



EFFECTS OF VIDEOTAPED INSTRUCTIONAL METHOD ON STUDENTS' ACADEMIC ACHIEVEMENT IN BASIC TECHNOLOGY IN SECONDARY SCHOOLS IN ANAMBRA STATE

Peter I. Okoye¹⁺
Kelvin I. Mbanefo²

^{1,2}Nnamdi Azikiwe University, Awka, Anambra State, Nigeria.

¹Email: px.okoye@unizik.edu.ng Tel: +2348037588548

²Email: kelvinmba@yahoo.com



(+ Corresponding author)

ABSTRACT

Article History

Received: 20 July 2020

Revised: 24 August 2020

Accepted: 14 September 2020

Published: 29 September 2020

Keywords

Videotaped instructional method
Basic technology
Academic achievement
Secondary school.

The study determined the effects of videotaped instructional method on students' academic achievement in basic technology in secondary schools in the State. Two research questions guided the study while two hypotheses were tested at 0.05 level of significance. The study adopted a non-randomized quasi experimental research design. The population was 11,129 students offering basic technology out of which 102 constituted the sample size. Purposive sampling technique was used to select two intact classes. The instrument for data collection was Basic Technology Achievement Test (BTAT) which contained 10 objective questions. The instrument was validated by three experts, and yielded the reliability coefficient 0.84 which was established using Cronbach Alpha. Mean was used to analyze data relating to research questions while Analysis of Covariance (ANCOVA) was used to test the null hypotheses. Findings revealed among others that students taught Basic Technology using videotaped instructional method performed better with higher post-test scores than those taught with conventional method. Sequel to the findings, the researchers concluded that videotaped instructional method could improve students' academic achievement in Basic Technology. It was therefore recommended among others that basic technology teachers should use videotaped instructional method to enable students effectively learn and assimilate what they learnt in order to improve on their academic achievements.

Contribution/Originality: The paper primary contribution is finding that Videotaped Instructional Method could enhance students learning of Basic Technology.

1. INTRODUCTION

Education is regarded as a necessity for human survival and national development. It is also, perceived as a conveyor belt that actuates the transfer of knowledge and skills required for employment. Ogbuanya and Okoye (2015) posit that education is a potential instrument for social change which often brings about societal wellbeing and political awareness which ultimately promotes economic development. Ogbuanya and Okoye (2015) also maintained that education is not limited to the classroom affairs but also a channel through which humanity explores and optimizes the gifts of nature, in order to establish universal community. Based on the foregoing, technical and vocational education and engineering were introduced with different component trades and modules designed to impart in individuals requisite skills for employment. Acquisition of the skills and the know-hows enables the recipients become professionals who can employ creativity in discharging their functions. That is why creativity is considered an indispensable tool which 21st Century trades (Okoye, 2019).

Since, creativity entails the use of skills, expertise and competence to do a work, create and modify a system in order to increase the quality of services rendered to humanity (Okoye & Nnajofofor, 2019) nations are expending

heavily in education system that avails learners the opportunity to acquire the skills needed to build individuals, and advance their economy socio-politically and technologically. Interestingly, the need to acquaint students with the skills to optimize their creative and innovative ingenuities necessitated the introduction of basic technology at upper basic level, to expose learners to the fundamental of engineering, sciences and technology (Federal Republic of Nigeria, 2013). Basic technology, aside being offered under the Upper Basic Education (UBE) programme, was configured to provide students with technological literacy required for everyday living (Uwaifo, 2011). Uwaifo further substantiated that it provides pre-vocational orientation for future development of skills and training in technology as well as stimulates creativity. Basic technology is offered in the Junior Secondary School (JSS) as a core subject like mathematics. In furtherance of this, the series of introductory technology for Junior Secondary Schools, which consist of three books, were revised and renamed basic technology for Junior Secondary Schools. Basic technology was designed in accordance with the new curriculum developed by the Nigerian Educational Research and Development Council (NERDC) for the Nine-Year Basic Education programme (Federal Republic of Nigeria, 2013). The content covers synthetic and natural materials, wood, plastic and ceramics, energy and machines needed to establish a flexible platform and sustainable bedrock for a successful technological advancement of the country. Hence, these constituted the objectives of basic technology.

