



Effects of K-Yan Multimedia Instructional Strategy on Students' Academic Achievement in Woodwork Technology in Federal Colleges of Education (Technical) in North-East, Nigeria

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Abstract Educational technology instructional strategy is fast taking over old methods of instruction in many countries today. Nigeria is not left out as many institutions are adopting the use of multimedia instructional strategies. One of this is K-YAN multimedia is gaining considerable popularity in some states in the Northeast of Nigeria mainly Borno and Jigawa state being the first to use it in schools. This study, therefore examined the effect of K-YAN multimedia instructional strategy on students' academic achievement. Area of study was North-East, Nigeria. Population of study is NCE (T) 2 students in Federal Colleges of Education (T) in North-East, Nigeria with a population of 355 students. Sample size is 150 students; purposeful sampling was used to determine sample size of the study. The study used Quasi-experimental design, three purposes, three research questions and three hypotheses were formulated to guide the study. Woodwork Achievement Test (WWAT) instrument was used. The instrument was developed by the researcher for data collection. The instrument was validated by four experts from Modibbo Adama University, Yola, Abubakar Tafawa Balewa University, Bauchi, and Federal College of Education (T) Gombe respectively. Data collected were analyzed using mean and standard deviation to answer research questions, while ANCOVA was used to test the hypotheses at 0.05 level of significance. The reliability of the instrument (WWAT) was tested at Ramat Polytechnic using 30 students, and a reliability coefficient of 0.89 was obtained. Findings from the study showed an improvement in students' academic achievement in both groups. However, there was significant difference between the instructional approaches in favor of experimental group. The study concluded that, K-YAN multimedia teaching strategy enhances students' academic achievement. It was recommended that, K-YAN multimedia be encouraged among woodwork technology teachers, students, professional organizations such as the National Commission for Colleges of Education (NCCE). It was equally recommended that, Federal Ministry of Education (FME) in collaboration with Tertiary Education Trust Fund need to sponsor technology teachers to undergo refresher courses on utilization of K-YAN multimedia instructional strategy and learning to countries that have advanced in the use of K-YAN multimedia teaching and learning strategy.

Keywords K-yan, Multimedia, Students, Technical, Woodwork

Introduction

The mandate given to Federal Colleges of Education (Technical) in Nigeria was to produce qualified and highly motivated technical teachers for the Basic Education sub-sector. According to the Federal Republic of Nigeria (FRN, 2013) National Policy on Education (NPE), recipients of this program should be able to teach at the junior section of technical colleges, be self-reliant or be able to further their education at a higher level. In the same vein (FRN, 2013) NPE, provides technical teachers with an intellectual and professional background,



adequately trained for teaching, and should be adaptable to any changing situation and technological development, not only in Nigeria but also in the world at large. To achieve these important objectives, efforts shall be made to inculcate an attitude of respect for and appreciation of the role of technology in the society. To accomplish this, students shall be made to appreciate the dignity of labour by involving them in making, repairing, and assembling machines, gadgets, and equipment. According to Bwala (2016), some Technical Colleges in North-East, Nigeria do not have a single woodwork teacher; yet continue to offer the course through hiring woodworkers in the informal sector to teach their students. This was worrisome; the resultant effect was a poor learning outcome. According to Abd-El-Aziz (2013) the lecture method of teaching and learning is saddled with many limitations. Apart from being teacher-centered, it renders students passive, encourages rote memorization of facts, and is unable to provide a variety of activities for instruction among others. Generally, multimedia in education training allows teachers to prepare study materials more concisely and comprehensively, especially when dealing with demonstration and visualization. Most study materials on multimedia presentations make learning easier for students. Hana, Akram, Walced and Roslina (2013) observed that “Multimedia technology empowers educational process through increasing interaction and interest between teachers and their students”. Mikova (2012) similarly, pointed out six main elements in multimedia applications for educational purposes which are: texts, images, audio, videos, animations, and user control which improves students’ retention of learned material.

Knowledge Vehicle (K-YAN) multimedia applications can be used by lecturers to convey information to students such as lecture slides, assessment materials, and learning resources. It can as well be used by students to learn new skills and knowledge without the teacher’s presence, making learning easier. However, it may not be out of place for multimedia instruction to abound in different applications, but interestingly, the one which attracted the attention and curiosity of the researcher was the K-YAN multimedia was a modern multimedia instructional technology that had a single wire computer with internet connectivity, projector, and device which converts any wall in a school into an interactive classroom, supports multiple peripherals and enables interactive learning. Makingu, et. al. (2018) also stated that academic performance connotes successful academic progress attended through efforts and skills. Good performance can easily be attended to when students are highly interested in the subject. Therefore, interest is another key factor to be considered in learning outcome of students.

