

EFFECT OF MULTIMEDIA AND CONVENTIONAL TEACHING METHODS ON STUDENTS' ACHIEVEMENT IN FOUNDATION OF VOCATIONAL TECHNICAL EDUCATION IN UNIVERSITIES IN NIGERIA

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Abstract

This study determined effects of multimedia teaching method on students' achievement in Foundation of Vocational Technical Education course in Universities in Nigeria. The quasi-experimental study adopted Solomon four research design and spanned from November 2020 to March 2021 (a semester). The two research questions posed were answered through analysis of data collected from 368 undergraduate students of vocational technical education from five federal universities in Nigeria, which were Ahmadu Bello University (ABU), University of Abuja (UniAbuja), Niger Delta University (NDU), University of Lagos (UniLag) and University of Nigeria, Nsukka (UNN) located in the Northern, Central, Southern, Western and Eastern parts of Nigeria. The students were subjected to "Vocational Technical Education Achievement Test" (VTEAT) before and after teaching; The study revealed that the students taught foundation of Vocational Technical Education using Multimedia Teaching method performed significantly higher than their counterparts taught using conventional method; similarly, males demonstrated a higher achievement in Multimedia Teaching method than females. The study recommended that teachers should employ Multimedia Teaching strategy in teaching Foundation of Vocational Technical Education in Tertiary Institutions in Nigeria.

Key words: Multi-media; Teaching-method; Achievement; Solomon-4; Effect

Introduction

There is a lot of pressure on instructors of tertiary institutions to come out with more effective and efficient learning environment and experience to their students. In tertiary institutions, teaching serves as an important vehicle for achieving institutional goals of enhancing students' knowledge and learning and engaging them in the learning community to prepare for future citizen. To improve the educational productivity of their students, some of the instructors sought to embrace the use of multimedia instruction (Tang, Lin & Qian, 2020).

Multimedia refers to variety of items like printed materials, pictures among others. In the view of Mayer (2017), Multimedia is the act of presenting words, pictures and other materials to students to foster learning through printed (on-screen text), or spoken (narration) words. The pictures can be static (illustration, graph, photos or maps), or dynamic (animation, video or interactive illustration). An important example of multimedia instruction in tertiary institutions is a computer-based narrated animation that explains the operation of a given topic to students (Septiani & Rejekiningsih, 2020). One promising approach in addressing instructional challenges is multimedia presentations of explanations in visual and verbal formats such as presenting a computer-generated animation synchronized with narration or on-screen text (Martin, & Betrus, 2019). Nevertheless, multimedia is now offering the educational system a tool for effective teaching and learning. Multimedia allows teachers to integrate text, graphics, animation, and other media into one package to present comprehensive information to students in order to achieve specified course outcomes. Multimedia permits demonstration of complicated processes in a highly interactive, animated fashion in which that instructional material can be interconnected with other related topics in a more natural and intuitive way (De Sousa, Richter & Nel, 2017). According to the authors, multimedia-based instruction are efficient and effective because (1) it is self-paced learning process; allows students to break down the group instructional setting, which often inhibits some people's natural progression (2) enhances learner's interaction with the course material through less bridging effort between the learner and the information being processed; and (3) provides autonomy in the learning process in that self-regulated instruction shifts the sense of responsibility from the instructor to the student. Besides potential advantages to students, multimedia formats offer benefits to instructors teaching multi-section courses because this type of format ensures uniformity in the lecture content across the sections (Alegre & Legaspi, 2021). It therefore, means that students understand better thus encouraging their future involvement in the world of work when multimedia teaching method is utilized in teaching Foundation of Vocational Technical Education Course

Foundation of Vocational Technical Education (VTE, 101) is a first-year course for all the students in the Faculty of Vocational Technical Education. The aim of the course is to equip learners with the knowledge in philosophical, sociological, historical and economic foundation of vocational and technical education for comparative analysis. The course further ex-rays the objectives of vocational technical Education for National development in addition to professional opportunities in Vocational Technical Education (Joshi, 2021). The course also emphasizes the need for training of both head and hands of the learners (Ann, 2016); preparation and participation in occupation for social value (Wheeler, Clark & Grisham, 2017) in addition to being trained as a teacher. Better understanding of the course by use of appropriate teaching method (multimedia) improves students' academic achievement.

