu, 2017). According to Muijs and Reynolds (2005) Mathematics plays a main role in many branches of science such as physics, engineering, and statistics. This is because Mathematics is seen as the language which science disciplines depend on as they cannot exist in isolation. The teaching and learning of mathematics in secondary schools is geared towards developing the nation in terms of scientist, technologists, doctors, engineers and other professions. Mathematics shapes individuals' intellectual dispositions. Aiyedum as cited in Onuoha, Ifelunini,

Ezeocha and Agah (2017) pointed out that Mathematics is the gate and key to science and further indicated that Mathematics can be seen as the language of sciences since most science discipline cannot exist in its isolation. The relevance of mathematics made the Federal Government of Nigeria to make Mathematics a core compulsory subject to be offered at both the primary and secondary school levels in Nigeria (FRN, 2014). Mathematics is so important that, any candidate without a credit in the subject will not gain admission to read any course in any tertiary institution in Nigeria

This all-important subject has suffered a lot of setbacks in terms of students' outcome. Obodo (2004) stated that students' achievement in Mathematics over the past decade has not been impressive. Galadima and Okogbeni (2012) indicated that despite the importance and relevance of Mathematics to the individual and the nation in general, students' performance both at internal and external examinations has continued to deteriorate year after year. Anibueze, Ayogu and Abugu (2017) stated that in Nigeria, the performance of students offering Mathematics especially at the 2014–2017 West African Senior Secondary School Certificate Examination (WASSCE) where the percentages of students that obtained credit passes and above in Mathematics is within the range of 31.28% to 59.62% despite the fact that all senior secondary school students offer Mathematics. The teaching and learning of Mathematics in recent time has encountered several challenges which has resulted to poor students' achievements. Among these challenges include, unqualified teachers, inappropriate use of instructional strategies, gender and environmental issues (Karue & Amukowa,2013). National Mathematics Centre (2009) indicated that poor performance in the promotion/public examinations in Mathematics has more to do with teachers' method of teaching than the content of curricular of the school Mathematics. Teachers are noted to consistently stick to the use of traditional teacher-centered approach in teaching Mathematics. This approach does not liberalize or favour students as they are only passive in the classroom. According to Gambari, Yaki, Gana and Ughovwa (2014) teachers' centered method emphasizes learning through the teacher's guidance at all times. Students are expected to listen to lectures, copy notes and learn from them without making any input.

Gender is another construct that has contributed to students' poor achievement in Mathematics. For instance, Frempong and Ayia in Onuoha et al (2017) observed that female students are less successful in learning Mathematics due to their low interest and confidence in learning Mathematics and their low academic expectation. Anjum (2015) indicated that girls and boys differ in Mathematics achievement with girls outperforming boys. Arhin and Offoe (2015) also in a study on gender differences and mathematics achievement of senior high school students, found no significant difference in the mathematics achievement between male and female students from experimental group. Abiam and Odok (2006) found no significant relationship between gender and achievement in number and numeration, algebraic processes and statistics in Nigerian schools. However, a weak significant relationship in geometry and trigonometry was established. Viann (2004) investigated differences and the effects of cooperative learning in Mathematics classroom setting and found no significant gender-related differences in Mathematics achievement but female students achieved slightly higher grades than male students. Koller, Baumert and Sehnabol (2000) studied gender differences in Mathematics achievement which favoured males in achievements, interest and placement in advanced Mathematics courses. To improve students' achievement in Mathematics and address the various dichotomies associated with it, there is need to employ instructional approach that supports technology in the learning process. To support this, Ibrahim (2009) stated that, to improve the educational productivity, some of the teaching staff sought to embrace the use of multimedia instruction.

Multimedia is defined as the presentation of the learning material using both pictorial form and verbal form such as spoken and printed text (Mayer, 2000). Sharma (2013) sees multimedia as computer-mediated information that is presented concurrently in more than one medium. Ogochukwu in Nwoke, Uzoma and Ugo (2016) described multimedia as the combination of various digital media types, such as text, images, sound and video, into an integrated multisensory interactive application or presentation to convey a message or information to an audience. Multimedia is multi-sensory technology that stimulates multiple senses of the audience at a time. Its interactive nature enables teachers to control the content and flow of information (Shah & Khan, 2015). Philips (1997) stated that multimedia is characterized by the presence of text, pictures, sound, animation and video, some or all of which are organized into a coherent program. Mayer and Moreno (2003) defined multimedia instruction as presenting both words and pictures that are intended to foster learning. They further indicated that, the word can be printed (e.g., on-screen text) or spoken (e.g., narration). The picture can be static (e.g., illustrations, graphs, charts, photos or maps) or dynamic (e.g., animation, video or interactive illustrations).

Multimedia is increasingly being used in many developed countries and developing countries including Nigeria due to its advantages which includes among others: complicated topics can be explained and understood better with the aid of pictures, graphs, animations and simulations as well as complex concepts are presented in small, chronological steps as a means to improve students' ability to comprehend information in meaningful way (Adegoke, 2010; Neo & Neo, 2001). Gilakjani (2012) indicated three reasons and the rational for the use of multimedia in the classroom. These include; its use increases students' interest level, enhances their understanding, and increases their memorizing ability. The use of multimedia in Mathematics classroom increases students' motivation and makes them active learners. According to Prabowo, Anggoro, Astuti and Fahm (2017) technology-backed learning environment motivates students to participate and to interact with others in the instructional process and their motivation makes them confident in studying Mathematics (Leow & Neo, 2014). John, Musa and Waziri (2018) opined that through multimedia teachers motivate students to learn by using their different senses and through audio-visual presentation of information, the students obtained clearer and more complete knowledge of the outside world and themselves. Skinner in Nwaocha (2010) stated that students usually learn more in classes in which they receive multimedia presentation-based instruction and that they learn their lessons in less time with multimedia presentation-based instruction. Maha (2008) indicated that schools that employed the use of multimedia instruction have higher students' attendance and lower dropout rates that leads to greater academic achievements and retention.

Irrespective of the unending efficacy of multimedia instruction in teaching and learning mathematics and other subjects, there has been no research evidence of application of this instructional mode within the area of the study to the knowledge of the researchers. This has made it pertinent to employ this technology based instructional approach in mathematics.

Statement of the Problem

Gender balance in Mathematics achievement at the secondary school level has persistently remained a mirage as revealed by various research results. Some of the results indicated the existence of gender difference in Mathematics achievement in favour of male students such as Frimpong and Ayia as cited in Onuoha et al (2017), while Schabel (2001), Arhin and Offoe (2015) and Viann (2004) showed no gender difference in Mathematics achievement or its existence in favour of female students. These inconsistent results in gender achievement in Mathematics may have a link with the instructional approaches employed by teachers which, has proven to be

counterproductive. Based on the foregoing, the study was carried out to investigate the promotion of gender equity in Mathematics achievement using Multimedia Instructional Approach (MIA) in secondary schools. Specifically, the study determined:

1. The effect of multimedia instructional approach (MIA) on students' achievement in Mathematics
2. The influence of gender on students' achievement in mathematics
3. The interaction effect of treatment and gender on students' achievement in Mathematics.

Hypotheses

Based on the purpose of the study the following hypotheses were formulated to guide the study:

$H0_1$: There is no significant effect of treatment on achievements of students in mathematics.
HO_2: There is no significant influence of gender on students' achievement in mathematics
$H0_3$: There is no significant interaction effect of treatment and gender on students' achievements in Mathematics

Methodology

The study was a quasi-experimental type adopting the pre-test post-test non-equivalent control design. The design was adopted since it was not possible to carry out a randomization of the participants due to the school programme.

The population of the study consists five thousand nine hundred and seventeen (5917) senior secondary II (SS2) students in the 15 Government owned secondary schools in Owerri North Local Government Area of Imo State. Based on the nature of the study, two secondary schools were purposively selected for the study since they are co-educational and possess the characteristics required for the study. In each of the schools selected two intact classes were randomly assigned to control and experiment groups respectively. This implies that, two classes were assigned to control group and two classes assigned to experiment group. This gave a total of 263 students comprised 140 females and 123 males. The control group had144participants made up 66 males and 78 females. The experiment group was made up of119 participants with 57 males and 62 females. The instrument for data collection was a researcher made 50 items objective test questions titled "Mathematics Achievement Test (MAT)". The construction of the test was guided by a table of specification based on the topics taught the students. The face and content validity were determined by two Mathematics educators and a Measurement and Evaluation expert. Their inputs guided the restructuring of the instrument where necessary. To determine the reliability of the instrument, 35 copies were administered to students outside the study group in another school with the same characteristics with the study group. The data generated were analyzed using Kuder Richardson 20 (KR_{20}) formula which gave a reliability co-efficient of 0.80 which was acceptable for the study. Before the treatment commenced, the control and experimental groups were pre-tested to determine their cognitive readiness. After that, the experiment groups were taught trigonometry using Multimedia Instructional Approach (MIA) by a research assistant who was trained on the approach for one week. The content of the topic was downloaded from the internet and projected to board through a laptop. The step-by-step process of the instruction was outlined on a lesson plan to conform with the downloaded material. The approach allowed students to ask

and answer questions, practice with the instructional procedure. The researchers were on ground to ensure the treatment procedure was strictly maintained. The control groups were taught the same topic using the traditional approach as outlined on a lesson plan. The entire process lasted for 3 weeks after which a post test was administered to both groups using a rearranged version of the pre-test instrument and marked over 100%. Based on the design of the study, generated data were analyzed using Analysis of Covariance (ANCOVA) and tested at 0.05 level of significance.

Results

$H0_1$: There is no significant effect of treatment on achievement of students in Mathematics

Table 1: Summary of ANCOVA Analysis

Source	Type III sum of squares	df	Mean square	f	Sign
Corrected Model	48540.987	4	12135.247	326.015	.000
Intercept	17096.143	1	17096.143	495.290	.000
Covariate	48.975	1	48.975	1.316	..252
Method	47615.123	1	47615.123	1279.187	.000
Gender	**19.574**	**1**	**19.574**	**.526**	**.469**
Method* gender	**7.855**	**1**	**7.855**	**.211**	**.646**
Error	903.523	258	37.223		
Total	497137.000	263			
Corrected Total	58144.510	262			

Table 1 shows that the computed f (258,1) =1279.187, P=0.000 is less than 0.05 level of significance under method. Based on the result, the null hypothesis is rejected. This implies that there is significant effect of MIA on students' achievement

HO_2: There is no significant influence of gender on students' achievement in mathematics

Table 1 revealed f(258,1) =0.526, P=0.469 is greater than 0.05 level of significance under gender. This means that gender has no significant influence on students' achievement in mathematics when taught using multimedia instruction.

$H0_3$: There is no significant interaction effect of treatment and gender students' achievements in Mathematics.

Table 1 also shows that f(258, 1)=0.211, p=0.646 is greater than 0.05 level of significance under method and gender. Based on the result, the null hypothesis is upheld which implies that there is no interaction effect of treatment and gender achievements in Mathematics.

Discussion

The result of the study revealed that male and female students had improved achievement in Mathematics due to the application of Multimedia Instructional Approach (MIA). The statistical analysis showed that, there was no significant difference between the achievement of male and female students taught mathematics using Multimedia Instructional Approach (MIA). This result

is in agreement with that of Akinoso (2018) which revealed that, there was no significant difference on mathematics achievement using multimedia materials based on gender. Also, the study carried out by Anyamene, Nwokolo, Anyachebelu and Anemelu (2012) on the effect of CAI packages on the performance of senior secondary students in mathematics, history and physics respectively revealed that there was no significant difference in the test performance scores of male and female students taught using CAI packages. Also, the equal achievement of male and female students in multimedia group could be attributed to factors such as, motivating nature of computer technology, cooperative nature of the approach, interactive nature of the learning approach and their learning styles, etc.

The study finally revealed that, there was no significant interaction effect of treatment and gender on students' achievement in mathematics. The result is also in line with Nwoke et al (2001) which revealed that, gender is not a factor on students' achievement when taught with appropriate Instructional approach.

Conclusion

The result of the study revealed that Multimedia Instructional Approach (MIA) was effective in improving male and female students' achievement in Mathematics and reduced the gender issues associated with Mathematics achievement.

Recommendations

Based on the result, the following recommendations were made;

1. Multimedia should be employed in teaching Mathematics at secondary school level to enhance students' achievement.
2. Multimedia facilities such as laptop/Desk top computers, projectors, slides, etc should be provided in secondary schools by the government to enable teachers use them to teach Mathematics.
3. Government, non-governmental organizations and school managers should organize seminars, symposium and workshops to train teachers on the application of innovative approaches such as Multimedia approach in teaching Mathematics.

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Effect of Mastery Learning Strategy on Academic Achievement and Interest of Metalwork Technology Students in Universities in South East Nigeria

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Abstract

The study investigated the effect of mastery learning strategy on academic achievement and interest of metalwork technology students in universities in South East Nigeria. The study adopted a quasi-experimental design. The population of the study comprisal of 5 universities offering industrial Technical Education in South East Nigeria. The entire population was 372 which 72 students were purposively sampled for the study. The population for the study was grouped into two intact classes. The experimental group called A is made up of 40 students and the control group called B is made up of 32 students. The experimental group was taught metalwork technology using mastery learning strategy while the control group was taught using conventional teaching method for the period of four weeks before exposing them to post-test treatment. Two research questions and one null hypothesis were formulated for the study. The metalwork Achievement Test (MAT) was employed for the study as the instrument for data collection. The test items were validated by three experts. The reliability coefficient of the study was determined using Cronbach Alpha and the Reliability coefficient was 0.81. The data collected were analyzed with frequency count and percentages for research questions and t-test statistics was used in testing the hypothesis at 0.05 level of significance. The findings of the study revealed that there was a significant difference in the academic performance of students taught metalwork technology using mastery learning strategy and students metal technology using cremation teaching method (CTM) in universities in South East Nigeria. Based on the findings the researcher recommends that lecturers should adopt mastery learning strategy in the teaching of metalwork technology for skill acquisition by students to achieve better. The researcher also recommend that seminar, workshop and conferences should be organized to update lecturers on how mastery learning strategy should be used.

Keywords: Mastery Learning Strategy, Skill Acquisition, Metalwork Technology, Effective Teaching

Introduction

Mastery learning is a concept in educational system that cannot be overlooked or skipped whenever there is need to discuss about skill acquisition among students. Mastery learning approach according to Agboho (2014) is the instructional method where students are allowed unlimited opportunities to demonstrate mastery of the content taught. Hence mastery learning is described as the ability of the students to demonstrate effectively the content of the course of study taught. Similarly, Adeyemi (2007) asserted that mastery learning strategy involves a pre-specified criterion level of performance which students must master in order to complete instructional and proceed. Also, according to Wambugo (2008) mastering learning strategy permits students to

repeat study materials until they master them. Mastering of a content is said to be achieved only when students are allowed to practice such content repeatedly without failure. In metalwork technology students are expected to exercise the required competencies and skill needed in the contents before mastery is attained and student are expected to proceed. Also, according to Wambugo [2008] mastery learning strategy permits students to repeat study materials until they master them. Mastering of content is said to be achieved only when students' academic performances is above average as a result of repeated practice. In metalwork technology students are required to demonstrate the competences and skills needed in the content before mastery is attained and student are permitted to proceed to next level. In the same vein, Wachanga and Mwanga (2004) noted that for mastering to be achieved emphasis is placed on developing learners' capabilities for achieving instructional goals. The achievement of instructional goals according to Spencer (1996) is that the content should be planned and organized in such a way that every student can perform and learn to attain more academic achievement according to their capabilities. Stressing more on achievement, Maiyo (2009) posited that in Nigeria, examinations are measure of academic achievement. For instance, senior secondary school certificate and tertiary admission are critical examples of academic achievement.

Academic achievement can be described as the participant examination grade that can be ascertained through scores at the end of the programme. Academic achievement can also be described as the out coming teaching and learning process. In a similar way Imeofor (2019) described academic achievement as a fundamental aspect of everyday life, affecting peoples work, interpersonal relationship, sense of being and leisure. The academic achievement is further defined as the student's grade obtained at the end of a programme. This grade according to Egbule (2004) is seen as the level of performance of an individual in a particular field of study. But achievement of instructional goal in metalwork technology is summarized as the testing of skills and competences achieved.