Materials and Method

According to Egbita (2013) Colleges of Education Technical (COET) are the third categories of tertiary institution in Nigeria that offer technical and vocational education, specifically Colleges of Education (Technical) are tertiary institutions that are concerned with imparting Technical and Vocational Education and Training (TVET) knowledge, skills and attitudes for students to be equipped with scientific, technological, pedagogical knowledge and skills for effective participation in the workplace. Egbita (2013) again stated that (COET) are distinct from other conventional Colleges of Education (COE) because they pay much attention to technical skills as well as scientific knowledge and pedagogical skills for successful employment in the industry and teaching

Multimedia Instructional Strategy

Generally, multimedia in education training allows teachers to prepare study materials more concisely and comprehensively, especially when dealing with demonstration and visualization. Most study materials on multimedia presentations make learning easier for students. Hana, Akram, Walced and Roslina (2013) observed that “Multimedia technology empowers educational process through increasing interaction and interest between teachers and their students”. Mikova (2012) pointed out six main elements in multimedia applications for educational purposes which are: texts, images, audio, videos, animations, and user control which improves students’ retention of learned material. Similarly, Andresen and Brick (2013) also stated that “multimedia application in educational learning environment promotes active individual learning and facilitates group work, small groups of students can work through multimedia application together to learn from each other as well as improve their dialogue skills”. According to Abd-El-Aziz, Abd-El-Latif, Adekunle, and Hassan (2017) student’s academic achievement connote attainment in a school subject which was usually symbolized by a score or mark



on a test. Abd-El-Aziz, et al. (2017) again further stated that academic achievement depends on several factors among which are: Instructional methods, learning environment, learning material, and the learner.

Knowledge Vehicle (K-YAN) Multimedia

Knowledge Vehicle (K-YAN) multimedia applications can be used by lecturers to convey information to students such as lecture slides, assessment materials, and learning resources. It can as well be used by students to learn new skills and knowledge without the teacher's presence, making learning easier. However, it may not be out of place for multimedia instruction to abound in different applications, but interestingly, the one which attracted the attention and curiosity of the researcher was the K-YAN multimedia was is a modern multimedia instructional technology that had a single wire computer with internet connectivity, projector, and device which converts any wall in a school into an interactive classroom, supports multiple peripherals and enables interactive learning. According to the Council of Registered Engineers (CORBON, 2018) "the application of K-YAN multimedia in a classroom situation and its effect on learning outcomes cannot be overemphasized, apart from empowering teachers, it also aid teachers to focus on improving the learning outcomes by using content which was modern, engaging, interesting, interactive and involving students at every step".

Makingu, Peter, and Ahmad. (2018) stated that K-YAN multimedia exhibits a sustainability shift from technological and product-related innovation to a broader techno-socio-cultural innovation. To them, K-YAN multimedia technology teaching and learning has radically changed the teaching paradigm. By implication, it has brought an era of more efficient and effective technology-based teaching and learning.

Statement of the Problem

It has been observed that, there has been a persistent high rate of poor academic achievement among students in woodwork technology education in Colleges of Education (Technical) in the North-East, Nigeria for the past four years. According to Cyril (2014), Abd-El-Aziz et. al. (2017), the factors responsible for students' poor academic performance are partly due to the teaching method employed by the teachers. This researcher also observed that the prevalent method of teaching used in Federal Colleges of Education (Technical) in North-East, Nigeria particularly in woodwork technology has been the lecture method due to inadequate training materials supplied by the colleges. This method is teacher-centered teaching and saddled with many limitations as it renders students passive and has a limited effect on students' academic achievement. If this situation is left unattended to, the consequences will be continuous poor academic achievement among students in colleges of education

Purpose of the Study

The main purpose of this study was to investigate the effect of K-YAN Multimedia on students' academic achievement in woodwork technology in Federal Colleges of Education (Technical) in North-East, Nigeria. Specifically, the study sought to determine:

1. The effects of K-YAN Multimedia instructional strategy and Lecture method on woodwork students' academic achievement in carcass construction in Federal Colleges of Education (Technical) in North-East, Nigeria.
2. The effects of K-YAN Multimedia instructional strategy and lecture method on woodwork students' academic achievement in framing construction in Federal Colleges of Education (Technical) in North-East, Nigeria.
3. The effects of K-YAN Multimedia instructional strategy and Lecture method on woodwork students' academic achievement in finishing processes in Federal Colleges of Education (Technical) in North-East, Nigeria.