Achievement refers to the extent of attainment in a specific field of endeavour or something carried out successfully as planned. Academically, achievement means what individuals get as a result of successfully accomplishing stated objectives. Achievement refers to gain in knowledge or skill as a result of participating in a learning program (Kuhfeld, Soland, Tarasawa, Johnson, Ruzek & Liu, 2020). It is a product of effort or series of efforts which are cherished good when the target objectives are realized (He & Harris, 2020). Academic achievement therefore, requires that the students make personal efforts and get committed towards succeeding in their school work (Duckworth, Taxer, Eskreis-Winkler, Galla & Gross, 2019). Academic achievement is the outcome in education on the extent to which a student, teacher or institutions has achieved their educational goals/objectives. According to Masrai and Milton (2018), academic achievement is a measure of knowledge gained in formal education usually indicated by test scores, grades points, average and degrees. Masrai and Milton further stated that, achievement level of students is judged by the marks obtained in the quarterly or semester examinations especially in tertiary institutions.

Tertiary institution, referred to a third-level, third-stage or post-secondary institution, is the educational level following the completion of secondary education. Newfield (2018), defines tertiary institutions as universities as well as trade schools and colleges. Tertiary education generally culminates in the receipt of certificates, diplomas, or academic degrees in specialized fields. It includes academic and higher vocational education. Tertiary education is both the aspiration of more and more young people around the globe and a fundamental requirement for employment in the industries that drive the global knowledge economy. As such, tertiary institution provides unique opportunities for individual development and equality of opportunity as well as promoting shared prosperity. The academic achievement of students can be improved through teaching strategy. A well-managed, strategically oriented, diversified and articulated tertiary institution system is vital for producing the caliber and diversity of graduates needed both for the economy that exists today and for economy to which a nation aspires. From providing skills for immediate professional application to building stages of complexity of learning towards post-graduate studies and research, tertiary education offers limitless avenues for social mobility and economic development.

However, a lot of forgetting school experiences according to Lithari (2019), is the direct result of poor learning environmental conditions. The author found out that poor academic achievement is observed in tertiary institutions arising from poor teaching methods among others resulting to disruptive emotional state and drop out of students from schools. This study, therefore, sought to determine the effects of multimedia teaching method on Students' Achievement in Foundation of Vocational Technical Education in Universities in Nigeria. specifically the study sought to determine the:

1. mean achievement scores of students taught foundations of vocational technical education using multimedia teaching method and those taught using conventional method in tertiary institutions in Nigeria.
2. mean achievement scores of male and female students taught foundations of vocational technical education using multimedia teaching method

Methodology

The quasi-experimental study adopted Solomon four-group research design and was carried out in Federal Universities in Nigeria. Quasi-experimental research is a scientific approach where one or more independent variables are manipulated and applied to one or more dependent variables in an already existing environment without any interference (Brom, Starkova, & D'Mello, 2018). This means that in this study, multimedia teaching method was manipulated to find its effects on academic achievement of year one students in Foundation of Vocational Technical Education course (VTE 101) in their respective classes without disruption in Federal Universities with Vocational Technical Education Programme in Nigeria.

Solomon four-group research design is adopted when there is a concern that the treatment group might be sensitized by the pre-test (Şanlı & Ersanli, 2020). It is also referred to as two treatments and two controls. In this design, four groups A, B, C, D had different experiences which were:

	pre-test,	treatment	post-test
Group A	√	√	√
Group B	√	0	√
Group C	0	√	√
Group D	0	0	√

The effectiveness of the treatment was evaluated by comparing the academic achievement of all the students in groups A, B, C & D.