In metalwork technology, skills are acquired only when the content of metalwork is mastered. According to Odu (2010) the acquisition of the required skills is a means of increasing the productivity power of the nation. However, every citizen should be equipped with practical skills to contribute to the economic growth of the nation. In as much as Nigeria embraces technological growth our youth requires skill acquisition through mastery learning strategy especially in metalwork areas. In view of this skill acquisition according to Ayominke (2010) opinion is that youths should be empowered to acquire appropriate practical skills for the development and employment purposes. This is because graduates of technical and engineering studies are unskillful. And that is why Okoro (2008) opined that product of technical colleges do not have requisite knowledge and skills that can enable them to take up the available jobs or be self-employed. In respect to this happening, the FGN (2013) opined that the intentions of establishing technical and vocational education is to provide technical manpower in applied sciences, technology and business particularly at craft, advance craft and technical levels as well as given training and imparting the necessary skills to individuals for economic self-reliance. These proposals by the FGN can be achieved by adopting mastery learning strategy in the teaching and learning of metalwork technology for skill acquisition.

Learning can take place in an environment where interest and attention are sustained. The sustenance of interest and attention in learning is only when new instructional methods are injected into the teaching and learning. In as much as new instructional methods are introduced student will be interested to learn the content and achieve better. Highlighting on this Hazikiel (2012) asserted that interest and achievement which students show in learning the content and the mastery they

demonstrate on completion of the course of study is depends to a large extent on the teacher and instructional model used. Instructional model like mastery, learning strategy as introduced may help to arouse interest create attention and induce motivation in learning the contents of metalwork technology in universities.

Metalwork technology is an aspect of mechanical technology programme in tertiary institutions such as universities. Metalwork technology programme according to Oranu and Ogwo (2002) involves activities in the occupations that entail design, processing and fabrication of metals. These activities include forging, machining and welding. In a similar perspective Ugbehu (2015) defined metalwork technology as an entrepreneurial based skill, oriented field of study that is expected to equip learners with skill to make for self-reliance and paid employment. To acquire the needed skills and competences, required by students of metalwork technology in universities, mastery learning strategy should be adopted in teaching and learning to ensure that each skill content is learned before proceeding to the next content. This is because metalwork technology content involves a step-by-step skill acquisition in diverse occupational areas like drilling, welding, machining, fabrication among others.

Studies reviewed in different study areas identified the effectiveness of mastery learning strategy. Mastery learning strategy requires appropriate teaching methods whereby students are given contents to learn and perfect in them. The students are assessed through performance test whereby successful students proceed to the next level. According to Spencer (1997) mastery learning is the type of learning strategy that requires individual learning strategy and method. It can also be described by Davis and Sorrel (1995) as a strategy that involves the discussion of subject matter content into units that have predetermined objectives whereby students are grouped into units and are expected to demonstrate masteries on units. Students that score up to 70% is allowed to move to the next unit. But students who score below 70% in the performance assessment test have not obtained mastery and are allowed to receive remediation though small group discussions, peer mentoring tutorials.

The students that failed, continues the cycle of studying and testing until mastery is achieved through the process of corrective techniques. But in conventional teaching method, allotment of more time and opportunities were not given to student to improve in their course work (Mevanchde, 2001). But if mastery learning/ is adopted studying and testing the students on the content till high academic performance is achieved is guaranteed. Also, students reviewed on other science and related arts subjects indicated that mastery learning approach has been proven to be an effective teaching technique and positive in assessing achievement, attitude and retention of the concepts (Davis and Sorel, 1995). The use of mastery learning strategy should be adopted to identify its effects on the academic performance of students of metalwork technologies in South East universities. Other related studies include Udo and Udofia (2014) who conducted an experimental study to investigate the effect of mastery learning strategy on student achievement in symbols, formulae and equations in chemistry. It was found out that students taught using mastery learning strategy performed better than student taught with conventional teaching method. Similarly, Sarita and Jyoti (2014) investigated the effectiveness of mastery learning model on achievement of students of chemistry and found out that students of mastery learning class performed significantly better than those taught with conventional techniques.

In the same vein, Huteschestion (2015) carried out an experimental study to find out the effect of mastery learning approach on students' motivation in middle level science and found out that students showed an increase in motivation and academic achievement than those taught with conventions teaching method. However, inference drawn from these investigations indicated that student taught with mastery learning in both practical and non-practical courses or subjects

performed significantly better than those taught with conventional teaching method. In view of these, there is need to investigate the effect of mastery learning approach or strategy on the academic achievement of metalwork technology students in universities in South East Nigeria.

Statement of the Problem

There has been low achievement of students in metalwork technology learning and assessment in universities in South East Nigeria. The low achievement or performance can be attributed to students in ability to understand and master the topics and continents before proceeding to the next level. Thus, this paper the effect of mastery learning strategy on the academic achievement of metalwork technology students in universities in South East Nigeria is being or investigated. For sometimes metalwork technology has been very difficult course for technical and engineering students as it involves practical. Based on this reasons majority of the technicians perform negatively. For this reason, the nation cannot achieve favourable technological breakthrough in science asgraduates are deficient in skills and competence. To ensure that technological take off is achieve the effect of the use of mastery learning strategy can be guaranteed as a source of skill acquisition by technical and engineering students of universities in South East Nigeria.

Purpose of the Study

The main purpose of the study was to:

1. Determine the differences in the mean achievement scores of students taught metalwork technology using mastery learning strategy and those students taught using conventional teaching method in South East Nigeria.
2. Determine the differences between the mean interest scores of students taught metalwork technology using mastery learning strategy and those taught using conventional teaching method.

Research Question

The following research question guided the study:

1. What is the difference in the mean performance or achievement scores of students taught metalwork technology using mastery learning strategy and students taught using conventional teaching method in South East Nigeria?
2. What is the difference in the mean interest scores of students taught metalwork technology using mastery learning strategy and those students taught using conventional teaching methods?

Null Hypothesis

$H0_1$: There is no significant difference i in the mean achievement scores of students taught metalwork technology using mastery learning strategy and those taught using conventional teaching method in universities in South East Nigeria.

Methodology

The design for the study is a quasi-experimental design. The study was carried out in universities in South East Nigeria that offer technical education. The universities were chosen because poor academic achievement and lack of skill observed among graduates of technical education in metalwork technology. The population for the study comprised three hundred and seventy-two students of Year II in industrial Technical Education Department in South East Nigeria. Seventy-two students were purposively sampled from the entire population. The seventy-two students were selected from the two intact classes involved in the study. But, later 40 students were for experimental group and 32 for control group. The first class tagged group A is considered as the experimental group which was exposed to learning metalwork Technology using mastery learning strategy. While the second group is tagged group B which was considered as the control group which the students were exposed to learning metalwork technology using conventional teaching method (lecture). The instrument for data collection was a structured metalwork achievement test (MAT) that covered the content (topics) studied. The MAT was used as a post-test instrument for data collection and contained 10 test items. Data collection was 10 test items to pass six (6) test items i.e., 10 to 6. The metalwork achievement test was validated by three experts in Department of Industrial Technical Education, University of Nigeria, Nsukka and university of Agriculture Umudike. The reliability of the study was determined using Cronbach Alpha. The reliability coefficient of the study was 0.81. The experimental group which comprised of forty (40) students was taught using mastery learning strategy and the remaining 32 students (control group) were taught using lecture methods for 4 weeks. The data collected were analyzed using simple parentages in answering the two research questions while t-test statistics was used in answering the research hypothesis at 0.05.

Results

Research Question 1: What is the difference in the mean performance or achievement scores of students taught metalwork technology using mastery learning strategy and students taught using conventional teaching method in universities in South East Nigeria?

Table 1

Simple Percentage Scores of Students Achievement Test in Metalwork Technology

Group	N	Pass	%	Fail	%
Experimental	40	40	100	0	0
Control	32	20	62.5	12	37.5

Data in table 1 revealed that 100% of the students in experimental group responded positively to metalwork technology achievement test items (MAT). All the students in experimental group passed MAT while 12 students out of 32 from control group passed the test and about 37.5% of students in control group failed the test. Hence, it is imperative from the analysis of the data that mastery learning strategy used in teaching of metalwork technology for still acquisition has positive effect or influence on students' academic achievement in metalwork technology in Universities in South East Nigeria.

Research Question 2: What is the difference in the mean interest scores of students taught metalwork technology using mastery learning strategy and those students taught using conventional teaching method?

Table 2
Simple Percentage Scores of Students Achievement Test in Metalwork Technology

Group	N	Pass Score				Fail Score		
		(10)	(8)	(6)	%	(4)	(2)	%
Experimental	40	15	20	5	100	0	0	0
Control	32	3	2	4	28.1	13	10	71.875

Data in Table 2 revealed 15 out of 40 scored the highest score (10) in the experimental group while only 3 students score 10 in control group. Similarly, 20 students out of 40 students score 8 out of 10 in experimental group. In the same vein, 26 students out of 32 students in control group failed the metalwork achievement tests. This indicated that 71. 875% of student in control group are not highly interested in acquiring skills and competences in metalwork technology in universities in South East Nigeria.

Research Hypothesis

Ho_1: There is no significant difference on the mean achievement scores of students taught metalwork technology using mastery learning strategy and those students taught using conventional teaching method in universities in South East Nigeria.

Table 3

T- Test for Academic Achievement of Student in Metalwork Technology

Group	N	X	SD	Df.	T. Value	T. Critical	Significance
Experimental	40	8.15	1.50	70	9.73	1.65	0.05
Control	32	4.87	1.09				

The result in Table 3 indicated that the mean value of post-test experimental group is 8.15 is greater than that of control group which is 4.87. In the same way the t-test value 9.73 is greater than the t-critical which is 1.65 at P-value 0.05 level of significance and 70 degrees of freedom. The null hypothesis which stated that there is no significant difference on the mean achievement scores of students taught metalwork technology using mastery learning strategy and those students taught using conventional teaching methods (lecture) in universities in South East Nigeria was rejected. This implies that the students who were taught using MLS performed significantly better than the students who were taught using conventional teaching method in metalwork teaching in universities in South East Nigeria.

Discussion of Finding

The study reveals that students in the experimental group who were taught metalwork technology using mastery learning strategy (MLS) performed significantly better than those students who were taught metalwork technology using conventional methods in universities in South East Nigeria. The findings of the study were in agreement with Achifusi and Mgbemena (2012) who carried a study on the effect of MLS on physics SSII performance as against conventional teaching method (CTM). The study found out that student taught using MLS performed better in physics SSII than students taught using CTM.

Also, Mwangi (2009) who carried out a study on effect of MLS on secondary school achievement test in Chemistry found out that the mastery learning strategy (MLS) facilitated students' academic achievement in Chemistry faster than conventional teaching method.

In the same vein, the findings of this study are in congruent with findings of the study carried out by Wabugu (2008) on group instruction which revealed that those students taught using mastery learning strategy performed about 98% better than their counterpart. However, it is good to note that student taught using MLS need more time to master the content to enable they acquire skills.

Also, the study revealed that the mean interest scores of students taught metalwork technology using mastery learning strategy is far much greater than students taught metalwork technology using conventional teaching method. The findings of this study is in line with Hazikiel (2012) who asserted that interest and academic achievement which student show in subjects like financial accounting and the mastery they demonstrate on completion of a course of study depends to a large extent on the teachers methodology which include the teacher and instructional model. Inference drawn from Hazikiel's assertion showed also that interest students show in metalwork technology determines the academic achievement they acquire to achieve mastery of the skills needed. In a similar way, Agoghoron (20140 who conducted any experimental study to investigated the effect of mastery learning strategy on secondary students Integrated Science achievement and concluded that mastery learning approach results in high achievement of students' interest to effect mastery. The author also found out that students taught using mastery learning strategy has higher achievement scores. Also, in a similar perspective Adeyemo and Babajide (2014) carried out an experimental study on the effect of mastery learning strategy on students' achievement on physics and concluded that students taught using mastery learning strategy performed significantly better than students taught using conventional teaching method.

Conclusion

The study investigated the effect of mastery learning strategy on academic achievement and interest of metalwork technology students in universities in South East Nigeria. The study found out that there is significant difference in the academic achievement of students taught using mastery learning strategy in skill acquisition than their counterpart. The study also revealed that interest is a significant factor in learning when adopting a teaching model. Therefore, skill acquisition is effectively achieved by student taught metalwork technology using mastery learning strategy in universities in South East Nigeria.

Recommendation

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

1. Conferences, workshop and seminars should be organized for teachers to adopt necessary skill needed when using mastery learning strategy for skill acquisition
2. Mastery learning strategy should be adopted by teachers of metalwork technology in teaching the course to achieve excellence in performance
3. Mastery learning strategy should be incorporate into school curriculum for effective implementation.
4. Mastering learning strategy should be adopted in school curriculum to induce interest in students in learning metalwork technology.

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Environmental Oriented Factors Militating Academic Performance of Business Education Students in Tertiary Institutions in Owerri, Imo State, Nigeria

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Abstract

This study investigates the home and school-oriented environment factors that militate against academic performance of Business Education Students in tertiary institutions in Owerri, Imo State, Nigeria also suggested ways of addressing the environmental challenges. Based on these objectives, three research questions were answered. Descriptive survey design was adopted for this research. The entire population of the study was made up of 284 business education lecturers and 300 level students. A four-point Likert scale of strongly agree, agree, strongly disagree and disagree was used for data collection and validated using Cronbach's Alpha statistics to obtain reliability coefficient of 0.75. The data collected were analyzed in line with the three-research question and the results were presented using mean. The findings indicated that home and school environmental factors were responsible for the poor academic performance of Business Education Students in Tertiary Institutions in Owerri, Imo State, Nigeria. The study recommended that Government at all level should try to meet the 26% fund allocation to education as recommended by UNESCO. It further recommended the provision of specific human capital development programme through workshops, seminars and conferences for business education lecturers.

Introduction

National Policy on Education recommends Business Education subjects in our secondary schools. At post-secondary level, Business Education is offered in many specialized fields such as Marketing, Accounting, Office Practice Fine and Applied Arts, Home Economics. Majority of Nigerian schools could not offer Business Education due to a number of factors while a few that offer it could not meet its requirements. Ashby commission on higher education in Nigeria (1960) recommended professional education to train people for subjects such as Accounting, Banking, Business, Administration, Insurance and a sound professional education such as middle management and secretarial training.

This recommendation marked the beginning of direct government involvement in business education at post-secondary schools. The University of Nigeria, Nsukka was the first University to offer business education at the degree level in the year 1962, University of Benin in the 1980's while Ahmadu Bello University, Zaria started Business Education in the year 1976.
Now business education is being offered in a very good number of colleges of education at NCE level. Business Education related courses are also offered in all our Polytechnics while the course is being offered in many Universities. Business education is a branch of vocational technical education that aims at producing the manpower that will apply the acquired knowledge towards

improvement and solution of their environment problems, thus making the environment more useful and convenient for man. In the context of declining growth and global economic recession, the employment situation in Africa, especially Nigeria has become critical (Curtain, 2000). In particular, what is generally referred to as graduate unemployment has increasingly come to be recognized as one of the more serious socio-economic problem affecting many developing nations in Africa, especially Nigeria. Business education gives specific educational instructions on distributive and office occupations (Oduma, 2012). In the expression of Okon (2011), the significant objective of business education training is to prepare individuals for gainful employment through acquisition of skills and knowledge that affect business. Before now, Business Education provides for secondary school dropouts and those not privileged to go beyond that level of education. Business Education around then was viewed as perhaps the main vocational subjects with the aim of training the students in the knowledge and practice of vocational skills like typewriting, bookkeeping, and use of business machines and shorthand by making them useful members of the society in which they belong (Azuka, E.B, Nwosu, B.O, Kanu, I.N & Agomuo, E.E. 2006) Additionally, in our contemporary society, Business education as part of our general education programme should provide vocational, personal use, consumer business and socio-economic competencies needed for man's effective participation in society. In order to make Business education achieve its objectives, business education lecturers should try as much as possible to make students understand that business education is a means to achieve a dominant coordinating force for the society, occupying the same position as religion. Going by the above, business education can be said to be a wide discipline which covers broad sources. It is also an umbrella housing all other business-related courses such as Accountancy, marketing, banking and finance, Economics etc.

The Chief objective of business education is the preparation of students as competent business employees. To achieve this, the following factors are considered important: home environmental factors, and school factors. A good environment will enhance the academic achievement of the students (Baharudin & Luster, 1998; Walberg, Bole & Waxman, 1980; Collins, 2007).