Interestingly, the objectives of basic technology are: to inculcate in learners manipulative skills, inventive ingenuity, respect for dignity of labour as well as healthy attitude towards technological practices (Datuba & Ekeyi, 2013). This implies that, basic technology has the potency to impart in learners the urge to rediscover their potentials and exploit them for their sustenance. Unfortunately, the realization of the aforementioned objectives, as adjudged from students' achievements in various examinations seems impracticable. In the same vein, Adegoke (2011) laments that poor achievement of students in Basic Technology in Nigerian school system is not only unimpressive, but also, quite perturbing to all those concerned about the future of Nigeria. Evidently, the analyses of academic achievement of students in Basic Technology examinations from 2010 to 2015 revealed that about 50 percent of students who sat for the exams scored credit on the average (Puyate, 2015). The testimony does not portend an impressive signal, and therefore yearning for the way out. Apparently, the poor achievement of students in basic technology exams seems to raise some doubts over the realization of its objectives as enshrined in the policy document (Federal Republic of Nigeria, 2013). Scholars have linked this failure to myriad of factors, such as dearth of competent teachers, lack of instructional aids, lack of functional workshops, use of teaching methods, teacher/students' attitudes to learning among others. Similarly, some schools of thoughts have contended that Nigerian education system is not only fundamentally defective but also incapacitated by socio-political problems. Obanya (2013) also encapsulated some challenges to Nigerian education system as follows: proliferation of schools, shortage of qualified teachers, inordinate curricula, lack of equipment and facilities, poor funding, belief system and misinformed resistance to change. Okoye (2019) also attributed lack of willpower, undue apathy as well as over dependence on foreign policies and ideologies at the expense immeasurable potentials endowed to the nation as part of the woes to its education system at all levels. Amidst these shortcomings that tend undermine effective teaching and learning of some core subjects, including basic technology which has the potential to spark up technological development of a nation, the use of conventional teaching methods seems to be one of the most tropical factors responsible for the colossal failure among secondary schools students in Nigeria (Okoye, 2019; Puyate, 2015).

The conventional teaching method is classroom-based and consists of talk – chalk and direct instruction conducted by the teacher (Okoye, 2019). It is also known as teacher-centered instructional method. Teacher-centered teaching method depicts a learning situation under the teacher's guidance at all times. In a teacher-centered learning environment, students are expected to listen as the teacher teaches and directs the learning activities holistically. The teacher often talks to the students instead of encouraging them to interact, ask questions, or make them understand the lesson thoroughly. Most classes involve rote learning, where the students depend on memorization without having a complete understanding of the subject. Just passing the test, consisting of

descriptions, matching, and other forms of indicators, is all that matters to complete the curriculum (Adegoke, 2011). Conversely, other schools of thought have contended that teaching methods based on constructivist's theory or students' centered learning, such as videotaped instructions, appear quite effective in teaching technology based subjects or courses. To this end, Ajayi-Dopemu and Talabi (2010) affirmed that gender does not influence learning outcomes but rather, the intelligent quotient and attitude to learning do. From empirical evidence, educators have seen the exigency to reconsider the methods and techniques employed by teachers in delivering instructions in junior secondary schools, and therefore clamour for the adoption of instructional approaches that are supported by technology, that could motivate and encourage students to learn with ease, understand and retain basic technology concepts so as to achieve better results. According to Mayer, Dow, and Mayer (2010); Kuti (2012) and Adegoke (2011) one of the most effective computer aided teaching approaches is that that involves multimedia presentation supported in visual and verbal formats supplemented with pictures, animations, texts and narration which is in form of videotaped instructions. In the same vein, some scholars are of the opinion that the use of videotaped instructional method may likely save time, cost and also bridge the existing gap caused by shortage of competent teachers (Kuti, 2012). Brown in Aroh (2014) opined that videotaped instructional method has the potentials of increasing the possibility that students exposed to it could learn and retain better what they learnt, develop more skills as well as improve their academic achievements. In view of the foregoing narratives, the use of videotaped instructional method seems to possess the capacity to enhance quality learning, arouse learners' interest and stimulate thinking ability as well as concretize knowledge that could otherwise been dealt with in abstraction. It was in hope that videotaped instructional method, if appropriately applied could spur students to learn effectively, and also improve their academic performance that compelled the researchers to embark on this study.