The population for the study was 368 undergraduate year one students admitted in 2019/2020 academic year from five federal universities in Nigeria, which were Ahmadu Bello University (ABU 81), University of Abuja (UniAbuja 69), Delta State University (NDU 72), University of Lagos (UniLag 65) and University of Nigeria, Nsukka (UNN 81). The sample for the study was 153 students (62 males & 91 females) from two universities (DSU & UNN). Delta State University had 72 students made up of 25 males and 35 female while University of Nigeria, Nsukka has 81 students made up of 32 males and 50 females. The instrument for data collection for this study was 20 multiple choice test items developed from the curriculum contents of Foundations of Vocational Technical Education course. Each item in the test had a stem and four options A-D with one option as the correct answer while the remaining three were distracters. The instrument was validated by three experts; two

from Faculty of Vocational Technical Education and one from Science Education in Measurement and Evaluation unit all from Michael Opkara University of Agriculture, Umudike. The internal consistency of the test items was determined using Kuder-Richardson (K_{21}) which yielded a coefficient of 0.85. In each of the selected university, year one students were divided into four groups without their knowledge through the use of stratified random sampling technique making use of the class nominal roll. Group A & B were pre-tested while group C & D were not pre-tested. Group A & C were then taught using multi-media teaching method while other two groups (B & D) were taught adopting conventional teaching method. Each of the two groups was taught by their teacher using lesson plan prepared by the researchers. Each week, the lesson lasted for two hours. At the end of the treatment, a post-test was administered on all the groups. Data collected for this study were analysed using Statistical Package for Social Sciences (SPSS) to find mean percentage scores to answer the research questions and t-test was used to test the null hypotheses at 0.05 level of significance.

Results

The results of the study were generated from the research questions answered and hypothesis tested and presented in Tables 1-3

Research Question One: What were the mean achievement scores of students taught using multimedia teaching method and those taught using conventional method?

Data for answering research question one were presented in Table 1

Table 1: Mean and standard deviation of students' pre-test and post-test scores in Achievement Test (AEAT) for control and experimental group.

Groups	N	Pre-test	Treatment	Post-Test	%gain	A & B	A & C	B & D
A	39	48.46	v	77.35	28.89			
B	38	44.15	-	46.42	2.27	30.93		
C	38	-	v	73.69			3.66	
D	38	-	-	47.69				-1.27
Summary		31.31		51.29	19.98			

Data in Table 1 revealed that group A exposed to pretest, posttest and treatment had a mean gain score of 28.89 (77.35 –48.46); Group B exposed to pretest and post-test without treatment had a mean gain of 2.27 (46.42-44.15), indicating a treatment

influence of 30.93 (77.35-46.42) in favour of group A; group C exposed to treatment and post-test but was not pretested had a mean score of 73.69; indicating a pre-test influence of 3.66 (77.35-73.69) when compared with group A. Group D exposed to only post-test without treatment had a mean score of 37.69 and when compared with group B that were exposed to pre-test had a negative mean score of -1.27 (46-42-47.69); indicating that pretest had no significant difference on the achievement of students.

Hypothesis One: There is no significant difference in the mean scores of students taught through multi-media method and those taught using conventional method. Data for testing hypothesis one were presented in Table 2

Table 2: ANOVA statistic on effects of multi-media teaching method on students academic achievement in foundations of vocational technical education (VTE101) course in Universities in Nigeria

Groups	F	Sig.
A	40.091	.000
B	337.661	.000
C	31.929	.000
D	73.504	.000

Data in Table 2 revealed a significant difference of 0.000 which was less than the benchmark (0.05); indicating that there was significance difference in the academic achievement of students taught VTE 101 course through multi-media teaching method and those taught using conventional method. In order to determine the source of difference, the data were further subjected to Scheffe's test and the result was presented in Table 3

Table 3: Scheffe's test result

GROUP	N	Subset 2	Subset 2
B O1	38	34.1538	
B O2	38	36.4231	
DO2	38	37.6923	
AT1	39	38.4615	
CT2	38		63.6923
AT2	39		67.3462
Sig		0.503	0.680

Data in Table 3 revealed that group BO₁,BO₂,DO₂and AO₁were in the same subset and with a significant level of 0.503; meaning that there was no significance difference in the academic achievement of students in these groups. Furthermore, Table 3 showed that group CT₂and AT₂had a significant level of 0.680; indicating that there was no significant difference in academic achievement between the two groups that were taught through multi-media. Therefore, the source of significance difference was from 'C' & 'A' who were taught through multi-media.