Business education as a course of study is offered at the tertiary level in Nigeria plays an important role in achieving the objectives of many organizations as well as a tool in achieving self-reliant economy. Thus, the seemingly neglect of conducive academic environment is injurious as it rubs the nation of the contributions which business education graduate would have made on national growth. As indicated by Oduma (2012), factors such as location of classrooms, poor internet facilities, lack of modern equipment, lack of qualified staff and poor communication skills are variables influencing academic performance of students.

The determination of education quality does not only depend on the personnel as a measure of performance of their functions but also in the arrangement of the academic environment. Oduma further stressed that a learning environment has numerous characteristics that affects the teachers, students and the learning outcomes. Socio-economic status of families, size of families, academic level of parents, location of the Childs home, can make learning effective or difficult, while poor learning environment result to sickness among students as well as teachers, this leads to poor academic performance among students of business education.

Both the home and school environments can adversely influence academic performance of students and result into high level of frustration among teachers as well as the poor learning attitude

among students. To improve the academic performance of students and development, the conducive learning atmosphere is an essential area that should be and carefully managed.

According to Arifin, R., Binti, M, Walhab, N.B.A.K.S Bin, M. & Otman M.S.C (2018). A sound climate condition makes an ideal individual, while an unfortunate climatic prompts dangerous society Good or bad are dependent on what an individual takes in from his or her immediate environment. It is exceptionally important to state that no significant learning can be achieved from a helpless home and scholarly atmosphere. A healthy atmosphere for learning will further motivate the students to learn and improve their academic performance. A healthy learning environment in this manner is the thing that upgrades the scholastic accomplishment of an individual's (Pillow, 2008). Most of the challenges being faced in Nigeria today is as a result of unhealthy academic and home environment in which the students find themselves. The unhealthy home and school environments students find themselves have serious impact on their academic performance in Nigerian Tertiary Institutions particularly to Business Education.

Factors such as poor lighting, classroom noises, inconsistent temperatures, school size, location and class size, teacher-student relationship, teaching methods, family size, location of the home, social economic status, parental children relationship are traceable to be responsible in the poor performance of students in examinations (Uzochi, 2011). The above-mentioned factors are the reasons behind the poor academic performance of students including business education students.

Nigerian educational system is faced with numerous challenges such as poor electricity supply, lack of internet facilities, lack modern learning equipment and poor water supply among others. In an attempt to ascertain the way forward and in response to the current environmental problems faced by the educational sector, government felt that the establishment of TETFund is very necessary to scale up with the challenges. Again, there is a lack of comprehensive empirical research focusing on effects of environment on academic performance as evidenced in the educational literature (Pillow, 2008).

Therefore, given the above bias toward the effects of environment on academic performance of students and in the light of the need for more assessment of the topic of discussion, this paper aims to determine the environmental oriented factors militating academic performance of Business Education Students in Tertiary Institution in Owerri, Imo State, Nigeria. The remaining part of the paper will proceed as follows. In the next section, the paper will present research design, study area, study population, instrument for data collection, instructional procedures and data analysis. The paper will also present results and findings. In the final sections, the paper will present limitations, conclusion and recommendations.

Research Questions

1. What are the home environments-oriented factors militating academic performance of Business Education Students in Tertiary Institutions in Owerri?
2. What are the school environments-oriented factors militating academic performance of Business Education Students in Tertiary Institutions in Owerri?
3. What are the possible ways of improving the effects of the environmental factors on academic performance of Business Education Students in Tertiary Institutions in Owerri?

Contributions of the Study

This current study is expected to make a number of contributions in various ways. First, this adds new knowledge and extends the growing body of literature as it affects the major environmental and academic performance variables. By examining the effects of environment on academic performance of business education students, the analyses in this study can shed some light to add to the on-going debate about whether environment has positive or negative effects for academic performance and how this plays out for institutions of higher learning, using Nigeria as a case study.

Materials and Methods

The study used a descriptive survey design. The design was most appropriate because it involved collecting primary data, measurement and analysis of data (Babbie, 2010; Mugenda, O.M & Mugenda A.G., 2003). This enabled the researchers gain a deeper understanding of the reasons and perceptions of both lecturers and students on the variables of interest.

Study Area

The study is delineated to investigate the environment-oriented factors militating academic performance of Business Education Students in a Public Degree Awarding Institutions in Owerri, Imo State.

Study Population

The population for this study consisted of 180-degree students in 300 level Business Education and 104 lecturers in a public degree awarding institution in Owerri, Nigeria. All were selected for the study using purposive sampling techniques.

Instrument for Data Collection

The researchers' structured questionnaires titled "lecturers and Students Reponses on the Environmental Effects of Students Academic Performance Questionnaire". The questionnaires were designed on 4-point Likert scale as being strongly disagree, Disagree, Agree and Strongly Agree

Instructional Procedures

To establish the reliability of the research instruments, Cronbach Alpha was used to analyze the degree of internal consistency among the items and the reliability coefficient 0.75 was obtained. The questionnaire was validated by three experts' chosen from measurement and evaluation, Business Education and Economics.

Data Analysis

Mean was the descriptive statistical tool employed to answer the three research questions. The average mean of 2.50 was used as the minimum scale of positive result while items with mean below 2.50 were negative result.

Consent

There was no written consent, but the researchers approached the participants directly to take part in the study and inform them to feel free at any point in time to withdraw if they wish to do so without explaining their reasons but return their uncompleted questionnaires.

Research Question 1: Respondents' responses on home environment factors militating the academic performance of Business Education Students in Tertiary Institutions in Owerri.

Table 1

The Mean Scores and Standard Deviations of the Respondents' Responses on Home Environment Factors Militating the Academic Performance of Business Education Students in Tertiary Institutions in Owerri.

S/N	Items	SA	A	D	SD	Total	Mean	Remark
1	Poor parental relationship	102 (408)	91 (273)	40 (80)	51 (51)	(812)	2.85	Positive
2	Family social economic status	124 (496)	74 (222)	46 (92)	40 (40)	(850)	2.99	Positive
3	Location of the family	133 (532)	99 (297)	31 (62)	29 (29)	(920)	3.23	Positive
4	Socialization Pattern in the home	141 (564)	89 (267)	31 (62)	29 (29)	(922)	3.24	Positive
5	Parents academic level	166 (664)	98 (294)	14 (28)	06 (06)	(992)	3.49	Positive
6	Family size	147 (588)	88 (264)	22 (44)	27 (27)	(923)	3.25	Positive
7	Individual Differences at Home	194 (446)	71 (213)	10 (20)	9 (9)	(1018)	3.58	Positive
8	Poor Provision of Basic amenities	204 (816)	62 (186)	10 (20)	8 (8)	(1030)	3.62	Positive
9	Family Crises	177 (708)	101 (303)	2 (4)	4 (4)	(1019)	3.58	Positive
10	Non-payment of schools as when due	116 (464)	89 (267)	10 (20)	19 (19)	(751)	2.64	Positive

The research question one sought opinion of respondents on home environment factors militating academic performance of Business Education Students in Tertiary Institutions in Owerri. The analysis in table 1 shows that the mean rating of respondents on all the items were above the reference mean of 2.5 which affirmed that the identified items are the home related factors militating the academic performance of students of business education.

Research Question 2: Respondents' responses on school environment factors militating academic performance of Business Education Students in Tertiary Institutions in Owerri.

Table 2

The Mean Scores and Standard Deviations of the Respondents' Responses on School Environment Factors Militating Academic Performance of Business Education Students in Tertiary Institutions in Owerri.

S/N	Items	SA	A	D	SD	Total	Mean	Remark
1	Poor Business Education Laboratories	191 (767)	87 (261)	3 (6)	3 (3)	234 (1034)	3.64	Positive
2	Classroom location	111 (444)	94 (282)	46 (92)	33 (33)	(851)	2.99	Positive
3	Poor subject Mastery	162 (648)	88 (264)	11 (22)	23 (23)	(957)	3.86	Positive
4	Poor orientation of Business Education	103 (412)	85 (255)	33 (66)	63 (63)	(796)	3.36	Positive
5	Poor Lecturers-Student Relationship	86 (344)	66 (198)	44 (88)	88 (88)	(718)	2.52	Positive
6	Poor communication skill of lecturers and students	97 (388)	86 (258)	56 (112)	45 (45)	(803)	2.82	Positive
7	Lack of proper planning of programme	118 (472)	82 (246)	49 (98)	35 (35)	(851)	2.99	Positive
8	Lack of modern equipment	121 (488)	77 (231)	38 (76)	48 (48)	(843)	2.96	Positive
9	Poor internet facilities	149 (596)	81 (243)	22 (44)	32 (32)	(915)	3.22	Positive
10	Poor electricity supply	98 (392)	114 (342)	37 (74)	35 (35)	(843)	2.96	Positive

The table presents the analysis of the respondents' opinions on school-oriented factors that negatively affect Business Education Students academic performance. Analysis of the research question on table two reveal that opinion of respondents were above 2.5 references mean. This affirmed that all the school-oriented factors identified by the respondents negatively affect Business Education students' academic performance.

Research Question 3: Respondents' responses on possible ways of improving the academic performance of Business Education Students in Tertiary Institutions in Owerri.

Table 3

The Mean Scores and Standard Deviations of the Respondents' Responses on Possible Ways of Improving the Academic Performance of Business Education Students in Tertiary Institutions in Owerri.

S/N	Items	SA	A	D	SD	Total	Mean	Remark
1	Adequate provision of funds by parents for student's educational needs can enhance the student's academic performance.	122 (488)	88 (264)	40 (83)	34 (34)	(866)	3.04	Positive
2	Specific human capital development programmes for business education lecturers can provide educational need of the students.	100 (400)	94 (282)	42 (84)	48 (48)	(814)	2.86	Positive
3	Adequate government policy and legislation can provide the education needs of the students.	109 (436)	91 (273)	48 (56)	36 (36)	(841)	2.96	Positive
4	The academic level of parents and positive attitude towards education can enhance the student's academic performance.	90 (360)	92 (276)	56 (112)	46 (46)	(794)	2.79	Positive
5	Provision of uninterrupted power supplies both at home and school can enhance student's academic performance.	110 (440)	94 (282)	43 (86)	37 (37)	(845)	2.97	Positive
6	Enrollment of lecturers in academic programmes can enhance their performance.	154 (616)	99 (297)	12 (24)	19 (19)	(956)	3.36	Positive
7	Provision of adequate infrastructural facilities can enhance academic performance of students.	133 (532)	85 (255)	41 (82)	25 (25)	(894)	3.14	Positive
8	Positive reinforcement e.g love, unity and care in the student's family can enhance student's performance.	107 (428)	74 (222)	50 (100)	53 (53)	(803)	2.82	Positive
9	Attending to student's emotional needs by parents can enhance student's academic success.	96 (384)	98 (294)	47 (94)	43 (43)	(815)	2.86	Positive
10	Extensive research, and study by students can help to achieve academic success.	96 (384)	89 (267)	44 (88)	55 (55)	(794)	2.79	Positive

In the above table, all the items identified can enhance the student's academic performances. This is shown vividly by their mean scores which were all above the acceptable mean scores. However, item no 6 which deal with Enrollment of lecturers in academic programmes can enhance their performance, was most ranked, while item no 4 and 10 were the least ranked as being the possible ways of improving academic performance of business education students in tertiary institutions in Owerri.

Discussion of Findings

Analysis of research question one revealed that home environment factors militate academic performance of business education students in secondary schools. This affirms that, poor parental relationship, family socio economic status, home location, home socialization pattern, parents' academic level, family size, individual differences at home, poor provision of basic amenities family crises and late payment of school fees are the home environment factors militating academic performance of business education students in tertiary institutions. This finding confirms the prior study by (Baharudin & Luster,1998; Walberg et al 1980; Collins, 2002) that parental family relationship and home specialization pattern, family size, home location, parental academic level on the first rank of student academic performance.

Research question two solicited respondent's opinions on school-oriented factors militating academic performance of business education students in tertiary institution. The findings from the research question showed that poor Business Education Laboratories, classroom location, poor subject mastery, poor orientation of the discipline, poor lectures –student relationship, poor communication skill, lack of proper planning of programme, lack of modern equipment, poor internet facilities and poor electricity supply are the identified school environment factors militating business education students' academic performance in tertiary institutions. These findings reinforce the studies of (Oduma, 2012, & Uzochi, 2011) that identified number of factors as influencers of the students' academic performance.

Another finding of this study revealed that adequate funding, specific human capital development, adequate government policy and legislation, changing negative public attitude on business education, uninterrupted power supply enhancing viability of the lecturers through workshops, seminars and maximum attendant to students' academic needs are possible ways of curbing challenges of environment-oriented factors militating business education students' performance in the tertiary institutions. The implication of the finding will in no small measure provide business education programme designers, Government at all level and Nigeria tertiary institutions with the adequate knowledge to understand the challenges that characterized the tertiary institutions and equally to have a way forward for positive change regarding the impact of both home and school environment on academic performance of students.

Limitation and direction for future study

The major limitation of this research is the sample selection, which did not involve the entire tertiary institutions because of the financial involvement. Therefore, further research on this topic could re-examine this topic by using a much large sample while taking into account the issues of fund.

Conclusion

A major finding of this study is that both the home and school environments have much influence on the academic performance of business education students in tertiary institutions in Owerri. Therefore, a conducive environment both in the home and school if appropriately provided, would be able to improve on the academic performance of business education students and education in general.

Recommendation

Based on the data collected and analyzed in the research the following recommendations are made:

1. Government should increase the provision for Business Education programmes through adequate budgetary allocations that meet the 26% UNESCO recommendation.
2. Specific human capital development programmes through workshops, seminars and conferences should be organized for both lecturers and students.
3. Enabling environment should be guaranteed through adequate policies and legislation that support both the home and school as indispensable for factors in academic performance of students.

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Attitude of the Society Towards the Mainstreaming of Vocational Education for Persons with Disabilities in Owerri Municipal Council of Imo State

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Abstract

The paper focused on the attitude of the society towards the mainstreaming of vocational education for persons with disabilities. It was conducted in Owerri Municipal Council of Imo State. The study assessed both the societies' perception towards the mainstreaming of vocational education for persons with disabilities and possible solutions to the challenges encountered in the education of persons with disabilities. Thus, two purposes and two research questions guided the study. It adopted a descriptive survey design. a researcher made questionnaire which consist of eight items was used as the instrument for data collection. The sample for the study was 70 respondents comprising 14 teachers and 56 students of special needs education schools. Data obtained from the study through the questionnaire were compiled an analyzed in the table using mean and standard deviation. Findings indicated amongst others that government does not provide adequate facilities for the teaching of Vocational Education to disabled children, funds allocated be utilize for Vocational Education to disabled children are not properly utilized; and employment are not be offered to disabled children. some recommendations were made base on the findings which includes amongst others that Government should make sure that the funds and basic amenities allocated to Vocational Education for disabled children. are well utilized so that teaching and learning would take place in a conducive environment.

Keyword: Attitude, Mainstreaming, Vocational Education and Persons with Disabilities.

Introduction

When persons with disabilities have access to vocational education, they make significant contributions in society, work and earn a standard living for themselves and their households. The World Health Organization (WHO) (2013) describes disability as an umbrella term, covering impairments, activity limitation, and participation restrictions. The impairment being a problem in body function or structure an activity limitation being a difficulty encountered by an individual in executing a task or action; while participation restriction is termed a problem experienced by an individual in gettinginvolved in life situations. Disability is thus not just a health problem, but a complex phenomenon, reflecting the interaction between features of a person's body and features of the society in which he/she lives. Impairment can occur from birth or any time over the course of an individual's life, either permanently or temporarily.

The attitude of society, government and citizen on persons with disabilities had been highly negative and degrading, where the disabled were thought to be incapable of contributing

anything meaningful to the society (Okwelle, 2011). Government affording them the opportunity to acquire skills will help the disabled to be productive and useful in society so as to ignore this notion and attitude of society towards them. Given the serious disadvantaged situation of persons with disabilities, special measures need to be taken to equalize their opportunities to enroll in the vocational training programmes available in each country. One of such measures is the introduction of mainstreaming.

Mainstreaming is the processes of integrating children with special education problems into conventional classes and school activities. The concept ensures that special need persons learn in the same class with the normal children, rather than in a separate learning environment. The essence is to avoid segregation and feelings of worthlessness occasioned by discrimination and stigmatization.