1.1. Problem Statement

The consistence poor achievement of students in Basic Technology at the Junior Secondary School Certificate Examination is quite disturbing and apparently negates every decisive roadmap or plan to develop the country technologically. Unarguably, if this despicable trend subsists awhile, students could be denied the opportunity to acquire creative and innovative skills needed to compete globally, and this could in turn hamper the realization of the envisioned industrialization and technological advancement of the country. Cognizant of the impact of the foregoing to socio-economic status and viability of the nation prompted the researchers' curiosity to unravel possible factors that could be susceptible to poor achievement of students in basic technology examinations. To this end, researchers' interactions with Basic Technology teachers and students revealed that there are lots of challenges militating against effective teaching and learning of the subject; among which, use of inappropriate teaching methods appeared most significant. In a bid to chart the way forward and bridge the knowledge gap about this approach, the study ascertained the effects of videotaped instructional method on students' academic achievement in basic technology in secondary schools.

1.2. Purpose of the Study

Specifically, the study investigated the effects of videotaped instructional method on:

1. Students' academic achievement in basic technology using their pre-test and post-test mean scores.
2. Academic achievement of male and female students using their pre-test and post-test mean scores.

1.3. Research Questions

The study was guided by the following research questions:

1. What are the effects of videotaped instructional method on students' academic achievement in basic technology when compared with those taught with conventional method using their pre-test and post-test mean scores?

2. What are the effects of videotaped instructional method on male and female students' academic achievement in basic technology when compared with those taught with conventional method using their pre-test and post-test mean scores?

1.4. Hypotheses

The following hypotheses were tested at 0.05 level of significance:

1. There is no significant difference on the effects of videotaped instructional method on students' academic achievement in basic technology when compared with those taught with conventional method using their pre-test and post-test mean scores.
2. There is no significant difference on the effects of videotaped instructional method on the male and female students' academic achievement in basic technology when compared with those taught with conventional method using their pre-test and post-test mean scores.

2. METHODOLOGY

The study adopted a quasi-experimental research design with non-randomized pre-test and post-test control groups. A quasi-experimental research design shows the causal relationship between dependent and independent variables as well as involves the use of intact class or classes. The population of the study comprised all the 11,129 (male = 5372 and female = 5757) JS2 students that offered Basic Technology in the 18 co-educational public junior secondary schools in Awka South Local Government Area of Anambra State. The reason for choosing JS2 students for the study was to ensure that they were conversant with the terminologies and also not preparing for the external examinations. A simple random sampling technique was used to select two (2) out of the 18 co-educational public schools which gave a sample size of 102 (56 males and 46 females). In getting the sample size, all the 18 co-educational public schools were given equal chance to be selected in the sample by tearing paper into 18 pieces with only 2 pieces tagged "YES" while the other 16 pieces written "NO", and all the papers properly folded and shuffled in a basket. An independent colleague was invited to stand for each of the 18 schools and picked on their behalf. At the end, two schools were selected, namely: Community Secondary School, Amawbia which was assigned experimental and Community Secondary School, Okpuno was designated control groups respectively. One intact class each was selected from each of the schools formed the sample of the study. The researchers prepared two lesson plans for both the experimental and control groups covering the following topics: electrical circuit, wiring, wiring tools, material and wiring accessories based on Basic Technology syllabus. The experimental group was taught with videotaped instructional lesson plan while the control group was taught using the conventional lesson plan. Basic Technology Achievement Test (BTAT) with 10-item multiple-choice test validated by three experts in the field was the instrument used for data collection while its reliability coefficient was determined using Kuder-Richardson -21 which yielded 0.81. The value was considered appropriate for the study. The JS2 Basic Technology teachers administered both the pretest and posttest before the commencement and at the end of the four weeks treatment respectively and subsequently, turned in the scripts to the researchers who marked, collated and analyzed data thereafter. Whilst, mean statistics was used to answer the research questions, Analysis of Covariance, ANCOVA was used to test the hypotheses at 0.05 level of significance. ANCOVA was considered effective in controlling the differences associated with pretest, posttest group design (Uzoagulu, 2011) hence, was adopted for the hypotheses testing. Based on the ANCOVA, hypotheses with p-value greater or equal to the level of significance (0.05) were regarded as significant, otherwise, were considered not significant.

3. RESULTS

Research Question 1: What is the difference in academic achievement mean scores between students taught basic technology using videotaped instructional method and those taught using the conventional method?

Table-1. Pre-test and post-test academic achievement mean scores of students taught basic technology in the both groups.

