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EFFECT OF VIDEO CLIP ON JUNIOR SECONDARY TWO STUDENTS' ACHIEVEMENT IN BASIC SCIENCE AND TECHNOLOGY IN JOS-NORTH, PLATEAU STATE, NIGERIA

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ABSTRACT

The study investigated the effect of video clip on junior secondary school two (JSS2) students' achievement in Basic Science and Technology in Jos-North, Plateau State, Nigeria. Two objectives were identified; two research questions tested, and two hypotheses were tested at 005 level of significance. The study utilized quasi-experimental research design. The population for the study comprised all 1648. JSS2 students. Purposive sampling technique was employed to select two schools with 40 students and 32 students for experimental and control groups respectively. The Basic Science and Technology Achievement Questionnaire (BSTAQ) was used to collect data from respondents. The reliability of the instrument was 0.78 using Cronbach's Alpha. Descriptive statistics of mean and standard deviation were used to answer the research questions. Analysis of Covariance(ANCOVA) was used to test the hypotheses at 0.05 level of significant. The study found among others that the achievement mean score of students in Basic Science and Technology was higher in favour of the experimental group, there was a slight disparity in achievement between male and female students in Basic Science and Technology after exposure to treatment in favour of female students, and there was a significant difference in achievement mean scores of students in Basic Science and Technology after exposure to treatment. The study recommended among others, that the use of video clips: instructional strategy should be adopted in schools for teaching Basic Science and Technology, and teachers should be trained on how to effectively use video clips in classroom instruction to maximize student engagement and improve learning outcomes.

Key words: Achievement Basic Science and Technology Video clips

INTRODUCTION

Recorded lessons that are available on-line have functions such as 'play' 'forward', 'rewind', and 're-watch', providing students with the convenience of listening to lessons at their own pace. For this reason, on-line classes are expected to complement the weaknesses of long-distance classes and physical, face-to-face classes. Video clip multimedia for on-demand or video conferencing has become standard methods for many to obtain information (Islam, Kim, & Kwon, 2020b). It is also important to pay attention to teaching and learning strategies to provide learners with a quality learning environment that can compensate for the physical learning environment.

Video clips are widely used in various educational settings to deliver content, explanations, and demonstrations to students outside the traditional classroom. In the context of JSS2 students in Jos-North, Plateau State, the incorporation of video clips into the teaching of Basic Science and Technology holds great potential for transforming the way students engage with and understand complex scientific concepts. Basic Science and Technology is a foundational subject that provides students with essential knowledge about the natural world, scientific principles, and critical thinking skills. However, teaching and learning Basic Science and Technology can be challenging due to the abstract nature of certain concepts and the need for visualizations and real-world examples (Hoffler & Leutner, 2017).

Basic Science and Technology refers to the foundational and fundamental scientific knowledge and principles taught to students at the primary and junior secondary education levels. Basic Science and Technology is typically a subject taught as part of the Nigerian educational system and covers a wide range of scientific concepts, often integrated with practical aspects. The primary

objectives of teaching Basic Science and Technology in Nigeria include developing a scientific mind-set, promoting critical thinking, and building a solid foundation in science-related disciplines.

The persistent challenge of poor achievement in Basic Science and Technology in Jos North Local Government Area of Plateau State, Nigeria, is a matter of concern. One major factor contributing to this issue is the prevalence of teacher - centred instructional methods. This approach has resulted in disengaged students who lack enthusiasm for the subject. Traditional pedagogical approaches have proven ineffective in capturing the attention of students, leading to a decline in and academic outcomes, hence the need for an alternative teaching strategy such a video clips.

OBJECTIVES OF THE STUDY

The objectives of the study are to:

1. determine the pre-test and post-test achievement mean scores of JSS2 students in Basic Science and Technology in the experimental and control groups.
2. find out the post-test achievement mean scores of JSS2 students in the experimental group based on gender.