Research Questions

The following research questions were raised to guide the study:

1. What are the pre-test and post-test mean scores of students' academic achievement in carcass construction in Federal Colleges of Education (Technical) in North-East, Nigeria in the experimental and control groups.



2. What are the pre-test and post-test mean scores of students' academic achievement in framing in Federal Colleges of Education (Technical) in North-East, Nigeria in the experimental and control groups.
3. What are the pre-test and post-test mean scores of students' academic achievement in finishing process in Federal Colleges of Education (Technical) in North-East, Nigeria in the experimental and control groups.

Hypotheses

The following null hypotheses were formulated and tested at 0.05 level of significance to guide the study.

- Ho₁ There was no significant difference in the mean academic achievement scores of woodwork technology students in carcass construction in Federal Colleges of Education (T) in the North-East, Nigeria in the experimental and control groups.
- Ho₂ There was no significant difference in the mean academic achievement score of woodwork technology students in framing construction in Federal Colleges of Education (Technical) in North-East, Nigeria in the experimental and control groups.
- Ho₃ There was no significant difference in the mean academic achievement scores of woodwork technology students on finishing processes in Federal Colleges of Education (Technical) in North-East, Nigeria in the experimental and control groups.

Methodology

The study used Quasi-experimental design with pretest-posttest non-equivalent, non-randomized, experimental, and control groups, the quasi-experimental design was useful in a situation where other experiments cannot be used due to ethical or practical reasons. Research design layout

Experimental	G ₁ -----	0 _{A1} -----	X ₁ -----	-0 _{B1}
Control	G ₂ -----	0 _{A2} -----	-----	0 _{B2}

The area of the study was North-East, Nigeria. The study was conducted in the two Federal Colleges of Education (Technical) in the North- East, Nigeria. North-East Nigeria was one of the six sub-regions in the country. North- East, Nigeria has a geographical boundary of latitude 6.26° East and longitude 4.92° North of the equator with a total area of 103,639sq/m. Nigeria has 166,790.80 miles (1mile=1.6 kilometer, hosting two Federal Colleges of Education (Technical), which were Federal College of Education (Technical), Gombe and Federal College of Education (Technical) Potiskum respectively. The population of this study comprised all NCE (T) II students offering woodwork trade in all Federal Colleges of Education (Technical) in North-East, Nigeria, numbering 355 students. A purposive sampling technique was used to obtain a sample size of 155 students.

The instrument used for data collection was developed by the researcher called Woodwork Performance Test (WWPT). The (WWPT) was used to answer research question. The test was based on three topics namely: carcass construction, framing construction, and finishing processes. The test items measured the objectives in Bloom's Taxonomy of educational objectives. There were 4 validates drawn from Abubakar Tafawa Balewa University, Bauchi, Modibbo Adama University, Yola and Federal College of Education (Technical), Gombe.

The instrument (WWPT) was trial tested at Ramat Polytechnic Maiduguri for reliability using 30 students. The Polytechnic was located within the North -East geopolitical zone of Nigeria and did not form part of this study, even though it was not a college of education, it still offers woodwork technology at the NCE level, and they have the same characteristics as the colleges used for this study. The reliability of the instrument (WWPT) was obtained using Pearson product correlation coefficient (test-retest). The reliability coefficient obtained was 0.89. All the question items in the post-test were alternate forms of the same items used on the pre-test. These served as a substest of previously tested information that appeared in the initial test but were interspersed throughout the test, (Uzoagulu, 2011).

Row scores obtained from the pre-test and post-test were used to answer research questions 1-3 using mean and standard deviation. While ANCOVA was used to test the null hypotheses using the statistical package of (SPSS) version 22, at a probability level of 0.05 level of significance 95% confidence. The decision rule was, where $p < 0.05$ the null hypothesis was rejected but where $p > 0.05$ the null hypothesis was accepted.