Group	N	Post-test Mean	Pre-test Mean	Mean difference
Experimental	52	36.80	25.90	10.90
Control	50	34.50	25.72	8.78

Table 1 indicates that the experimental group had a post-test mean score of 36.80 and a pre-test mean score of 25.90 with a mean difference of 10.90 while those in the control group had post-test mean score of 34.50 and a pre-test mean score of 25.72 with a mean difference of 8.78. In other words, the experimental group had a higher mean score (in terms of achievement) than their counterparts in the control group.

Research Question 2: What is the difference in academic achievement mean scores of male and female students taught basic technology with videotaped instructional method using their pre-test and post-tests scores?

Table-2. Achievement scores male and female students in the pretest and posttest as well as mean difference.

Gender	N	Post-test Mean	Pre-test Mean	Mean difference
Male	29	36.40	24.90	11.50
Female	23	35.90	24.72	11.18

Table 2 reveals that male students had a post-test mean score of 36.40 and a pre-test mean score of 24.90 with a mean difference of 11.50 while the female students had post-test mean score of 35.90 and a pre-test mean score of 24.72 with a mean difference of 11.18. By implication, both groups performed well but the male students seem to do slightly better than their female counterpart as evidenced by the mean scores.

Hypotheses 1: There is no significant difference on the effect of videotaped instructional method on academic achievement of students taught Basic Technology using their pre-test and post-test mean scores.

Table-3. Summary of ANCOVA of posttest achievement scores (treatment x groups)

Source	Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	670.815	2	167.701	15.746	.000
Intercept	7073.732	1	7073.732	663.961	.000
Pre-Test	17.003	1	17.003	1.596	.221
Treatment	478.612	1	478.612	44.924	.000
Groups	6.075	1	6.075	0.561	.102
Error	1095.746	100	4.454		
Total	33813	102			
Corrected Total	1338.865	102			

Note: R squared = .230 (Adjusted R = .224).

The data in Table 3 showed that there was a significant effect of treatment on academic achievement of students in Basic Technology ($F = 44.92, p < .05$). Based on the results of the analysis, the hypothesis was rejected, indicating that the use of videotaped instruction had effect on achievement in Basic Technology.

Hypothesis 2: There is no significant difference on the effect of academic achievement of female and male students taught Basic Technology with videotaped instructional method using their pre-test and post-test mean scores.

Table-4. Analysis of covariance (ANCOVA) of academic achievement mean scores of male and female students taught basic technology using videotaped instructional method.

Source	Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	1164.528	2	566.882	33.688	.000
Intercept	625.094	1	625.094	12.332	.000
Treatment	912.839	1	912.839	54.367	.000
Gender	523.933	1	523.970	0.931	.000*
Treatment*Gender	516.040	1	516.032	1.016	.177
Error	5453.397	50	22.817		
Total	36456.012	52			
Corrected Total	2584.159	52			

Note: R squared = .183 (Adjusted R = .181) * Significant, $P < 0.05$.

Table 4 shows that $F = 0.931$; $P < 0.05$ in respect of treatment. This indicates that there is a significant difference in the academic mean scores of male and female students taught basic technology with videotaped instructional method. The null hypothesis indicated there was no significant difference, and thus was rejected.

4. DISCUSSION

Findings in Table 1 revealed that academic achievement mean score of students in experimental group taught Basic Technology using videotaped instructional method is higher than their counterparts in control group who were taught with conventional method. The findings was in agreement with the submission of Okoye (2019) which upheld that experimental group taught with student-centred teaching method performed better than their counterparts taught with conventional method. This was further acknowledged by the findings of Adegoke (2011) that posits that the use of electronic gadgets could enhance students' academic achievements technology-related courses or subjects. Based on the foregoing submissions, it could be deduced that application of videotaped instructional method in teaching basic technology could aid students to achieve better results in their examinations. Apparently, the outcome of the hypothesis testing substantiated the aforesaid findings as it upholds that, a significant difference exists.

In a bid to establish the effects of videotaped instructional method on academic achievement of students in respect of gender, the achievement scores of male and female students were subjected to statistical testing. The findings revealed that the method impacted positively on the academic achievements of both male and female students, but their academic achievement difference mean scores indicated that male students exposed to experimental condition got slightly higher score than that of their female counterpart. On the other hand, the hypothesis revealed that there was no significant difference in their achievement. The findings corresponded with the assertion of Ajayi-Dopemu and Talabi (2010) that gender does not influence learning outcomes but rather the intelligent quotient and attitude to learning do. It is therefore, concludes that the academic achievement of female students taught basic technology with videotaped instructional method does not significantly differ from their male counterpart in the same group.