RESEARCH QUESTIONS

The following research questions guided the study:

1. What are the pre-test and post-test achievement mean scores of JSS2 students in Basic Science and Technology in the experimental and control groups?
2. What are the post-test achievement mean scores of JSS2 students in Basic Science and Technology in the experimental group based on gender?

HYPOTHESES

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

1. There is no significant difference in the pre-test and post-test achievement mean scores of JSS2 students in Basic Science and Technology in the experimental and control groups.
2. There is no significant difference in the post-test achievement mean scores of JSS2 students in Basic Science and Technology in the experimental groups based on gender.

LITERITURE REVIEW

Video clips are versatile educational resources encompassing lectures, demonstrations, and tutorials, accessible through digital platforms like websites and learning management systems (Haleem, Javaid, Qadri, and Suman, 2022). These videos offer a spectrum of content tailored for diverse learning needs, providing supplementary material and engaging visual aids that complement traditional educational methods. Despite video's potential as a sensory learning medium fostering comprehension and retention, institutions encounter hurdles in harnessing its benefits effectively, resulting in underutilization in most educational settings in the region.

While videos serve as effective learning catalysts by providing context and visual representations of concepts (Karppinen, 2015), concerns persist regarding potential biases and interpretational limitations in their use for classroom teaching (Goldman, 2017). Furthermore, assessing the true effectiveness of a video as an instructional medium remains complex and contentious, and the production cost of high-quality videos strains institutions resource-wise, especially in Sub-Sahara Africa and other developing regions (Rahm & Reed, 2017).

Over the past two decades, video-based instruction has gradually gained acceptance as an alternative and supplement to traditional classroom teaching in Sub-Sahara African countries like Ghana, particularly in tertiary education institutions. These videos afford students the flexibility to navigate content at their own pace, enabling personalized learning experiences. Their accessibility allows learning from anywhere with an internet connection, facilitating deeper understanding and knowledge retention (Karppinen, 2015).

Science and technology interplay with the society to bring about sustainable development before, during and after the post COVID-19 era. Nations that are considered to be developed and largely considered as civilized have achieved that status through purposeful scientific education of their citizens. In Nigeria, education is perceived as an instrument for achievement of national objectives (Odili, Ebisine & Ajuar, 2011). According to the National Policy in Education, Federal Republic of Nigeria, FRN, 2014), education is an "instrument per excellence" for achievement of national development. This explains the huge amount of money government earmarks for education in its annual budget. To buttress the emphasis on science and technology education in the National Policy on Education, Basic Science and Technology has been made mandatory as a subject for all Nigerian children at the basic education level.

Achievement serves as a crucial benchmark within education, encapsulating the realisation of both short-term and long-term educational objectives (Ingersoll & Wainer, 2014). It stands as a cornerstone, often evaluated through assessments or examinations, providing a fundamental measure to assess the success of students, educators, and educational institutions. Tangible markers of academic achievement, such as secondary school certificates or bachelor's degrees, underscore the fulfilment of these educational milestones amidst ongoing debates about evaluation methods and the varying significance of different knowledge domains, from procedural skills to factual knowledge (Ingersoll & Wainer, 2014). The impact of academic achievement extends deeply into the lives of students, shaping their future educational trajectories significantly. Metrics like grade point average (GPA) or standardised tests like the Scholastic Assessment Test (SAT) play a pivotal role in determining access to higher education, acting as gatekeepers for further learning (Awodun, 2021). They delineate individuals' eligibility for pursuing advanced education, thereby establishing a critical link to higher learning opportunities.

Gender roles, primarily shaped through childhood socialisation, peer influences, and stereotyped work expectations, categorise individuals into male and female domains. This categorization significantly impacts societal beliefs, behaviours, and opportunities, aligning certain subjects and professions as 'masculine' or 'feminine.' Fatokun and Odagboyi (2016) highlighted the suppression of women's roles in societal development efforts. Certain fields, like science and mathematics, are often perceived as masculine, while others, such as home economics, are considered feminine, further perpetuating gender-based distinctions.