Research Question Two: What were the mean achievement scores of male and female students in tertiary institutions taught VTE 101 course using multimedia teaching method?

Data for answering research question two were presented in Table 4

Table 4: A comparative analysis of the academic achievement of male and female students taught VTE 101 course using multimedia-based teaching method.

Method	Gender	Number	Type of test	Mean
Multimedia	Male	62	Pre-test	14.50
		-	Post-test	31.50
	Female	91	Pre-test	13.00
		-	Post-test	28.50

In Table 4, the male and female students in the multimedia method had achievement scores of 14.50 and 13.00 respectively in the pre-test. The male students scored 31.50 in the post-test while the female students scored 28.50. The mean gain of the male was 17.00 while that of the female was 15.50. This indicates that male students taught VTE 101 course using multimedia-based teaching method achieved higher mean score than female students taught same course

Hypothesis Two: There is no significant difference between the mean achievement scores of male and female students in Federal Universities taught VTE 101 course using multimedia teaching method.

Data for testing hypothesis two were presented in Table 5

Table 5 t-test statistic on the academic achievement of male and female students taught VTE 101 course using multimedia-based teaching method

Group	Number	T	P	Decision
Males	62	6.542	.002	S
Females	91			

Data in Table 5 revealed that t-value was 6.5421 while the p-value was 0.002). Since the p-value of 0.002 is less than 0.05, the null hypothesis of no significant difference was not upheld. Therefore, the researchers concluded that there was a significant difference in academic achievement of male and female students taught VTE 101 using multimedia-based teaching method. This difference was in favour of male students. This showed that those students taught foundations of vocational technical education using multimedia-based teaching approach tend to achieve significantly higher scores than those female students taught the same course contents using the same approach.

Discussion of Findings

A major finding of this study disclosed that the use of the multimedia-based teaching has a positive impact on students' academic achievement towards studying and learning foundations of vocational technical education. This is because the results of the findings revealed that there is a significant difference in the mean scores obtained by students who were taught foundations of vocational technical education using a multimedia-based teaching method, as compared to their counterparts who were taught the same content using the conventional based learning method.

This finding gave credence to what was earlier found by Pekdağ and Azizoğlu (2020), that there is a significant difference in the mean scores obtained by students who were taught mechanics using a multimedia-based teaching method, as compared to their counterparts who were taught the same content using the conventional based learning method.

Secondly, it was found out that the academic achievement indices of the Male students exposed to a multimedia-based teaching were higher than those of the Female students who were taught using same multimedia-based method. This can be observed from the mean scores obtained by male students exposed to the multimedia-based teaching method than that of the females. These findings agreed with the findings of Akinbadewa (2020,) that the academic achievement indices of males in Home Economics exposed to multimedia-based teaching were higher than those of the females taught using the same multimedia-based method.

Conclusion

This study investigated the Effect of Multimedia Teaching Method on the Students Achievement in foundations of vocational technical education in Tertiary Institution in Universities in Nigeria. From the findings of the study which were

based on the statistical analysis of the data collected and presented, some conclusions were drawn. The use of Multimedia Teaching method was found to be more effective in enabling students achieve higher performance in foundations of vocational technical education than the use of the conventional based teaching method. Furthermore, it was found out that male students' achievement indices of students in foundations of vocational technical education exposed to a Multimedia Teaching method were higher than those of the female students who were taught same content using same approach.

Recommendations

Based on the findings obtained in the study, the following recommendations were made:

1. Teachers should ensure that they teach foundations of VTE 101 with a Multimedia-based learning because this method enhances students' academic achievement.
2. The government through ministries of education should provide proper facilities and equipment' which are necessary for effective use of a Multimedia-based learning. This is because foundations of vocational technical education is best be taught in well-equipped classrooms coupled with technology driven methods of pedagogy.

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