5. CONCLUSION

The findings of the study showed that students taught in experimental group obtained significantly higher scores than their counterparts in the other group. This shows that adoption of technological devices in the learning process could enhance teaching and learning of basic technology, and consequently improve students' performance. Sequel to the foregoing, the paper therefore, concludes that proper application of videotaped instructional method in teaching Basic Technology could enhance students' understanding of the subject, and ultimately improve their academic achievement in examinations.

6. RECOMMENDATIONS

Based on the findings, the following recommendations were proffered:

1. Basic Technology teachers should be encouraged to use videotaped instructional method in teaching Basic Technology concepts. This would enable students to understand and participate actively in lessons in order to perform well in examinations.
2. Basic Technology experts and curriculum planners should be actively involved in the development and production of videotaped instructional packages to ensure that they are configured to facilitate the realization of the expected instructional objectives.
3. Ministry of Education should provide schools with the necessary facilities and gadgets, such as steady power supply, DVD players and multimedia projectors to facilitate their effective utilization for successful instructional delivery.

4. Students should be motivated and encouraged embrace to Videotaped instructional method in learning basic technology and related subjects to foster better understanding and mastery of the subjects which could invariably enhance their academic achievements.

Funding: This study received no specific financial support.

Competing Interests: The authors declare that they have no competing interests.

Acknowledgement: Both authors contributed equally to the conception and design of the study.

REFERENCES

- Adegoke, B. A. (2011). Effect of multimedia instruction on senior secondary school students' achievement in physics. *European Journal of Education Studies*, 3(3), 537-541.
- Ajayi-Dopemu, Y., & Talabi, J. K. (2010). Effects of videotaped recording on microteaching training techniques for education students. *Journal of Educational Television*, 12(1), 39-44. Available at: <https://doi.org/10.1080/0260741860120105>.
- Aroh, D. C. (2014). *Effects of videotaped instruction on secondary school students' achievement and interest in mathematics*. An Unpublished M.Ed Thesis, Department of Science Education, University of Nigeria Nsukka.
- Datuba, N., & Ekeyi, N. (2013). Student's performance in introductory technology at the junior secondary school certificate examination in Ankpa Local Government Area of Kogi State, Nigeria. *Journal of Education and Practice*, 4(3), 150-157.
- Federal Republic of Nigeria. (2013). *National policy on education*. Lagos: NERDC Press.
- Kuti, J. B. (2012). *Effects of multimedia instructional strategy on senior secondary students' learning outcomes in physics in Ogun State, Nigeria*. Unpublished Master's Project. University of Ibadan, Ibadan, Nigeria.
- Mayer, R. E., Dow, G. T., & Mayer, S. (2010). Multimedia learning in an interactive self-explaining environment : What works in the design of agent-based micro worlds? *Journal of Educational Psychology*, 4(2), 806-813.
- Obanya, M. (2013). Curriculum: The position and state in our educational institutions. *Education Today*, 6(1), 1-2.
- Ogbuanya, T. C., & Okoye, P. I. (2015). Repositioning technology and vocational education and training for poverty reduction in Nigeria. *International Journal of Vocational and Technical Education Research*, 1(2), 10-21.
- Okoye, P. (2019). Effects of constructivist instructional method on low achievers Academic performance and retention in automechanics in technical colleges. *Review of Knowledge Economy*, 6(1), 1-8. Available at: <https://doi.org/10.18488/journal.67.2019.61.1.8>.
- Okoye, P. I., & Nnajiolor, F. N. (2019). Technical and vocational education and training and inclusive education: Towards entrenching creative innovation for technological advancement in Nigeria. *Interdisciplinary Journal of African and Asian Studies*, 5(2), 14-28.
- Puyate, S. T. (2015). Constraints to the effective implementation of vocational education programme in private schools in porthacourt local government area. *International Journal of Work-Integrated Learning*, 9(2), 59.
- Uwaifo, V. O. (2011). School-based approaches to skill identification models in Introductory technology under the universal basic education system in Nigeria. *Journal of Research in Education and Society*, 2(1), 46-58.
- Uzoagulu, A. E. (2011). *Practical guide to writing research project reports in tertiary institutions*. Enugu: John Jacob's Classic Publishers Ltd.

Views and opinions expressed in this article are the views and opinions of the author(s), World Journal of Vocational Education and Training shall not be responsible or answerable for any loss, damage or liability etc. caused in relation to/arising out of the use of the content.