Studies by United Nations Women. (2016) revealed disparities in knowledge between male and female teachers, emphasising male teachers' depth in certain subjects like environmental education. United Nations, UN, 2016, underscored the prevalence of patriarchal values that reinforce the notion of male superiority, leading to power imbalances favouring men. Moreover, UN Women. (2016) noted gender imbalances in fields like science, technology, engineering, and mathematics (STEM), labelling them as predominantly masculine subjects. This societal perception significantly affects career choices and opportunities for individuals based on their gender.

METHODOLOGY

The study utilized quasi-experimental design, specifically the non-randomized pre-test post-test non-equivalent control group design. Quasi-experimental designs are recognized for their applicability in natural settings and the ability to address real-world educational challenges. The population for the study includes 1,648 JSS2 students studying Basic Science and Technology in 22 public schools in Jos-North, Plateau State. Out of this, a sample of 72 students was drawn from two schools: 32 students from Government Secondary School Jos Jarawa (representing the control group) and 40 students from Government Secondary School Jishe (representing experimental group). Instrument for data collection was the Basic Science and Technology Motivation Questionnaire (BSMQ)**,** comprising 30 items scored on a 4-point Likert scale. The reliability coefficient of the instrument stood at 0.78. The research questions were answered using mean scores and standard

deviations. The hypotheses were tested at a significance level of 0.05 using Analysis of Covariance (ANCOVA).

Research Question One
What are the pre-test and post-test achievement mean scores of JSS2 students in Basic Science and Technology in the experimental and control group?
This research question is treated using the data presented in Table 1.

Table 1: Pre-test and Post-Test Achievement Mean Scores of JSS2 Students in Basic Science and Technology in the Experimental and Control Group.

Group		Pre-test		Post-test			
	N	Mean	SD	Mean	SD	$\overline{x}$	$\overline{x}_G$ Difference
Experimental	40	45.50	4.78	77.60	10.45	32.10	26.75
Control	32	24.76	5.06	30.11	8.99	5.35	

Key
$\overline{x}$ = Mean Gain
$\overline{x}_G$- Difference = Mean Gain difference.

Table 1 presents the mean scores and standard deviation of students in Basic Science and Technology in the experimental and control group. The result for experimental group shows that the pre-test mean score is 45.50 with a standard deviation of 4.78, while the post-test mean score is 77.60 with a standard deviation of 10.45 higher than the pre-test mean score with a mean gain of 32.10, indicating that there was improvement in the achievement of students after treatment. Also, for the control group the mean score was 24.76 with a standard deviation of 5.06 for the pre-test. The post-test mean score was 30.11 and a standard deviation of 8.99 with a mean gain of 5.35. The findings show that students in the experimental group had a higher achievement mean score (77.60) after treatment using diagnostic test with feedback as against those in the control group (30.11) who were not given treatment, with a mean difference of 26.75. This indicates that the use of video clips improves students' achievement in Basic Science and Technology.

Research Question Four
What are the post-test achievement mean scores of JSS2 students in Basic Science and Technology in the experimental groups based on gender?
Research question two was answered using the data presented in Table 2.

Table 2: Post-Test Mean Achievement Scores of JSS2 students in Basic Science and Technology in the Experimental Group Based on Gender

Gender	Post-test			
	N	Mean	SD	X- Difference
Males	13	59.85	18.16	1.81
Females	27	58.04	20.87	

Table 2 reveals the mean scores and standard deviation of students in Basic Science and Technology in the experimental group based on gender. The result for experimental group shows that the post-test mean score among the males is 59.85 with a standard deviation of 18.16, while the post-test mean score among the females is 58.04 with a standard deviation of 20.87. There is

a mean difference of 1.81 in favour of male students. This result shows that male students achieve slightly higher than female students.

Hypothesis One

There is no significant difference in the pre-test and post-test achievement mean scores of JSS2 students in Basic Science and Technology in the experimental and control groups.

Table 3 shows the results summary of ANCOVA result on pre-test and post-test Achievement mean scores of experimental and control groups.