Mainstreaming which is an educational provision and technique for persons with disabilities is useful in the impartation of vocational education and skills for the sustainability of persons with disability. If fully implemented, it will not only erase the negative label on disabled children, but will restore their self-worth and increase their self-concepts to participate and contribute to the development of services and the society. It will also modify the negative attitudes of the society towards the physically and mentally challenged individuals and thus make them feel well-adjusted in the society especially through trainings and skill acquisition from Vocational Education.

Vocational Education is education within vocational schools that prepares students for a specific trade and directly develops expertise related to technology, skills and scientific techniques to span all aspects of the trade (Maris, 2010) it is also an educational training that provides practical experience in a particular occupational field, as agriculture, home economics, or industry so as to equip the individual for job acquisition (Okwelle, 2011). Vocational education, also known as career and technical education can also be explain as education that prepares people for crafts and career at various levels or a high professional practitioner position in engineering, accountancy (Victor, 2012). It can also be explained as those aspects of education process involving, in addition, to general education, the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life (UNESCO 2011). Williams (2009), opined that vocational skills are needed for enterprise productivity and profitability, as well as for national productivity and wealth creation. Without the necessary vocational education, enterprise and national growth can be seriously hobbled. The need for technical and vocational skills is increasing because of a convergence of factors including technological change, changes in work organization, growing economic openness and competitiveness, and capital deepening (increasing capital per worker).

According to Okoye (2007), the term vocational education generally includes every form of education that aimed at the acquisition of qualifications related to a certain profession, art or employment or that provides the necessary training and appropriate skills. Vocational skill can also be regarded as the part of vocational education that provides the specialized professional knowledge and skills, which attribute professional adequacy to the trainee which is the focus of every vocational training program (Williams 2009). According to Steedman (2009), vocational

education enterprises facilitate the acquisition of practical and applied skills as well as basic scientific knowledge, which is a planned program of courses and learning experiences that begins with exploration of career options, supports basic academic and life skills. Also, Nuru (2007) indicated that a change in a country's economy is required to prepare young ones for the jobs of the future and reduce poverty among the rural area. Vocational education has important roles to play in this process as it has been an integral part of national development.

Diogu (2009) also posited that the neglect of vocational education in the area of adequate personnel, financial support and facilities are robbing the nation of the contribution their graduates would make in the economy. Also,Asogwa (2007) maintained that there is an urgent need for people's attention to be redirected towards self-reliant and sustainable means of livelihood which vocational education provides in support of economic development. To enable persons with disabilities access varied opportunities created by vocational education requires that their mindset and attitudes as well as those of the society must be directed positively.

Attitude can be explained as predispositions towards behavior. Attitudes are learned, and are influenced by the amount of knowledge and contact as regarding particular issue or group thus, an individual's attitude towards something will affect that person's behavior. A close view from Agulanna and Nwachukwu (2014), describes attitude refers to how one behaves and feels towards, persons, institutions and events. Positive or favorable attitudes are associated with approach tendencies and feelings of joy, while negative attitudes are associated with avoidance, withdrawal and dissatisfaction. Attitude is a complex mental state involving beliefs, feelings and values. It is a disposition to act or behave, and think in certain ways.

According to Penny Tassoni (2003), the way we think about disability affects the care and education we offer. It is important to understand that discriminating against people with disabilities has been an aged long tradition as disability was perceived to be a "curse" and stigma upon the child and his or her family. This belief or negative attitudes towards disabilities were probably founded on ignorance, poverty and religious bigotry. Today, the society is still faced with the remnants of these attitudes even though it is no longer as a result of ignorance and poverty, as we are a relatively well-educated and the society is prospering. The non-disabled society has a stereotype attitude towards person with disabilities or children with special needs (Ferran, 2005). This makes them grow up thinking that they are unworthy and uneducable. When the learners with disabilities are labeled by their non-disabled society/parents, then all their other behaviours and characteristics are coloured by the label. The result of labeling leads to the development of negative self-concept of learners with disabilities.

The negative self-concept leads to the formation of self-destructive ideas and attitudes expressed in their daily transactions. However, some children have been helped to change these irrational beliefs as they have realized that they are capable of performing better in their education (Ferran,2005). Those who have gone to school and disregarded the attitude of society towards them have excelled and become successful in life even better than their able-bodied counter parts. With change in the thinking about children, learners with disabilities are capable of becoming what they want to become and be useful members of society, which is the crux of special education.

Accordingly, Obani (2014) opined that special education is the education specially designed to suit the special needs children who may experience learning problems and learning difficulties as a result of disabilities or handicaps of other forms of Special Educational needs. Special Education utilizes facilities, materials and equipment in imparting worthwhile knowledge, values, beliefs and skills into the exceptional children who are the concerns of special education (Adebiwole& Bolaji, 2011). Thani (2006) holds that adequate funding is crucial to the successful implementation of Special Education programme. This is because more is required to employ desired manpower and maintain infrastructural facilities, instructional materials and to cope with emergencies arising from expansion and implementation of mainstreaming especially in Vocational Education.

Statement of the Problem

In Nigeria, healthy and "normal" children (without disabilities) are apparently the expectation of families within the society. Therefore, the society tends to exhibit a completely different attitude towards persons with disabilities against the ones born "normal". The impact of this negative attitude towards the education of children with persons with disabilities has apparently affected the psychological, sociological and educational development of the children within the society.It has been observed that disabled childrenare automatically given lower standards than those without disabilities. This however affects their level of adjustment in school, their attitude towards studies resulting to low academic performance. there is need therefore to address the equality of education given to these children with disability to enable them fully contribute their own quota to development of the nation. There exist to the researchers' knowledge, little or no research on the attitude of the society towards mainstreaming using the variables adopted in this study, the researcherstherefore wish to fill this perceived gap by investigate the attitude of the society towards the mainstreaming of vocational education for persons with disabilities in Owerri Municipal Council of Imo State, Nigeria.

Purpose of the Study

The main purpose of this study is to examine the attitude of the society towards the mainstreaming of vocational education for persons with disabilities in Owerri Municipal Council Specifically, the study seeks to:

1. Find out the perception of the society towards mainstreaming of vocational training for persons with disabilities in Owerri Municipal Council.
2. Find out the possible solutions to mainstreaming of Vocational Education for persons with disability in Owerri Municipal Council, Imo State.

Research Questions

The following research questions guided he study:

1. What are the perceptions of the society towards the mainstreaming of vocational education for persons with disability in Owerri Municipal Council?
3. What are the possible solutions to mainstreaming of Vocational Education for persons with disability in Owerri Municipal Council, Imo State?

Methodology

A descriptive survey research design was employed to carry out this study. The aim of the design was to record, analyze and interpret the existing conditions or variables. The study was carried out in Owerri Municipal Council in Imo State. The population for this study comprised of teachers and students of the special needs education schools in Owerri Municipal Council. The teachers were fourteen (14) and students were ninety-four (94) and total is one hundred and eight (108) altogether. This is according to records obtained from the principal of special education Resource Centre Owerri, and Ministry of Education, Owerri (Special Children Unit, year).

The instrument for data collection was a researcher made questionnaire titled. “Attitude of the Society Towards Mainstream of Vocational Educationfor persons with disabilities"(ASTMPD), which was divided into two section, section A and B. section A sought the bio data of the respondents while section B consisted of eight questions which elicited the responses on the Attitude of the Society Towards Mainstream of Vocational Educationfor persons with disabilities.Two experts in measurement and evaluation and one Vocational Educationist validated the study. Reliability of the instrument was obtained using Cronbach Alpha method and 0.87 was obtained which is high and significant. Data collected were analyzed using mean and standard deviation.

Results

Research Question 1: What are the perceptions of the society towards the mainstreaming of Vocational Education for persons with disability in Owerri Municipal Council?

Table 1:

The Perceptions of the Society towards the Mainstreaming of Vocational Education for Persons with Disability in Owerri Municipal Council.

S/N	Item Statement	SA 4	A 3	SD 2	D 1	$\sum fx$	N	X	Decision
1	Government provides adequate facilities to aid the teaching and learning of Vocational Education to disabled children.	6	16	28	20	148	70	2.11	Disagree
2	Funds allocated for the Vocational Education to disabled children are properly utilized.	1	6	33	30	118	70	1.68	Disagree
3	Parents and teacher’s cultural and belief systems, affect the Vocational Education to disabled children.	30	20	13	7	213	70	3.04	Agree
4	Disabled children are easily offered employment in the society after graduation	16	5	19	30	147	70	2.1	Disagree

Table 1 shows that respondents disagree with the mean of 2.11, 1.68 and 2.1 respectively implying that; the government provide adequate facilities for the teaching of Vocational Education to disabled children., funds allocated be utilize for Vocational Education to disabled children are properly utilized; and employment should be offered to disabled children. The respondents agree with the mean of 3.5 that parents and teacher's cultural belief system affects the Vocational Education to disabled children.

Research Question 2: What are the possible solutions to mainstreaming of Vocational Education for persons with disability in Owerri Municipal Council, Imo State?

Table 2

The Possible Solutions to Mainstreaming of Vocational Education for Persons with Disability in Owerri Municipal Council, Imo State.

S/N	Item Statement	SA 4	A 3	SD 2	D 1	$\sum fx$	N	X	Decision
1	There is a need to provide a conducive learning environment for the Vocational Education of disabled children.	43	10	9	8	228	70	3.25	Agree
2	Extensive training of parents and teachers by professionals will correct the nonchalant attitude towards Vocational Education of disabled children.	54	6	-	-	234	70	3.34	Agree
3	The national policy should accommodate the Vocational Education of disabled children and parents' policy planning.	36	19	9	6		70	3.21	Agree
4	Establishment of more Vocational Education Centres will enhance the implementation of mainstreaming program for disabled children.	46	11	13	-	243	70	3.47	Agree

From Table 2 **i**tem 1, 2, 3, and 4 with mean of 3.25, 3.34, 3.21 and 3.47 shows that the respondents agree to the possible solutions to mainstreaming of Vocational Education for persons with disability in Owerri Municipal Council, Imo State.

Discussion of Findings

Findings indicates that government does not provide adequate facilities for the teaching of Vocational Education to disabled children, funds allocated be utilize for Vocational Education to disabled children are not properly utilized; and employment are not be offered to disabled children. It however agrees that parents and teacher's cultural belief system affects the Vocational Education to disabled children. This result depicts discouragement, shame and isolation. this is in line with the findings of Ferran (2005) is in support of this motion as he believes that the non-disabled society has a stereotype attitude towards persons with disabilities

or special children. When the learners with disabilities are considered abnormal by their non-disabled society/parents, then all their other behaviours and characteristics are coloured by the label. Findings also indicated that the society experience challenges as regards the education of special children. The respondents disagreed with the fact that government provide adequate facilities to aid teaching and learning of persons with disabilities, and that funds allocated for the persons with disabilities are properly utilized.

It was also revealed that most of their parents are attached by cultural beliefs hence they do not encourage their education because they believe that they are wasting their funds and effort on them because at the long run they will amount to nothing in the society. So, they prefer to channel that time on their siblings who are not disable therefore neglecting them. The founding also showed that special needs children are not offered automatic employment after the completion of their academic training. This makes it hard for them to survive as they are not employed nor empowered.

Again, findings from the data analyzed revealed the possible solutions to the challenges encountered in the education of persons with disabilities. All respondents agreed to the fact that there is need to provide a conducive learning environment for the persons with disabilities, organization of enlightening programs for parents and teachers will correct the nonchalant attitude towards the education of persons with disabilities, the national policy on education should recommend the persons with disabilities and parents in policy planning, and more special schools should be established by both government and private sector, for the training of children with special needs. The findings are in line with the assertions in the National Policy on education which provides for equal education opportunities and facilities for all citizens.

Recommendation

Based on the findings of the study, the researchers hereby make the following recommendations:

1. The society should be enlightened on the efficacy of Vocational Education for disabled children.
2. Parents of disabled children should encourage Vocational Education for disabled children as disability is not lack of ability, goal, dreams and aspiration; it is also not a limitation to them. The persons with disabilities are equally important and can be useful in future.
3. Government should make sure that the funds and basic amenities allocated to Vocational Education for disabled children. are well utilized so that teaching and learning would take place in a conducive environment.

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Split-Air Conditioner Maintenance Competencies Required for Effective Training of Secondary School Leavers at Skill Acquisition Centers in Enugu State

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Abstract

The study was carried out to determine split-air conditioner maintenance competencies required for effective training of secondary school leavers at skill acquisition centres in Enugu State. To achieve the purpose of the study, six research questions were developed and answered by the study while six null hypotheses formulated were tested at 0.05 level of significance. The study employed a descriptive survey research design. The population for the study was 80 subjects comprising of 20 instructors in two skill acquisition centres, 40 installers and 20 split air conditioner technicians. There was no sampling because of the manageable size of the population. The instrument used for data collection was structured questionnaire comprised 68 item statements to answer the six research questions. Three experts validated the instrument used for the study. The reliability of the research instruments was established using Cronbach Alpha reliability method and a reliability coefficient of 0.93 was obtained which indicated that the instrument was reliable for the study. Data collected were analyzed using mean and standard deviation to answer the research questions while analysis of variance was used to test the null hypotheses. The findings of the study showed that eleven competencies are required for installation of wall mounted indoor and outdoor units of split air conditioner, eight competencies are required for installation of refrigerator tubing in Split air conditioner, six competencies are required for gas charging in split air conditioner, twelve competencies are required for servicing split air conditioner, fifteen competencies are required for repairing Split air conditioner and fifteen safety competencies are required for effective maintenance of split air conditioners, and there were no significant difference in the mean responses of respondents on the maintenance competences determined. It was recommended that all the determined competencies should be used for training secondary school leavers at various skills acquisition centers.

Keywords: Split-Air Conditioner, Maintenance, Competencies, Secondary school leavers, Training, Skill acquisition centers

Introduction

Maintenance is the actions undertaken to mend, improve and reconstruct damaged or faulty system. Maintenance according to Iloma, (2013) is the combination of actions carried out to service, repair or replace a device or system so that it will continue to operate satisfactorily for a specified period. Olaitan in Ihediwah (2007) defined maintenance as a set of measure or steps taken to ensure that a given piece of equipment or infrastructure is kept in good operational order until it attains its maximum possible life span. One of such equipment that needs regular maintenance is split air conditioner (SAC). The systematic approach to improve the maintenance of split air conditioner is to ensure that it functions optimally to satisfy the users need as well as to elongate their lifespan. In other words, any activity aimed at keeping or restoring a SAC to its

satisfactory operating status can be considered as maintenance. The split air conditioner is one of the most widely used types of the air conditioners. Earlier, window air conditioner was used most widely, but the split air conditioner is now common among people because of its flexibility, accuracy, low power consumption, efficiency among others. Legutko and Taylor (2000) stated that a split system is an air-conditioning or heat pump system that uses refrigerant as the heat exchange fluid and has an evaporator, compressor, and condenser as separate components. There are two main parts of the split air conditioner: the indoor unit and the outdoor unit. The indoor unit of the split AC is installed inside the room that is to be air conditioned or cooled while the outdoor unit is installed outside the room in open space where the unit can be installed and maintained easily. Apart from these two major parts there is copper tubing connecting the indoor and the outdoor units. To maintain these units or the SAC as a whole efficiently requires a competent technician

Competence is the ability to do something successfully or efficiently. UNICEF (2019) defined competencies as sets of behaviors that are instrumental in the delivery of desired results. Rankin (2002) also stated that competency is a collection of behaviors and skills which people are expected to show in their organization.

Skills are learned, while competencies are inherent qualities an individual possesses; which is the combination of skills, knowledge and ability. For the purpose of clarity, Onoh (2011) defined skill as the ability to perform expertly well, facility in performance with dexterity and tact through what one has learnt and practiced in training. Skill is the ability to make a purposeful movement that is necessary to complete or master a particular task in a given job (Mbah & Umurhurhu, 2016). Skill therefore is the ability and capability acquired through deliberate, systematic, and constant effort to smoothly and adaptively carryout multifaceted activities or job functions involving the maintenance of split air-conditioner. Competency therefore is the combination of skills, knowledge and attitudes possessed by secondary school leavers for effective maintenance of split air conditioner either through training or experience.