Results and Discussion

Research Question 1

Table 1: Mean and Standard Deviation Scores of Woodwork Students Academic Achievement in Carcase Construction in Federal Colleges of Education (Technical) in North-East, Nigeria

Group	N	Pre-test		Post-test		Mean Difference
		Mean	SD	Mean	SD	
Experimental	87	36.44	5.19	41.97	5.56	5.53
Control	70	35.58	5.02	38.41	6.17	2.83

The data presented in Table 1 showed that experimental group taught carcase construction using K-YAN multimedia learning method has mean score of 36.44 and standard deviation of 5.19 in pre-test and mean score of 41.97 with standard deviation of 5.56 in post-test. There was mean gain of 5.53. Control group taught carcase construction using lecture method had pre-test mean score of 35.58 with standard deviation of 5.02 in pre-test and post-test mean score of 38.41 with standard deviation of 6.17 having mean gain of 2.83. Mean gain of experimental group in academic achievement in carcase construction was 5.53 which was higher than control group that had mean gain of 2.83. It then implies that, students in experimental group performed better than those in control group during carcase construction. Standard deviation scores 5.56 of students in experimental group was also less than standard deviation of 5.60 in control group, indicating that variability of students' scores were much closer to mean in experimental group than in control group.

Research Question 2

Table 2: Mean and Standard Deviation Scores of Woodwork Students' Academic Achievement in Framing Construction in Experimental and Control Groups.

Group	N	Pre-test		Post-test		Mean Difference
		Mean	SD	Mean	SD	
Experimental	87	35.55	4.70	48.09	3.74	12.54
Control	70	34.42	4.02	37.49	5.22	3.07

Table 2 shows that achievement means score of the experimental group was 35.55 with standard deviation of 4.70 in pre-test. Experimental group post-test mean score was 48.09 and standard deviation of 3.74 having 12.54 mean gains in framing construction. In control group, pre-test mean score was 34.42 with standard deviation of 4.02; post-test mean score was 37.49 with standard deviation of 5.22 and 3.07 as mean gain. Students in experimental group shows greater mean gain of 12.54 over those in control group with 3.07 as mean gain. Standard deviation 3.74 in experimental group was lower than standard deviation of 5.22 in control group. This means that students scores in control group were more scattered away from the mean compared with experimental group.

Research Question 3

Table 3: Mean and Standard Deviation Scores of Woodwork Students' Academic Achievement on Finishing Processes in the Experimental and Control Groups

Group	N	Pre-test		Post-test		Mean Difference
		Mean	SD	Mean	SD	
Experimental	87	41.12	8.26	46.82	9.08	5.70
Control	70	36.24	7.98	40.48	9.88	4.24

Table 3 shows analysis of achievement mean scores using K-YAN multimedia learning method and lecture teaching method in finishing process. The Table showed that experimental group had mean score of 41.12 with standard deviation of 8.26, while post-test mean score was 46.82 with standard deviation of 9.08, and mean difference of 5.70. In control group students had mean score of 36.24 and standard deviation of 7.98 in pre-test, while in post-test, mean score was 40.48 with standard deviation of 9.88 and 4.24 as mean difference. This implies that, students performed better in finishing processes in experimental group with mean difference of 5.70 than those in control group with 4.24 as mean difference. However, standard deviation of 9.88 in control



group is higher than standard deviation in experimental group which was 9.08. This shows that students' scores in the experimental group were more clustered around the mean than those in control group during finishing processes.

Hypothesis 1

Table 4: Analysis of Covariance (ANCOVA) on Mean Academic Achievement of Woodwork Technology Students in Carcase Construction When Taught Using K-YAN Multimedia and Those Taught Using Lecture Method

Source	Type III Sum Of Squares	Df	Mean Square	F	Sig
Corrected Model	21243.07	2	10621.53	213.03	.000
Intercept	7569.90	1	7569.90	151.82	.175
Pretest	92.28	1	92.28	1.85	.000
Treatment	20768.22	1	20768.22	416.54	.000
Error	8924.57	179	49.85		
Total	507024.00	182			
Corrected Total	30167.64	181			

R Squared = .704 (Adjusted R Squared = .701)

Table 4 shows analysis of covariance (ANCOVA) for difference in academic achievement of students taught carcase construction using K-YAN multimedia and those taught using lecture method regarding their performance mean scores in carcase construction. Data presented showed that there was a statistical difference in academic performance means scores of students taught carcase construction with K-YAN multimedia and those taught using lecture method. This was because P-value (0.000) was less than alpha level of 0.05. Hence, the null hypothesis was rejected implying that there was significant difference in academic performance of students taught carcase construction using K-YAN multimedia instructional strategy and those taught using lecture method.