A secondary school leaver is the young person who has just left secondary school. A secondary school leaver can be trained to acquired skills, knowledge and attitudes for effective maintenance of SAC. Training is the activity of learning skills, the basic skill needed to perform a certain job. Nick (2011) described training as the acquisition of knowledge, skills, and competencies as a result of the teaching of vocational or practical skills and knowledge that relate to specific useful competencies. Uko (2010) also described training as a process of transferring basic knowledge, skills and attitudes to learners to enable them improve their performance. Maintenance of SAC also involves employing good operational inspection, fault model analysis skills, practical and safety skills but secondary school leavers do not acquire these skills; this is because the curriculum they went through while in schools does not contain element of these quality/skills. It is therefore worthwhile to determine these skills or competencies required for maintenance of split air conditioners in order to prepare secondary school leavers to take career in SAC maintenance.

Statement of the Problem

Effective maintenance of split air-conditioning is vital for national development in industrial air-conditioning, home air-conditioning, office air-conditioning and other uses in industries in Enugu State, Nigeria. Skills for installation of wall mounted indoor and outdoor units, installation of refrigerator tubing, gas charging in Split air conditioner, servicing and repairing of Split air conditioner are required. Lack of these skills gives rise to various forms of problems for consumers of split-AC. Most of the consumers could not easily locate trained and competent technicians who can repair or service their defective split-AC thereby making users whose split-AC are defective to be subjected to maintenance monopoly, high cost of maintenance and increased dependency on the few numbers of craftsmen who carry out these maintenance activities even in an ineffective way, some also abandon the faulty AC for the purchase of new ones. Lack of training of people for maintenance of split-AC indirectly amounts to continuous spending of money and electronic wastage which can cause health problems such as cancer to people especially where they are disposed haphazardly. Besides, skill centers that are to produce skilled technicians and technologists to maintain and repair all kinds of electronics such as Split-AC still lack contents of split-AC maintenance activities. Also, with this lack of maintenance skills by secondary school leavers, there will be unemployment as not all secondary school leavers can get admission into higher institutions. Lack of unemployment among these leavers in turn can lead to increase in crime rate that can disturb the peace of the entire society. There is need for effective training of secondary school leavers with split air conditioner maintenance competencies as this will enable them to acquire relevant skills, knowledge and attitudes to embark on repair and maintenance of split air conditioners.

Purpose of the Study

The general purpose of the study was to determine split air conditioner maintenance competencies for effective training of secondary school leavers at skill acquisition centres in Enugu State. Specifically, the study identified:

1. competencies required for installation of wall mounted indoor and outdoor units of split air conditioner.
2. competencies required for installation of refrigerator tubing in split air conditioner.
3. competencies required for gas charging in split air conditioner.
4. competencies required for servicing split air conditioner.
5. competencies required for repairing split air conditioner.
6. safety practice competencies required for effective maintenance of split air conditioners.

Research Questions

The following research questions guided the study:

1. What are thecompetencies required for installation of wall mounted indoor and outdoor units of Split air conditioner?
2. What are the competencies required for installation of refrigerator tubing in Split air conditioner?
3. What are the competencies required for gas charging in Split air conditioner?
4. What are the competencies required for servicing Split air conditioner?
5. What are the competencies required for repairing Split air conditioner?

6. What are the safety practice competencies required for effective maintenance of split air conditioners?

Hypotheses

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

1. There is no significant difference in the mean responses of split air conditioner installers, instructors and road side technicians on the competencies required for installation of wall mounted indoor and outdoor units of Split air conditioner
2. There is no significant difference in the mean responses of split air conditioner installers, instructors and road side technicians on the competencies required for installation of refrigerator tubing in Split air conditioner
3. There is no significant difference in the mean responses of split air conditioner installers, instructors and road side technicians on the competencies required for gas charging in Split air conditioner
4. There is no significant difference in the mean responses of split air conditioner installers, instructors and road side technicians on the competencies required for servicing Split air conditioner
5. There is no significant difference in the mean responses of split air conditioner installers, instructors and road side technicians on the competencies required for repairing Split air conditioner
6. There is no significant difference in the mean response of split air conditioner installers, instructors and road side technicians on the safety competencies required for effective maintenance of split air conditioners.

Method

A descriptive survey research design was employed for this study which by its nature is aimed at gathering data and describing in a systemic manner, the facts and features or characteristics about a given population. Descriptive research design according to McCombes (2019) is aims to accurately and systematically describe a population, situation or phenomenon. This design can answer what, when, where and how questions, but not why questions and this makes it suitable for this study. Through this study, a questionnaire was used to obtain information on the maintenance competencies required for the maintenance of split AC.

The study was carried out in Enugu State of Nigeria. Enugu State is one of the 36 States located in South-Eastern Nigeria. This state has schools and skill acquisition centers such as; Nazareth Vocational Skill Centre, Coal Camp, Enugu, Calvary Foundation Institute of Technology, (CAFITECH), Enugu, Enugu State and Institute of Administration and Construction Engineering, Awgu, Enugu State. Enugu is a State that works towards empowering the youths for skill acquisition, evident in the free skill acquisition support programme, UNN Enterprise Skill acquisition school among others. Enugu State was chosen for this study because of aforementioned reasons and the presence of skill acquisition Centers with personnel who can respond to questionnaire items adequately.

The population for the study was 80 which comprised 10 instructors of Electrical Installation and Repair in Calvary Foundation Institute of Technology (CAFITECH), Enugu, Enugu State, 10 instructors of Electrical Installation and Repair in Institute of Administration and Construction Engineering, Awgu, Enugu State and 40 split AC technicians and 20 installers in Enugu State. The instructors were selected for the study to respond to all sections of the questionnaire in order to determine competencies required for the maintenance of split AC. Split AC technicians and installers were selected as part of the population as they are those that practice the installation and have encountered some problems at the cause of installation and maintenance. The entire population was used in the study as their size is manageable.

The instrument used in gathering data for this study was a structured questionnaire titled maintenance competencies for installation of split-AC Questionnaire (MCISAQ). The MCISAQ was structured questionnaire used to elicit information from the respondents on the maintenance competencies required for installation of split AC. MCISAQ has two parts; part one solicited general information of the respondents and part two made up of six sections consisting of 68 items in all, A to F. Section A was made up of 11 items soliciting information on the competencies required for installation of wall mounted indoor and outdoor units of split air conditioner, section B had 8 items on the competencies required for installation of refrigerator tubing in split air conditioner, section C consisted 7 items on the competencies required for gas charging in split air conditioner, section D consisted 12 competencies required for servicing split air conditioner, section E had 15 competencies required for repairing split air conditioners while section F consisted 15 items on safety competencies required for effective maintenance of split air conditioners. The response options of five-point scale of 5, 4, 3, 2 and 1 representing Highly Required, Required, Undecided, Not required and Highly Not Required was adopted for the instrument for data collection.

The instrument was face validated by experts in the Industrial Technical Education Department, University of Nigeria, Nsukka. The researchers requested these experts to examine and objectively criticize and scrutinize the research instrument for validity and relevance. This was to ensure that no aspect of the instrument is faulty for collecting relevant data and to ensure the sound quality of the instrument and invariably the reliability of the research findings. The title, the purpose of the study, the statement of the problem, research questions and hypotheses were attached to the instrument to guide the validation. The experts made insightful and corrective suggestions to the submitted instrument. The researchers later adjusted the research instrument in line with the experts' corrections.

The instrument (MCISAQ) was trial tested on 20 respondents (technicians, installers and instructors) at Nsukka other than the ones sampled for the study. This area possesses similar characteristics with the study area as it is still within the state. Cronbach alpha reliability method was used in determining the internal consistency of questionnaire items. Their responses were analyzed using Statistical Package for the Social Science (SPSS) version 20. The Cronbach Alpha Coefficient values obtained through this trial testing are 0.89 for competencies required for installation of wall mounted indoor and outdoor units of Split air conditioner, 0.87 for competencies required for installation of refrigerator tubing in Split air conditioner, 0.92 for competencies required for gas charging in Split air conditioner, 0.96 for competencies required for servicing Split air conditioner, 0.96 for competencies required for repairing Split air conditioner, 0.98 for safety competencies required for effective maintenance of split air conditioners. The

overall reliability coefficient of 0.93 was obtained for the instrument, indicating that the instrument is reliable.

The researchers administered copies of MCISAQ on the respondents with the help of three research assistants. The researchers personally visited the road side technicians and installers in their various workshops. The presence of the researchers to the road side technicians and installers enables him provide adequate explanation or clarification to the respondents if the need arises. By this, a 100% return of the questionnaires was ensured.

Data collected was analyzed using Mean and standard deviation in answering the research questions, while Analysis of Variance (ANOVA) was used to test null hypotheses one to six at 0.05 level of significance. A cut-off points of 3.50 was used for decision making. Any item whose Mean value is greater than or equal to 3.50 was accepted, while any item whose Mean value is less than 3.50 was unaccepted. In taking decision on the hypotheses tested, the hypothesis of no significant difference was rejected in favour of the alternative hypothesis, when the *p* value is less than 5% ($p < 0.05$) and this indicated that there is a significant difference in the mean responses of the respondents on that item. But retained when the *p* value is greater than 5% ($p > 0.05$) which indicated that there is no significant difference in the mean responses of the respondents on that item.

Results

The results are presented in Table(s) below in line with the research questions and null hypotheses that guided the study.

Table 1
Mean and Standard Deviation of Responses on the Competencies Required for Installation of Wall Mounted Indoor and Outdoor Units of Split Air Conditioner

S/N	ITEMS	$\overline{X}$	SD	Remarks
A	**Setting up the indoor unit**			
1	Select an unobstructed location on the interior wall to mount the indoor unit	4.54	0.50	R
2	Secure the mounting plate to the interior wall	4.33	0.61	R
3	Make a hole in the wall or partition	4.49	0.50	R
4	Mount the indoor unit	4.18	0.69	R
5	Tilt the indoor unit	4.74	0.44	R
B	**Installing the Outdoor Condenser**			
6	Position the outdoor unit away from any heavily trafficked, dusty, or hot areas	3.86	0.47	R
7	Lay a concrete pad on the ground	4.29	0.46	R
8	Secure the outdoor unit on top of the concrete pad	4.25	0.44	R
9	Install the outdoor unit on a non-tilted surface	4.66	0.50	R
10	Secure the outdoor unit against any water collector environment	4.49	0.50	R
11	Use burglary to secure the outdoor unit from intruders	4.16	0.43	R
	Grand mean	**4.36**		**R**

$\overline{X}$ = Mean, SD = Standard Deviation, R = Required, NR = Not Required

Table I shows that all the items have their Mean values higher than the cutoff point of 3.50 on 5-point Likert scale. This indicated that the entire items were required competencies for installation of wall mounted indoor and outdoor units of Split air conditioner. In general, the grand Mean of 4.36 indicates that the item statements are required competencies for installation of indoor and outdoor unit of the Split air conditioner. The items have standard deviation ranging from 0.43 – 0.69 which is less than 1.96 that is 95% confidence limit. This indicated that the respondents were not too far from the mean and were close to one another in their responses. This added some values to the reliability of the mean.

Table 2:

Mean and Standard Deviation of Responses on the Competencies Required for Installation of Refrigerator Tubing in Split Air Conditioner

S/N	Item Statements	$\overline{X}$	SD	Remarks
12	Cut two copper tubing of the distance between the indoor and outdoor unit	4.59	0.50	R
13	Make the two tubing have flaring connections at one end.	4.40	0.49	R
14	Pass the two-copper tubing from the indoor unit of the split AC to emerge through the hole made in the wall	4.45	0.57	R
15	Connect the flaring end of the tubing into the flare nut already available on the tubing emerging from the indoor unit	4.34	0.47	R
16	Cover the refrigerant tubing with the insulation material, which is usually the foam tube	4.83	0.38	R
17	Connect the refrigerant tubing to the outdoor unit	4.11	0.32	R
18	Connect the nuts of each of the tubing to the connector provided outside the outdoor unit	4.35	0.48	R
19	Tighten the connection of the tubing to the outdoor and indoor unit	4.31	0.47	R
	Grand mean	**4.42**		**R**

Table 2 show 8 competencies required for installation of refrigerator tubing in Split air conditioner. The Means of the competencies ranged from 4.11 to 4.59. Each mean was above the cutoff of 3.50 indicating that all the items are the competencies required for installation of refrigerator tubing in Split air conditioner. The value of the grand mean 4.42 also confirmed that all the items are the competencies required for installation of refrigerator tubing. The items have standard deviation ranging from 0.32 – 0.57 which is less than 1.96 that is 95% confidence limit. This indicated that the respondents were not too far from the mean and were close to one another in their responses. This added some values to the reliability of the mean.

Table 3

Mean and Standard Deviation of Responses on the Competencies Required for Gas Charging in Split Air Conditioner

S/N	Item Statements	$\overline{X}$	SD	Decision
20	Install the new split air conditioners without charging as it is always prefilled with gas	2.86	1.00	NR
21	Charge the gas externally if the distance between the indoor and the outdoor units is large.	3.55	0.50	R
22	Refill the outdoor unit with the refrigerant or the gas from the factory	4.45	0.57	R
23	Check right at the installation of the system to ensure that there are no leakages of the gas	3.69	0.47	R
24	Apply soap solution to the joints to check for leakage of the gas.	4.83	0.38	R
25	Frequently check the gas to know when it is due for refill	4.23	0.50	R
26	Keep track of the refill interval to know when next to refill the gas	4.35	0.48	R
	Grand mean	**3.99**		**R**

Table 3 reveal 7 item statements representing competencies required for gas charging in Split air conditioner. The Means for the competencies ranged from 3.55to 4.83, except for item 20 which is 2.86. Each Mean was above the cutoff of 3.50 except for item 20, indicating that all the items are the required competencies for gas charging in split air conditioner except for item 20 which is indicated not to be a competency for gas charging. The items have standard deviation ranging from 0.38 – 1.00 which is less than 1.96 that is 95% confidence limit. This indicated that the respondents were not too far from the mean and were close to one another in their responses. This added some values to the reliability of the mean.

Table 4

Mean and Standard Deviation of Responses on the Competencies Required for Servicing Split Air Conditioners

S/N	Item Statements	$\overline{X}$	SD	Decision
27	Identify wrong connection	4.38	0.60	R
28	Recharge refrigerant if necessary	4.28	0.59	R
29	Fix blocked capillary tube	4.39	0.67	R
30	Change faulty parts when identified	4.21	0.71	R
31	Make use of parts appropriately	4.61	0.49	R
32	Make use of a multi-meter in taking measurement	3.81	0.39	R
33	Make use of appropriate tools	3.91	0.40	R
34	Clean the outdoor unit of split AC regularly	4.33	0.47	R
35	Clear simple or minor faults	4.56	0.50	R
36	Clean dirt in the condenser to enable easy transfer of heat	4.35	0.48	R
37	Clean the evaporator coil when there is a warm air or no air from the split AC register	4.31	0.47	R
38	Check for leaking or dirty duct if the air are not evenly distributed	4.13	0.33	R
	Grand mean	**4.27**		**R**

Table 4 reveal 12 item statements representing competencies required for servicing Split air conditioner. The Means for the competencies ranged from 3.81 to 4.61 for all the items. Each Mean was above the cutoff of 3.50 indicating that all the items are the required competencies for servicing Split air conditioner. The items have standard deviation ranging from 0.33 – 0.71 which is less than 1.96 that is 95% confidence limit. This indicated that the respondents were not too far from the mean and were close to one another in their responses. This added some values to the reliability of the mean.

Table 5: mean and standard deviation of responses on the competencies required for repairing Split air conditioner

S/N	Item Statements	$\overline{X}$	SD	Decision
39	Identify faulty parts	4.38	0.60	R
40	Check if the split air conditioner turns on	4.28	0.59	R
41	Check for blown fuse or tripped circuit breaker if AC refuse to turn on	4.39	0.67	R
42	Check broken or loose wiring if the fuse and circuit breaker are in place	4.21	0.71	R
43	Set the thermostat to the lowest temperature setting if it does not tell the air conditioner to turn on	4.61	0.49	R
44	Check for leakage if there is low refrigerant leading to no cooling	3.81	0.39	R
45	Fix the leakage path if it is just one	3.91	0.40	R
46	Replace the unit if there are multiple leakages	4.32	0.47	R
47	check the condenser coil if the air conditioner heats up easily	4.56	0.50	R
48	Fix power faults if any	4.35	0.48	R
49	Fix panel board when faulty	4.31	0.47	R
50	Shut down the AC by turning off your thermostat if it suddenly trips due to storm	4.13	0.33	R
51	Locate the electrical panel and find the circuit breaker that your AC connects to	4.55	0.53	R
52	Leave the thermostat off for at least half an hour for the AC to reset its internal circuit breaker	4.40	0.67	R
53	Investigate further AC electrical damage after waiting if the air does not come back on with the thermostat.	4.29	0.58	R
	Grand mean	**4.30**		**R**

Table 5 reveal 15 item statements representing competencies required for repairing Split air conditioner. The Means for the competencies ranged from 3.81to 4.61for all the items. Each Mean was above the cutoff of 3.50 indicating that all the items are the required competencies for repairing Split air conditioner. The items have standard deviation ranging from 0.33 – 0.71 which is less than 1.96, that is 95% confidence limit. This indicated that the respondents were not too far from the mean and were close to one another in their responses. This added some values to the reliability of the mean.

Table 6

mean and standard deviation of responses on the safety competencies required for effective maintenance of split air conditioners

S/N	Item Statements	$\overline{X}$	SD	Decision
54	Disconnect power supply prior to repair	4.53	0.66	R
55	Keep children away from unit while on repair	4.26	0.59	R
56	Ensure not to use extension card in powering the AC	4.41	0.50	R
57	Make sure installation conditions are satisfactory for safety	4.43	0.50	R
58	Connect properly and not tap into power cord	4.35	0.48	R
59	Always use soapy water to check for leakage.	4.09	0.28	R
60	Keep the parts away from rainfall	4.21	0.47	R
61	Use specified refrigerant	4.33	0.52	R
62	Keep the rotating fan away from reach	4.48	0.50	R
63	Use suitable soldering method in joining pipe	4.46	0.65	R
64	Be very careful in making wire connection	4.29	0.48	R
65	Gently dismantle the system to avoid damage	4.33	0.47	R
66	clean air filter properly	4.16	0.46	R
67	Be careful in opening the A/C front grill	4.58	0.69	R
68	Use appropriate tools for what they are meant for during maintenance	4.68	0.50	R
	Grand mean	**4.37**		**R**

Table 6 reveal 15 item statements representing safety practice competencies required for effective maintenance of split air conditioners. The Means for the safety competencies ranged from 4.09 to 4.68 for all the items. Each Mean was above the cutoff of 3.50 indicating that all the items are the required safety practice competencies for effective maintenance of split air conditioners. The items have standard deviation ranging from 0.28 – 0.69 which is less than1.96 that is 95% confidence limit. This indicated that the respondents were not too far from the mean and were close to one another in their responses. This added some values to the reliability of the mean.

Testing of Hypotheses

Table 7

Analysis of Variance (ANOVA) of the Mean Responses of Instructors, Technicians and Installers on the Competencies Required for Installation of Wall Mounted Indoor and Outdoor Units of Split Air Conditioners

Sources of Variance	Sum of Squares	Df	Mean Square	F-Cal	F-Tab	P-Value	Level of Sig.
Between Groups	0.078	2	0.039	2.008	3.96	0.141	0.05
Within Groups	1.492	77	0.019				
Total	1.570	79					

Data in Table 7 show the P-value of 0.141 is greater than 0.05 at degree of freedom between and within of 2 and 77. The null hypothesis is therefore accepted at 0.05 level of significance. This implies that there is no significant difference in the mean responses of respondents on the competencies required for installation of wall mounted indoor and outdoor units of Split air conditioners. Therefore, the null hypothesis of no significant difference was accepted for the

competencies required for installation of wall mounted indoor and outdoor units of Split air conditioner.

Table 8

Analysis of Variance (ANOVA) of the Mean Responses of Instructors, Technicians and Installers on the Competencies Required for Installation of Refrigerator Tubing in Split Air Conditioner

Sources of Variance	Sum of Squares	Df	Mean Square	F-Cal	F-Tab	P-Value	Level of Sig.
Between Groups	0.059	2	0.029	0.931	3.96	0.398	0.05
Within Groups	2.422	77	0.031				
Total	2.480	79					

Data in Table 8 show the P-value of 0.398 is greater than 0.05 at degree of freedom between and within of 2 and 77. The null hypothesis is therefore accepted at 0.05 level of significance. This implies that there is no significant difference in the mean response of respondents on the competencies required for installation of refrigerator tubing in Split air conditioners. Therefore, the null hypothesis of no significant difference was accepted for the competencies required for installation of refrigerator tubing in Split air conditioner.

Table 9

Analysis of Variance (ANOVA) of the Mean Responses of Instructors, Technicians and Installers on the Competencies Required for Gas Charging in Split Air Conditioner

Sources of Variance	Sum of Squares	Df	Mean Square	F-Cal	F-Tab	P-Value	Level of Sig.
Between Groups	0.090	2	0.045	1.335	3.96	0.269	0.05
Within Groups	2.600	77	0.034				
Total	2.690	79					

Data in Table 9 show the P-value of 0.269 greater than 0.05 at degree of freedom between and within of 2 and 77. The null hypothesis is therefore accepted at 0.05 level of significance. This implies that there is no significant difference in the mean response of respondents on the competencies required for gas charging in Split air conditioners. Therefore, the null hypothesis of no significant difference was accepted for the competencies required for gas charging in Split air conditioner.

Table 10

Analysis of Variance (ANOVA) of the Mean Responses of Instructors, Technicians and Installers on the Competencies Required for Servicing Split Air Conditioner

Sources of Variance	Sum of Squares	df	Mean Square	F-Cal	F-Tab	P-Value	Level of Sig.
Between Groups	0.053	2	0.026	1.181	3.96	0.312	0.05
Within Groups	1.721	77	0.022				
Total	1.774	79					

Data in Table 10 show the P-value of 0.312 greater than 0.05 at degree of freedom between and within of 2 and 77. The null hypothesis is therefore accepted at 0.05 level of significance. This

implies that there is no significant difference in the mean response of respondents on the competencies required for gas charging in Split air conditioner. Therefore, the null hypothesis of no significant difference was accepted for the competencies required for gas charging in Split air conditioner.

Table 11

Analysis of Variance (ANOVA) of the Mean Responses of Instructors, Technicians and Installers on the Competencies Required for Repairing Split Air Conditioner

Sources of Variance	Sum of Squares	df	Mean Square	F-Cal	F-Tab	P-Value	Level of Sig.
Between Groups	0.104	2	0.052	1.853	3.96	0.164	0.05
Within Groups	2.163	77	0.028				
Total	2.267	79					

Data in Table 11 show the P-value of 0.164 greater than 0.05 at degree of freedom between and within of 2 and 77. The null hypothesis is therefore accepted at 0.05 level of significance. This implies that there is no significant difference in the mean response of respondents on the competencies required for repairing Split air conditioner. Therefore, the null hypothesis of no significant difference was accepted for the competencies required for repairing Split air conditioner.

Table 12

Analysis of Variance (ANOVA) of the Mean Responses of Instructors, Technicians and Installers on the Safety Practice Competencies required for Effective Maintenance of Split Air Conditioners

Sources of Variance	Sum of Squares	Df	Mean Square	F-Cal	F-Tab	P-Value	Level of Sig.
Between Groups	0.042	2	0.021	0.868	3.96	0.424	0.05
Within Groups	1.876	77	0.024				
Total	1.919	79					

Data in Table 12 show the P-value of 0.424 greater than 0.05 at degree of freedom between and within of 2 and 77. The null hypothesis was therefore accepted at 0.05 level of significance. This implies that there is no significant difference in the mean response of respondents on the safety practice competencies required for effective maintenance of split air conditioners. Therefore, the null hypothesis of no significant difference was accepted for the safety practice competencies required for effective maintenance of split air conditioners.

Discussion of findings

The study found out eleven competencies required for installation of wall mounted indoor and outdoor units of split air conditioners, eight competencies required for installation of refrigerator tubing in Split air conditioner, six competencies for gas charging in split air conditioners, twelve competencies required for servicing split air conditioners, fifteen major competencies required for repairing split air conditioner and fifteen safety competencies required for effective maintenance of Split air conditioner. These findings are in line with the findings of Oluka & Onyebuenyi (2017) who worked on the electric motors maintenance practice training needs of electrical installation

and maintenance works students for self-employment in Nigeria and found that installation competencies are required for maintenance of electric motors. The findings of the study also agreed with the findings of Kanishk (2017) that gas charging competencies are important and that during gas charging. Proper display of gas charging competencies during maintenance allows refrigerant to get distributed in the whole air conditioning system including the indoor unit, the outdoor unit and the refrigerant tubing. The findings of the study also agreed with the opinion of Onyebuenyi & Mbah, (2018) that servicing of split AC is a very important competency required by an AC installers, technicians and instructors. The authors also stated that practical skills like ability to draw and interpret designed drawings, ability to carry out repairs, fault detection, troubleshooting and likes are highly required for sustainable self-employment of electrical/electronic technology education graduates in Enugu urban. The findings of the study also agreed with the findings of the study conducted by Nwachukwu, Bakare & Jika (2009) who found out that all the safety and installation skills are required by electrical/electronic students for effective functioning in the workshop/laboratory.

Conclusion

Split air conditioner is an electric device capable of removing heat and moisture from the interior of an occupied space to increase the comfort of occupants in their various places such as industries, homes, offices and other places. This device is very useful but the users found it very difficult to locate trained and competent technicians who can repair or service it. It was on this note that this study was carried out to determine the SAC maintenance competencies in other to train secondary school leavers for effective maintenance of SAC and also to solve the problems of Split AC users

Recommendations

The following recommendations were made in view of the findings of the study:

1. The determined SAC maintenance competencies should be integrated to secondary school curriculum for preparation of students in SAC maintenance.

2. Relevant facilities should be supplied to provide adequate training to secondary school leavers at various skill acquisition centers

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Design and Implementation of Moodlecloud-Based Platform for Teaching and Learning Building Technology Course in Abia State College of Education (Technical), Arochukwu

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Abstract

The study designed and implemented a Moodlecloud-based Platform (MBP) for teaching and learning Building Technology (BT) course in Abia State College of Education (Technical), Arochukwu. The MBP was developed in the Moodlecloud platform (https://buildtech.moodlecloud.com/), which has a group of interactive tools that facilitate the inclusion of variety of teaching and learning activities. The design and implementation of MBP was based on the following stages: needs assessment, design of MBP platform, trial-testing MBP and implementation of MBP. The study employed Research and Development design. Mixed research approach involving the use of questionnaire and structured interview schedule, were utilized for data collection, and were analyzed and reported quantitatively and qualitatively respectively. The study was carried out in Abia State College of Education (Technical), Arochukwu, Abia State, Nigeria. The population for the study comprised 7 BT lecturers, 9 NCE year one students, 7 NCE year two students and 2 NCE year three students. At NCE years one and two, all the students offer BT course and then specialize at NCE year three. Purposive sampling technique was adopted to select only year three students who specialized in BT, to participate in the study while all the BT lecturers participated at the needs assessment stage. Three research questions were formulated to guide the study. The instruments used for data collection were the researchers' developed questionnaire for research question one and structured interview schedule for research questions two and three. The data collected for the study were analyzed using mean scores to answer research question one while an interview summary sheet was used to summarize the main findings of the interview schedule for research questions two and three. The findings of the study revealed that generally, the contents of the BT course are difficult; students were satisfied with MBP based on their expressions during the structured interview exercise. It was further revealed that cost of data subscription, workload from other courses, are among the challenges encountered in the online course. Therefore, it was recommended among others that school management and ministry of education should fund the hosting of courses in Moodlecloud-based platform since it has been proven to increase students' interest in teaching and learning especially in the BT course, in all Technical Colleges in Nigeria.

Keywords: Building Technology, Moodlecloud, Teaching and Learning, Learning Management System, Online Learning.

Introduction

The contributions of education to the growth of national economy have led to the campaign for improvement on the standard of education in Nigeria so as to sustain the benefits it offers especially in the modern world of digital technology. According to Nwangwu (2018), modern education systems all over the world hardly operate without the use of Information and Communication Technologies (ICTs) such as computers, smart phones, projection devices, internet facilities, among other digital devices. Bawaneh (2011) previously opined that computer technology has become an integral part of university education system especially in the instructional delivery

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process. This is evidenced during the outbreak of Covid19 pandemic that led to the lock down of the country including schools, which forced countries all over the world to adopt alternative means of instruction delivery. This new means of delivering instruction involves the use of internet applications such as zoom, social media, learning management systems (also known as online teaching and learning platforms), among others to prepare, present and assess students' learning achievement.

The internet has contributed immensely to the success of online education especially during the Covid19 lockdown. During the COVID-19 pandemic, over 1.2 billion children were out of the classroom and this resulted in schools shutting all across the world; as a result, education has changed dramatically, with the distinctive rise of e-learning, whereby teaching is undertaken remotely and on digital platforms (Li & Lalani, 2020). According to Li and Lalani, research suggests that online learning has been shown to increase retention of information, and takes less time, meaning the changes coronavirus have caused might be here to stay. There were a lot of applications that were developed and used for the purpose of teaching and learning during the Covid19 era. For example, Zoom, which is a very powerful video conferencing app, became highly significant and relevant in the education industry as educators and students use it to exchange ideas during the lockdown irrespective of their respective geographical locations. Other online platforms used for teaching and learning during the Covid19 lockdown include Google Classroom, Kahoot, Khan Academy, Desire2learn, Edmodo, Google Sites, Schoology, YouTube/Twitter/Facebook live, Skype, Webex, ClassDojo, Microsoft Teams, Moodle, among others. All of these online apps/platforms work with the internet in order to serve their respective intended purposes, and learning with online/internet apps is referred to as Online Learning.

Online Learning, simply put, is the type of learning that takes place remotely or virtually with the use of the internet. According to Dhull and Sakshi (2017), online learning encompasses a range of technologies such as the worldwide web, email, chat, news groups and texts, audio and video conferencing delivered over computer networks to impart education. Dhull and Sakshi opined that the advantages of the online learning are that it helps learners to learn at their own pace, and according to their own convenience. Teachers and students share ideas either in real-time mode (synchronous) or non-real-time mode (asynchronous). Whichever way instruction is delivered, what matters most is the ability of learners to follow the lesson activities and be able to respond at a specified period of time. Online learning is believed to improve students' level of academic achievement since they have the opportunity to access the materials from the comfort of their homes as well as interact with the lesson contents as if they are in the face-to-face teaching and learning environment. Online courses have been found to be conducive to students who favor self-regulated learning (You & Kang, 2014). In a study conducted by Kirtman, a student responded to online coursework by stating, "It is more self-guided so I can spend more time on the concepts that I need help with and less on concepts that I can pick up quickly" (Kirtman, 2009, p. 110). Based on the usefulness of online learning, Learning Management Systems (LMS) (such as Blackboard, Moodle, WebCT, Schoology, Google Classroom, Canvas by Intructure, D2L Brightspace, Absorb LMS, LearnDash, CertCentral, Edmodo LMS, etc.) were found most apt in addressing the issue of low access to lesson contents during and in post Covid19 pandemic.

Learning Management System (LMS) is an online platform that is developed to assist educators in creating and presenting their lesson contents virtually as well as assess learning performance of students without physical classroom contact. According to Turnbull, Chugh, and Luck (2019),

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learning management system is a web-based software platform that provides an interactive online learning environment and automate the administration, organization, delivery, and reporting of educational content and learner outcomes. Furthermore, K12Blueprint (2014) refers to LMS as an online platform that enables the delivery of materials, resources, tools, and activities to students both in and out of the classroom environment. LMS allows teachers to offer tailored instruction that can be accessed by students anytime, anywhere without geographic constraints. Also, Barreto, Rottmann, and Rabidoux (n.d.) define Learning Management System (LMS) as a platform that assists the delivery of content online for learning purposes. Barreto et al further defined LMS technically as a web-based software used to facilitate the delivery of online, face-to-face, and blended courses, whether in an academic setting or in the world of business. Majority of the LMS are interactive by design to accommodate learning styles of diverse learners who appreciate the student-learner approach to teaching and learning. The inclusion of the interactive sequences in lesson development and delivery helps to boost creativity, participation, and learning achievement of students. Virtually all LMSs accept the inclusion of multimedia contents that are highly interactive that promotes active participation, collaboration, real-time communication, accessibility, timing, flexibility, variety, and community of learners/educators. Findings from several studies have shown that multimedia instructions with high level of interaction can lead to increased learner satisfaction, higher levels of academic achievement, higher learner engagement, and a positive attitude toward teaching and learning (Fredericksen, Pickett, Pelz, Swan and Shea, 1999; Swan, 2003; Piotrow et al. cited in Zhang, 2005; Asih, 2013;). These visible benefits of LMS led to its adoption in the design and development of BT course, which is the focus of the present study.