Hypothesis 2

Table 5: Analysis of Covariance (ANCOVA) on Mean Academic Achievement of Woodwork Technology Students in Frame Construction When Taught Using K-YAN Multimedia and Those Taught Using Lecture Method

Source	Type III Sum of Squares	Df	Mean Square	F	Sig
Corrected Model	14217.70	2	7108.85	240.64	.000
Intercept	6154.07	1	6154.07	208.32	.000
Pretest	134.17	1	134.17	4.542	.059
Treatment	14034.51	1	14043.51	475.38	.011
Error	5287.86	179	29.54		
Total	461697.00	182			
Corrected Total	19505.56	181			

a. R Squared = .729 (Adjusted R Squared = .726)

Table 5 shows analysis of covariance (ANCOVA) for difference in academic achievement of students taught framing construction using K-YAN multimedia and those taught using lecture method regarding their performance mean scores in framing construction. The data presented showed there was statistical difference in academic performance mean scores of students taught framing construction with K-YAN multimedia strategy and those taught using lecture method concerning their performance mean scores. This was because P-value (0.011) obtained was less than alpha level of 0.05. Hence, the null hypothesis was rejected, implying there was significant difference in academic performance means score of students taught framing construction using K-YAN multimedia instructional strategy and those taught using lecture method.



Hypothesis 3

Table 6: Analysis of Covariance (ANCOVA) on Means Academic Achievement of Woodwork Technology Students in Finishing Process When Taught Using K-YAN Multimedia and Those Taught Using Lecture Method

Source	Type III Sum Of Squares	Df	Mean Square	F	Sig.
Corrected Model	10222.66	2	5111.33	149.24	.000
Intercept	2290.48	1	2290.48	66.87	.000
Pretest	9973.38	1	9973.38	291.20	.056
Treatment	1050.74	1	1050.74	30.68	.012
Error	6130.52	179	34.24		
Total	501951.00	182			
Corrected Total	16353.19	181			

a. R Squared = .625 (Adjusted R Squared = .621)

Table 6 showed an analysis of covariance (ANCOVA) for difference in academic achievement of students taught finishing processes using K-YAN multimedia and those taught using lecture method regarding their performance mean scores in finishing construction. Findings showed that there was statistical difference in academic performance means scores of students taught finishing construction with K-YAN multimedia strategy and those taught using lecture method in their performance mean scores. This was because P-value (0.012) obtained was less than alpha level of 0.05. Hence, null hypothesis was rejected, implying that there was statistical difference in academic performance of students taught finishing process using K-YAN multimedia instructional strategy and those taught using lecture method.

Findings of the Study

1. The study discovered that the students taught carcass construction in woodwork technology with K-YAN multimedia performed significantly better than those taught with lecture method
2. The study discovered that the students taught framing construction in woodwork technology with K-YAN multimedia performed significantly better than those taught with lecture method in the areas of carcass construction, framing construction and finishing processes.
3. The study discovered that the students taught finishing processes in woodwork technology with K-YAN multimedia performed significantly better than those taught with lecture method.

Conclusion

The study explored the effect of K-YAN multimedia instructional strategy on NCE (T) 11 student's academic achievement in woodwork technology in Federal Colleges of Education (Technical) in North-East Nigeria. K-YAN multimedia instruction was found effective for learning woodwork technology concepts. The students taught using the K-YAN multimedia learning mode of instruction performed better. K-YAN multimedia learning represents an effective method in teaching woodwork technology, and it reflects positively on the students' performance in the specific subject. This method of teaching has an advantage because of the use of pictures; videos and animation, which made the teaching more interactive and easier for teaching and learning and can be followed up by students after the lesson without the presence of the teacher. The use of the K-YAN multimedia learning strategy played major role in turning the educational environment to be creative and interactive. Both the teacher and the learner plays major role in K-YAN multimedia learning, thus, the class turns into fun. In addition, the interaction between the learner and the learning materials in the K-YAN multimedia learning environment without the need for the presence of the teacher, developed the skill of self-learning. In other words, it allows the transition of education from learning and concentration on the teacher to be more on the learner and thereby improved the quality of learning process as a whole.



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