Building technology is defined by O'Sullivan (2013) as the knowledge of the technical processes and methods of assembling buildings. It refers to the technical processes and methods used in constructing buildings (Designing Buildings, 2021). According to Learn.org (2021), a building engineering technology program focuses on the mathematical and technical aspects of building a commercial or residential structure; and it involves the process of designing and constructing buildings and other types of structures. Building technology is a course offered in technical colleges and universities in Nigeria. The Department of Building Technology; School of Technical Education, Abia State College of Education (Technical), Arochukwu is one of the technical institutions that offer the BT course. The course exposes learners to the concept of the use of technology in building of structures such as houses, hotels, churches, schools, markets, etc. In the course, students are trained to acquire skills in elementary structural design, construction method, and construction management. The *Elementary Structural Design* addresses the following course contents: structural forces, stress and strain, shearing force and bending moment in beams; the *Construction Method* addresses the following course contents: basic principles and methods of foundations, walls and floors construction, types of stairs, roofs and ceilings construction, process of setting out a simple building; while *Construction Management* addresses the following course contents: building (construction) contract and tendering.

According to NBTE (2001), on completion of BT course, students should be able to: (i) supervise and manage efficiently the construction of buildings of all sizes from setting out to final completion; (ii) understand and interpret all kinds of project drawings - architectural, structural, services to be able to implement them on site; (iii) design and prepare working structural drawings for medium size buildings structures; (iv) prepare realistic estimates in terms of cost, materials and labour for all building works including maintenance works; (v) appreciate and determine quality

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of materials to be used for construction through appropriate tests in line with relevant codes of practice; (vi) carry out surveys of various kinds on existing buildings and prepare a schedule of dilapidation and repairs; and (vii) prepare a cost effective post-tender report for all sizes of buildings contracts for competitive building. The reason for improving on how BT is taught in schools is based on the evidence of structural failures and building collapses currently being experienced in Nigeria. Punch Newspaper (2016) listed some of the tragic building collapses in Nigeria to include the synagogue building collapse in September 2014; the Lekki building collapse in March 2016; the uncompleted building in Abuja in August 2010; the Jos school building collapse in September 2014; the Bank of Industry building collapse in March 2006; the collapse of House No. 12, Hadeja Road, Kaduna in July 11, 2013; among others. TheCable Newspaper (2021) reported that building collapse, though a common phenomenon all over the world, is more rampant and devastating in developing countries. According to CBS News (2021), building collapses occur as a result of building with the use of substandard materials, negligence and a lack of enforcement of construction standards. TheCable Newspaper (2021) reported that many of the documented cases of building collapse in Nigeria are due to the use of defective or substandard building materials, lack of requisite technical knowledge, non-adherence to building codes, standards and regulations, lack of maintenance, use of non-professionals and the high level of corruption which has ravaged every sphere of the construction industry including government and private parastatals. Therefore, this calls for a change of the current method (conventional approach) the future professionals (students) are taught BT course in a modern digital society.

It is evident that the teaching and learning BT course has not adopted modern and student-centred approaches or methods in the Abia State College of Education (Technical), Arochukwu, Nigeria. Preliminary observations by the researchers of this study revealed that the teaching and learning BT course in a conventional classroom face a lot of challenges ranging from Covid19 pandemic lockdown, limited number of periods the course is taught in a week, industrial actions embarked by teachers for non-payment of salaries, the use of chalkboards to draw skeletal view of buildings to non-use of multimedia materials to show or demonstrate real-life BT concepts such as what causes structural failure, how to identify structural failure and how buildings collapse and how to prevent it, among others. Based on these shortcomings, the present study designed, developed and implemented a moodlecloud-based platform for teaching and learning of BT course in Abia State College of Education (Technical), Arochukwu, Nigeria.

Moodle means "Modular Object-Oriented Dynamic Learning Environment". It is an online educational platform that provides custom learning environments for students (Techterms, 2018). Educators can use Moodle to create lessons, manage courses, and interact with teachers and students for free. Developed on pedagogical principles, Moodle is used for blended learning, distance education, flipped classroom and other e-learning projects in schools, universities, workplaces and other sectors (Wikipedia, 2021). Moodle allows students to access course materials, gain feedback, contact tutors, upload work, see grades and much more all by logging in to their very own online account (Online Learning College, 2015). With around 80 million students, Moodle is one of the biggest and widely-used platforms around. Moodle has an assorted tools that facilitate the design and implementation of interactive virtual classrooms. These tools include announcements, news and events, chats, survey, wikis, discussion forums, databases, activity control, etc. Educators and course creators can also add audio, video, whiteboards and enable desktop sharing and online conferencing. While Moodle is robust with many options available, it could be a bit complex to set up, run, and maintain, especially for someone not-so-

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tech-savvy (Pathak, 2021); this is the reason why MoodleCloud and other Moodle hosting platforms were released.

Moodlecloud is one of the Moodle's hosting services. It is a versions of Moodle app and the fastest way to get a Moodle site for trial or off-the-shelf applications. MoodleCloud has a range of low cost and low maintenance hosting plans including updates and backups (Pathak, 2021). The present study utilized Moodlecloud to develop an interactive learning experience for learners in the BT course. The BT course can be accessed through this link: https://buildtech.moodlecloud.com/. Each course module contains announcements, lesson contents and materials for download, web links to external sources, chats, survey, forum, quiz, wiki, videos and images, etc. that facilitate active teaching and learning process in the course. Students receive announcements on their current or scheduled lesson activities as well as news and events regarding the module under discussion including the tracking of active online users/participants. Furthermore, the participating students can be engaged in activities that will bring out their personal ability to comprehend with the learning materials. Such activities include engaging the students in survey to rate their understanding of the course/module before it is introduced and after it was taught; engaging students in real-time conversations to further discuss the module for a particular week; engaging students in collaborative wiki activities to edit and contribute to already presented or uploaded contents by other learners; creation and presentation of quiz questions to assess students' level of understanding of a module among others. Lessons can be presented to be read online or to be downloaded for offline reading depending on the learner's choice. Moodlecloud, as a user-friendly platform, allows for inclusion of multimedia elements – video, audio, text, picture, animated demonstrations, simulated presentations, hyperlinks and hypermedia, etc., which cater for students' learning styles.

Review of Related Empirical Studies

Researches have been conducted on the adoption, integration, implementation and effectiveness of ICT/software and web-based platforms in teaching and learning in schools across the globe. Nwangwu, Obichukwu, Uzuagu and Omeh (2021) conducted a study on the development of an interactive PowerPoint presentation design training package (IPPDTP) for Lecturers of Tertiary Institutions. Findings revealed that IPPDTP was functional and very effective in mastering PowerPoint presentation designs while users expressed satisfaction; males recorded a higher mean compared to their female counterparts on their level of satisfaction with the IPPDTP based on gender. Similarly, Ibezim, Onyia and Nwangwu (2020) conducted a study on Using Digital Learning Objects (DLOs) for Students' Achievement in Computer Appreciation Studies (CAS). Findings of the study showed significant increase in the scores of students taught CAS using DLOs irrespective of gender. Andreas, Müller, Linden, Klois and Künne (2014) conducted a study on the development of an e-learning platform named "Third Place of Learning" (TPL), for vocational education systems in Germany. TPL supports student's digital learning by means of interactive examples and exercises. Also, another study carried out by Nguyen, Hite, and Dang (2019) on Web-based Virtual Reality development in classroom: From learner's perspectives revealed that students exhibited technological acceptance by not only learning and implementing WebVR in a short time (one month), but were also capable of demonstrating creativity and problem-solving skills with classroom supports (i.e., preproject presentations, online discussions, exemplary projects, and TA support).

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Despite the numerous positive findings of various studies regarding the effectiveness of computer/web-based teaching and learning platforms, other studies (Milovanović, 2010; Nwangwu, 2010; Nnajiofor & Achukwu, 2011; Nwangwu, 2011; Hallyburton & Lunsford, 2013; Hemant, Rajiv & Lal, 2014; Gillett-Swan, 2017; Mathew & Iloanya, 2019) have reported challenges of using digital platforms such as LMS in teaching and learning. For example, Nwangwu (2011) enumerated the challenges of integrating Moodle into the teaching and learning process in Nigerian higher institutions to include: non-regular training of staff on technology innovation in the form of professional development, broadband and wireless connectivity issues, poor or non-provision of infrastructure and funding, frequent electricity interruption, lack of confidence and enthusiasm in exploring digital technologies on the part of the teacher, poor equipment maintenance culture, among others. According to a study by Nnajiofor and Achukwu (2011), some of the challenges in implementing e-learning in Nigerian higher institutions include among others unwillingness or reluctance in adopting new digital technologies, poor or slow awareness on the effectiveness of e-learning in education and training, bandwidth issues and connectivity, low-level of computer literacy, lack of/inadequate technically experienced lecturers, limited ICT facilities, and problem of electricity. Nwangwu (2010) identified among others teachers workload issues, time management, low funding for infrastructural acquisition/setup, poor maintenance culture, inadequate provision of electricity, as the factors that affect effective adoption and utilization of ICTs in schools.

According to Yun-Jo An (n.d.), among barriers to effective use of web 2.0 tools for instruction is the challenge of creating meaningful assignments to promote desired learning outcomes. Ill-designed assignment with no visible connection to the overall purpose of the course not only frustrates students, it decreases students' interest in using the tool, and results in little or no learning (Reynard, 2009). Yun-Jo An (n.d.) highlighted the following - uneasiness with openness, technical problems and time as among the barriers to effective adoption of web-based platforms for teaching and learning. According to Yun-Jo An, in terms of uneasiness with openness, a number of participants noted that the open nature of Web 2.0 technologies is still new to many students. These students preferred one-to-one teacher-student interaction more than public, peer-to-peer interactions. In terms of technical problems, five participants reported that students who have older computers often have technical issues when using Web 2.0 tools. It was also noted that some Web 2.0 tools are "still a little primitive," having technical glitches and might not work well with current course management systems. Several participants mentioned that universities do not provide enough technical support for faculty who are unfamiliar with Web 2.0 technologies. Regarding the issue of time, it takes time to learn and manage new technologies. Several participants reported that learning new technologies takes time away from learning subject matter content. Milovanović (2010) pointed out the complexity of work environment, lack of skilled labor, need for reduction of training cost, social and demographic changes, requirement for greater flexibility in the workplace, and rapid growth of the Internet as some of the challenges of e-learning in schools.

Based on the review of the literature, it is evident that none of the studies addressed the design and implementation of Moodlecloud-based platform (MBP) for teaching and learning BT course in Abia State College of Education (Technical), Arochukwu. Furthermore, it is not known the extent

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to which students are satisfied with such innovative technology (MBP) and the challenges likely to encounter while learning with MBP. This is the gap to be filled in this study.

Theoretical Framework

This study was anchored on the Cognitive Theory of Multimedia Learning (CTML) and Constructivist Theory. CTML was propounded by Richard E. Mayer in 1997, and was based on how people learn from words and visuals. Multimedia learning, according to Mayer, occurs when people build mental representations from words and pictures. The words can be spoken or written and the pictures can be any form of graphical imagery including illustrations, photos, animation, or video (see Fig. 1). CTML covers the following principles of multimedia learning: Multimedia (students learn better from words and pictures than from words alone), Personalization (students learn better when words are in conversational style rather than formal style), Coherence (students learn better when irrelevant words, pictures, and sounds are eliminated from the presentation), Signalling (deeper learning is attained when learners receive signals that inform them on key steps), Redundancy (students learn better from narration and animation compared to animation, narration, and text); Segmentation (learners will learn better if narrated information is divided into small segments for easy comprehension), among others.

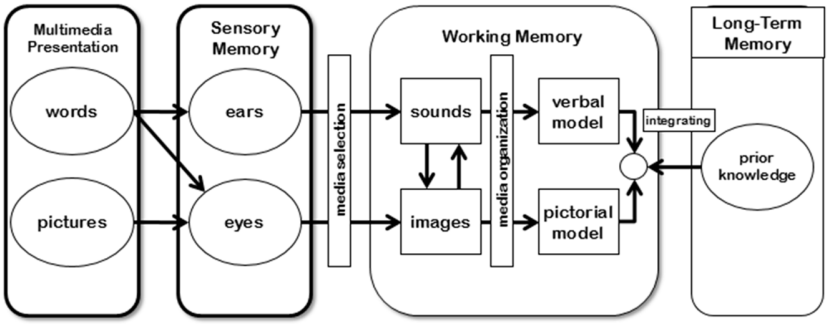

Fig. 1: CTML (The Cognitive Processes)
Source: Mayer (2005)

CTML is relevant to the present study because, MBP was designed to foster deeper learning by allowing users (students) to have control of the pace of the lesson (interactive principle); organization of contents and learning experiences into learnable modules for easy comprehension (segmentation principle); and use of audio-visual materials to engage learners in the learning activities so as to cater for both their auditory and visual processing channels (multimedia principle).

On the other hand, constructivism is a theory of learning and an approach to education that lays emphasis on the ways that people create meaning of the world through a series of individual constructs. The constructivists believed that knowledge is constructed by the learner and that the learner develops his/her own understanding through experience. The principles of constructivist theory of learning include: (i) knowledge is constructed (ii) people learn to learn, as they learn (iii) learning is an active process (iv) learning is a social activity (v) learning is contextual (vi) knowledge is personal (vii) learning exists in the mind (viii) motivation is key to learning. The present study was anchored on cognitive and social constructivism. Cognitive constructivism focuses on the idea that learning should be related to the learner's stage of cognitive development.

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In this case, students learn new information by connecting it to things they already know, enabling them to make modifications in their existing intelligence to accommodate the new information (Bruner, 1966). On the other hand, social constructivism by Lev Vygotsky (1978) focuses on the collaborative nature of learning. Knowledge develops from how people interact with each other, their culture, and society at large. Learning from others helps them construct their own knowledge and reality.

With the growing popularity of online learning, instructional platforms should facilitate an interactive problem-based environment in which the student is empowered to take charge of his or her own learning. The platform has to be interesting, engaging and appealing; it must also be authentic, personally relevant, challenging to learners, and provide a physical simulation of the real-world task environment. This enables learners explore the course contents and perform activities that are engaging and productive. This theory is relevant to this study in a number of ways. Firstly, the students are at liberty to explore the course as soon as the web link is sent to them. Secondly, the students engage in collaborative activities such as chats and forum discussions which are similar to the normal WhatsApp, Instagram and Facebook chats they have experienced. MBP was designed in such a way to allow students think critically and interact with the BT course contents to construct their own meaning.

Purpose of the Study

Generally, the study designed and implemented a Moodlecloud-based Platform (MBP) for teaching and learning Building Technology (BT) course in Abia State College of Education (Technical), Arochukwu. Specifically, the study:

1. determined the difficulty level of contents of the BT course.
2. designed and developed MBP for the BT course.
3. ascertained students' level of satisfaction in learning BT with the developed MBP.
4. determined the challenges faced by students in using Moodlecloud-based platform (MBP) in learning BT course.

Research Questions

1. What is the difficulty level of contents of the BT course?
2. To what extent are students satisfied in using MBP to learn BT?
3. What are the challenges faced by students in the use of MBP to learn BT?

Research Methods

This study employed Research and Development (R&D) design. Luenendonk (2019) defines Research and Development as utilizing findings of a research for the production of specific products including materials, systems and methods. According to Nworgu (2006), Research and Development, when applied in the field of education, is aimed at developing and testing more efficacious educational products that could be textbook, equipment and curricular. R&D design was appropriate for this study because it aimed at using research findings to design and implement Moodlecloud-based platform (MBP) for teaching and learning BT. A mixed research approach involving the use of questionnaire and structured interview schedule, were utilized for data collection, and were analyzed and reported quantitatively and qualitatively respectively. A mixed research method, according to Creswell (2012), is a procedure for collecting, analyzing, and "mixing" both quantitative and qualitative research and methods in a single study to understand a

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research problem. Questionnaire was developed to collect quantitative data for research question one while research questions two and three utilized structured interview schedule to collect qualitative data from the respondents. A one-page interview summary sheet was used to summarize the main findings of the interview. The main advantage of a summary sheet is that it enables investigators/researchers to reduce vast amounts of information into manageable themes that can be easily examined (Kumar, 1989).

The study was carried out in Abia State College of Education (Technical), Arochukwu, Abia State, Nigeria. One of the departments in the institution is the Department of Building Technology that is situated in the School of Technical Education. The Department has 7 lecturers, 9 NCE year one students, 7 NCE year two students and 2 NCE year three students. At NCE year one and two, all the students offer BT course and then specialize at NCE year three. The instruments developed for the study are: Building Technology Needs Assessment Questionnaire (BTNAQ), Students' Satisfaction Interview Schedule (SSIS), and Students' Challenges Interview Schedule (SCIS). The BT lecturers responded to BTNAQ instrument that was used to collect data for research question one while students responded to research questions two and three through SSIS and SCIS instruments respectively. The instruments were validated by three experts: one Building Technology lecturer, one Measurement and Evaluation lecturer, and a Web developer. Cronbach Alpha method was used to estimate the internal consistency of the instrument for research question one, which yielded the coefficient of 0.81. The data collected for the study were analyzed and interpreted using mean scores and standard deviations for research question one. For the interpretation of research question one, items >= 3.50 are Very Easy; items >=2.50 and <= 3.49 are Somewhat Easy; items >= 1.50 and <= 2.49 are Somewhat Difficult; and items <= 1.49 are Very Difficult. On the other hand, research questions two and three were analyzed qualitatively.

The ADDIE (Analysis, Design, Development, Implementation and Evaluation) model guided the processes involved in the development of MBP. The study first analyzed the need for the design and implementation of MBP using BTNAQ to collect data on the difficulty level of contents of the BT course as it is currently taught in a conventional face-to-face classroom. Based on the findings of the needs analysis, MBP was designed to incorporate the difficult and abstract segments of the BT course in the following distinct units: Elementary Structural Design, Construction Methods, and Construction Management. Each unit has sub-units that incorporated multimedia elements and collaborative activities' tools to interactively present concepts for better understanding. This was done at the Design and Development stages of the ADDIE model. At the implementation stage of the ADDIE model, the developed MBP was launched (see link: https://buildtech.moodlecloud.com/) and students were granted access to learn BT for the full semester. At the end of the course exercise, the students' level of satisfaction with the MBP was determined. Similarly, the challenges encountered by the students in the course of their online study were also determined so as to reveal the areas for further improvement.

The Design and Development of MBP

The design and development of MBP at the Design and Development stages of the ADDIE model was based on the Waterfall Model of Software Development Life Cycle (SDLC) by Royce (1970). SDLC is a systematic process for building software that ensures the quality and correctness of the software built (Martin, 2021). According to Powell-Morse (2016), implementing a waterfall model within a new software project is a rather straightforward process, especially due to the step-by-step nature of the method itself. The present study adopted the Modified (Iterative) Waterfall

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model that has the feedback approach. Feedback obtained from testing the software often leads back to the design and coding phases if there are any identified errors. Modified waterfall provides a useful and flexible structure with an indication of how to handle unusual or unexpected situations (Nwangwu, 2018). The phases of the modified Waterfall Model adopted in this study are: *Phase 1:* Requirements' collection and analysis, *Phase 2:* Design, *Phase 3:* Coding, *Phase 4:* Testing, *Phase 5:* Installation/Deployment, *Phase 6:* Implementation and Maintenance.

A flowchart diagram was drawn to depict MBP logic-flow in order to understand the overview of how data are logically connected in the MBP to guide its design and development (see Fig. 2). In the flowchart, a user (student) is presented with three units (*Unit 1.* Elementary Structural Design; *Unit 2.* Construction Method; and *Unit 3.* Construction Management). The user selects a topic to learn based on his choice. Depending on the topic the user selects, the lesson activities will show by the right side of the window. Each unit contains sub-topics and lesson activities. The user is provided with an option of logging out of the MBP at any point in time and then later continues from where he/she stopped until all units have been attempted. Fig. 3 shows the MBP window that contains the three units for the BT course.

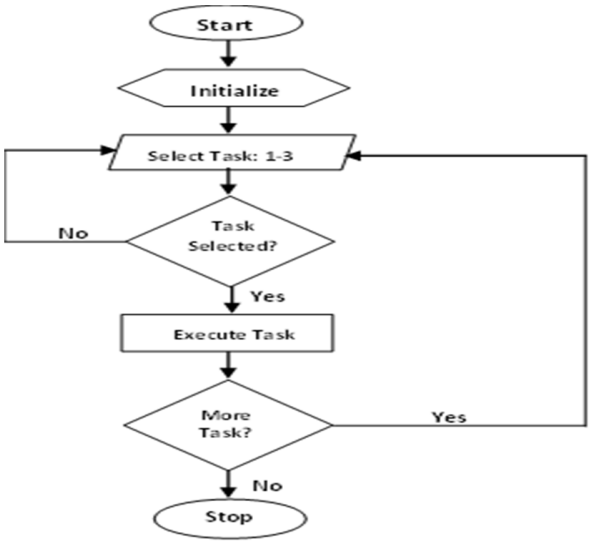

Fig. 2: MBP Flowchart Diagram;
Source: The Researchers

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Fig. 3: MBP Units and Sub-Topic
Source: The Researchers

Field Usability Testing of MBP

The MBP was hosted in the Moodlecloud platform (https://buildtech.moodlecloud.com/). A total of 18 NCE students were registered online for the BT course. However, only the final year (NCE Year three) students that major in BT course were used for the study. They were given the course link and the login credentials to enable them access and learn with the MBP. The essence of usability testing is to expose the students to the MBP and allow them to use it at their own pace and convenience to learn BT. According to Anunobi et al. (2017), the purpose of field trial validation of a courseware is to confirm its functionality. Similarly, Guru99 (2020) expressed that one of the benefits of software testing is that it reveals customer satisfaction to ensure the best user experience.

Presentation and Analysis of Data

This section presents the results of the data analysis, findings and discussion of findings. The presentation was organized according to the research questions formulated to guide the study.

Research Question 1

What is the difficulty level of contents of the BT course?

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Table 1: Mean Ratings and Standard Deviation of Respondents on the Difficulty Level of Contents of the Building Technology Course

S/N	BUILDING TECHNOLOGY ITEMS	$\bar{x}$	SD	Remark
	Elementary Structural Design (TED 224)			
A.	**Structural Forces**			
1	Explaining structural forces	1.48	0.87	VD
2	Describing the types of forces	2.15	0.43	SD
3	Conducting a successful experiment to investigate how tensile and compressive forces are created by bending	1.25	0.91	VD
4	Explaining how shear force is created in a structure	1.49	0.83	VD
B.	**Stress and Strain**			
5	Explaining the concepts: stress and strain	2.00	0.71	SD
6	Describing the types of stress and strain in a structure under the influence of loads	1.49	0.67	VD
7	Solving simple problems on stress and strain	1.50	0.87	VD
C.	**Shearing Force and Bending Moment in Beams**			
8	Defining a beam, shearing force and bending moment in a beam	1.25	0.43	VD
9	Stating the strength requirements of a beam	2.75	1.09	SD
10	Solving problems relating to shear force and bending moments	1.47	0.82	VD
	Construction Methods 1 (TED 214)			
D.	**Basic Principles and Methods of Foundations, Walls and Floors Construction**			
11	Describing the following concepts: (i) foundations (ii) walls (iii) floors	1.51	0.59	SD
12	Stating at least three types of (i) foundations (ii) walls (iii) floors	1.75	0.83	SD
13	Explaining the basic principles and methods of construction of any type of (i) foundations (ii) walls (iii) floors	2.25	0.83	SD
E.	**Types of stairs, roofs and ceilings Construction**			
14	Describing the following concepts: (i) stairs (ii) roofs (iii)ceilings	1.75	0,90	SD
15	Stating at least three types of (i) stairs construction (ii) roofs construction (iii) ceilings construction	1.33	0.58	VD
16	Sketching the different types of stair construction	3.18	1.00	SE
F.	**Process of Setting Out a Simple Building**			
17	Defining the term" Setting Out" and stating its' purpose in Building Construction	1.99	0.28	SD
18	Stating three preliminary site works in Building Construction	1.44	0.65	VD
19	Describing the procedure involved in setting out a simple building	1.20	0.98	VD
	Construction Management (TED 327)			
G.	**Building (Construction) Contracts**			
20	Explain building contracts	2.03	0.51	SD
21	Describe the types of building contract	1.20	1.00	VD
H.	**Tendering**			
22	Differentiating between a Tender and Tendering	1.54	0.58	SD
23	Discussing the methods of tendering	1.65	0.84	SD

*Key: $\bar{x}$ = Mean; SD = Standard Deviation; SE = Somewhat Easy; SD = Somewhat Difficult; VD = Very Difficult

The results in Table 1 reveal that 11 items (1, 3, 4, 6, 7, 8, 10, 15, 18, 19, 21) had mean scores ranging from 1.20 to 1.49 indicating that the respondents agreed that the items are very difficult. On the other hand, the respondents agreed that the rest of the items (2, 5, 9, 11, 12, 13, 14, 17, 20, 22 and 23) except item 16 ($\bar{x}$ = 3.18: SE), had mean scores ranging from 1.50 to 2.75 indicating that the items were rated somewhat difficult by the respondents. The standard deviation values for the items ranged from 0.28 to 1.09 which showed that the responses of the respondents were not far from their mean scores.

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Research Question 2

To what extent are students satisfied in using MBP to learn BT?

Structured interview technique was used to obtain information from the third-year students that major in BT course on their level of satisfaction in using MBP to learn BT. The students expressed that,

> the developed MBP enabled them to view and conceptualize the real-life structural failures that led to building collapses both within and outside Nigeria. The students also mentioned the following as the advantages of learning BT with the MBP: the Chat section for real-time communication; the availability of downloadable files/documents for offline use; the YouTube video links showing clips of collapsed building, their causes and how to avert such disasters; the Wikis that enabled them edit documents collaboratively; the Survey that was used to rate their level of understanding of the course both before the lesson and after lesson; the Quiz that provided immediate feedback on their performance in the course; Forum for collaborative activities and learning from each other (peer discussions); the other external sources (websites) for further readings; the Announcements and News sections that inform them on learning activities; among others.

According to one of the students,

> the YouTube video links served as highly educative source to support my understanding of what happens before buildings collapse. I also understand through the clips that building professionals should not compromise by using substandard materials in building construction. I now know what are the causes of structural failures and how they can be prevented. Students of BT will benefit greatly from learning with this MBP. I pray that the platform be sustained and regularly updated to encourage more students to major in the BT discipline.

The student also stated thus:

> the support I and my classmate received from the course lecturer on the platform especially during the Covid19, was amazing. We freely expressed our minds and made useful contributions without being scolded unlike during the face-to-face classroom experience we had in our first and second years when the course was being offered by all students in the face-to-face classroom.

The other student expressed that,

> My participation in this online course provided me with a lot of benefits. The MBP responds to my actions with high level of precision. It provides immediate feedback to my actions by directing my learning flow based on the structure of the entire course contents. The most enjoyable aspect of my learning experience

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> was the educative video clips I watched as well as my active engagement with the lesson activities while learning with MBP under my teacher's guidance and supervision. Each of the course modules contains objectives that helped me to know what I will learn at the end of each topic. In fact, I enjoyed using the MBP because it is user-friendly and not complex or complicated. I receive announcement in my email and respond to my teacher's directives. I will be willing to recommend MBP for use by educators and students in learning BT at all levels of education in Nigeria.

Research Question 3

What are the challenges faced by students in the use of MBP to learn BT?

Structured interview technique was also used to obtain information from the students of BT on the challenges of using MBP to learn BT. The students pointed out that initially, they found it difficult to understand the platform since that was the first time they were exposed to such innovative teaching and learning approach. The students said,

> it takes time to learn and manage new technologies especially if this is the first time one is exposed to such new platform. Initially, we found it difficult to understand the MBP interface and this took away part of the useful time we should have invested in the actual learning.

Furthermore, the students expressed that the workload from other courses interfered somehow with their active participation in the course which made them to put extra efforts in order to cope with the challenge. The students also pointed out that in as much as MBP was fantastic, it requires an internet-enabled device, data subscription and quality internet connection for faster browsing. These are costly and the school/department did not provide funding for the purchase of digital devices and data subscription.

On the issue of technical support, one of the students said

> in some occasions, I experienced poor connectivity to the internet especially when I am free to do my assignments or participate in the rea-time discussion with my lecturer. I felt so frustrated that I had to subscribe to more than one Internet Service Providers (ISPs) so as to switch over when one network fails. The school-based internet is always slow and frustrating so I had to spend my pocket money to buy data for my device.

The other student said,

> the use of technology in teaching and learning in my school can only make sense to students if the school management will fund its use as well as motivate students and lecturers to adopt digital technologies in the classroom through the provision of incentives and other interventions. Both students and lecturers should be trained regularly on the various digital technology platforms used for teaching and learning. In my own opinion, provision of technical support

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services by the school will go a long way in aligning and keying into eLearning best practices in the digital era especially during the pandemic era such as the Covid19 that is currently ravaging the world thereby forcing education to be delivered through online means.

Discussion of Findings

Research question one determined the difficulty level of contents of the BT course. The results in Table 1 revealed that the BT course was generally difficult. This could be the reason why few students register it in their NCE final year (year-three) as their major discipline. According to BCIT (2020), Architectural and Building Technology (ABT) is a comprehensive program with a focus on applied learning; and it combines sound theoretical knowledge with practical skills and technical training to provide job-ready competencies for immediate application upon entering the workforce. Therefore, in order to achieve applied learning, modern and effective methodologies will need to be adopted in information delivery of the course. This is an indication that implementing digital technology and new methodologies in the BT course will go a long way in simplifying the course contents thereby attracting more students to the course.

Research question two identified the extent students are satisfied with the use of MBP to learn BT. The findings of the structured interview conducted revealed that the students are satisfied with the MBP as it enabled them watch video clips on structural failures and building collapses both within and outside Nigeria. Furthermore, findings revealed that MBP contains features (such as chats, wikis, survey, forum, quiz, announcements and news, etc.) that boost active learning. This is in line with Turnbull, Chugh, and Luck (2019), who stated that LMS provides an interactive online learning environment and automate the administration, organization, delivery, and reporting of educational content and learner outcomes. According to Online Learning College (2015), Moodle platform allows students to access course materials, gain feedback, contact tutors, upload work, see grades and much more all by logging in to their very own online account. Furthermore, it was revealed that the video clips (YouTube) helped the students to clearly understand that building professionals should not compromise by using substandard materials in building construction. This corroborates with TheCable Newspaper (2021) that reported that many of the documented cases of building collapse in Nigeria are due to the use of defective or substandard building materials, lack of requisite technical knowledge, non-adherence to building codes, standards and regulations, lack of maintenance, use of non-professionals and the high level of corruption which has ravaged every sphere of the construction industry including government and private parastatals.

The findings on research question three showed that the challenges faced by students in the use of MBP to learn BT include initial stress in understanding MBP interface having being their first exposure on such innovative online platform; workload from other courses somehow interfered with their active participation in the online course; slow internet connectivity often do occur which affected their effective use of MBP to play video resources and participate in interactive sessions. Other challenges expressed by the students include cost of data subscription, lack/inadequate technical support, non-provision of incentives to motivate both lecturers and students to adopt online learning, etc. These challenges are in agreement with Nwangwu (2011), Nwangwu (2010), Nnajiofor and Achukwu (2011) who reported non-regular training of staff on technology innovation, broadband and wireless connectivity issues, poor or non-provision of infrastructure and funding, frequent electricity interruption, poor equipment maintenance culture, unwillingness or reluctance in adopting new digital technologies, limited ICT facilities, and problem of

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electricity, etc., as challenges affecting effective utilization of ICT in teaching and learning in Nigerian schools.

Conclusion

Building technology is one of the courses offered in Nigerian Technical Colleges and Universities. The course was introduced to equip learners with the technical skills required to professionally undertake building construction jobs on graduation so as to reduce or eliminate the cases of building collapse that are currently ravaging the country. Therefore, this study designed and implemented a Moodlecloud-based Platform (MBP) for teaching and learning BT in Abia State College of Education (Technical), Arochukwu. The findings of the study revealed that generally, the contents of the BT course are difficult; students' level of satisfaction with MBP was found to be high based on their expressions during the structured interview exercise. It was further revealed that cost of data subscription, workload from other courses, are among the challenges encountered in the online course. Therefore, the study recommended among others that school management and ministry of education should financially support the hosting of courses in Moodlecloud-based platform since it has been proven to increase students' interest in teaching and learning especially in the BT course, in all Technical Colleges in Nigeria.

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