Table 3: Summary of ANCOVA Result of Pre-test and Post-test Achievement Mean Scores of Experimental and Control Groups

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	4497.566[a]	2	2248.783	8.227	.001	.195
Intercept	129.224	1	129.224	.473	.494	.007
Covariate	4461.225	1	4461.225	16.320	.000	.194
GROUP	17.442	1	17.442	.064	.001	.001
Error	18587.927	68	273.352			
Total	444969.000	71				
Corrected Total	23085.493	70				

a. R Squared = .195 (Adjusted R Squared = .423)

Table 3, presents ANCOVA result to determine if a significant difference exists in the pre-test and post-test achievement mean score of students in Basic Science and Technology in the experimental and control groups. The table shows that $F(1,68) = .064$, $p < 0.05$, since the p-value of 0.001 is less than 0.05 level of significance, the null hypothesis was rejected, indicating that there was a significant effect of the treatment on students' achievement in Basic Science and Technology. The result further reveals an adjusted R squared value of .423, which means that 42% of the variation in the dependent variable which is achievement is explained by variation in the treatment, while the remaining is due to other factors not included in this study. This result indicates that there is a significant difference in the pre-test and post-test achievement mean scores of students in Basic Science and Technology in the experimental and control groups. This means that video clips do improve students' achievement in Basic Science and Technology.

Hypothesis Two

There is no significant difference in post-test achievement mean scores of JSS2 students in Basic Science and Technology in the experimental group based on gender.

Table 4 ANCOVA Result on Effect of Gender on Achievement of Students in the Experimental Group

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	94.611[a]	2	47.305	.941	.399	.048
Intercept	6002.623	1	6002.623	119.384	.000	.763
VAR00009	88.496	1	88.496	1.760	.193	.045
Gender	14.394	1	14.394	.286	.596	.008
Error	1860.364	37	50.280			
Total	340331.000	40				
Corrected Total	1954.975	39				

R Squared = .048 (Adjusted R Squared = -.003)

Table 4 shows ANCOVA result which determined if there was a significance effect of gender on achievement of students in Basic Science and Technology after exposure to treatment. The table shows that the main effect of gender $F(1,37) = .286$, $p > 0.05$. Since the p-value of .596 is greater than 0.05 level of significance, the null hypothesis was retained, indicating that there was no significant effect of gender on the achievement of students in Basic Science and Technology after exposure to treatment. The result further reveals an adjusted R squared value of -.003 which means no effect of gender on achievement of Basic Science and Technology. Therefore, there is no notable disparity in achievement between male and female students in Basic Science and Technology

FINDINGS

The analysis of the results yielded the following findings:

1. The achievement mean score of students in Basic Science and Technology was higher in favour of the experimental group
2. There was a slight disparity in achievement between male and female students in Basic Science and Technology after exposure to treatment in favour of female students
3. There was a significant difference in achievement mean scores of students in Basic Science and Technology after exposure to treatment
4. There was no significant difference in the achievement mean scores of students in Basic Science and Technology based on gender

DISCUSSION

The study found that the achievement mean score of students in Basic Science and Technology was higher in favour of the experimental group. This indicates that the use of video clips in teaching Basic Science and Technology has the tendency to improve students' achievement. This finding agrees with the work of The study also found that there was a slight disparity in achievement between male and female students in Basic Science and Technology after exposure to treatment in favour of female students. These findings agree with Ibenegbu, Ubah and Kaina (2020) whose work found that students taught with video clips achieved better than those taught with the traditional lecture method. Again, Cruz, Albino, Tejome, Albino, and Santos (2023) found that students perceived that video clips with subtitles served as better instructional material because they helped them in understanding difficult concepts, keep them engaged, and motivate them to suit their learning style. Furthermore, Omotayo and Michael's (2017) work found that students taught with developed video clips outperformed those students taught without the video clips. The authors also found that the gender of students and school types were not factors in the performance of students when taught with developed video instructional package. Chung and Chung (2017) found that learners of different genders were found to have better learning achievement through digital game-based learning. The usability of the digital game in the study received positive response from learners regardless of gender

CONCLUSION AND RECOMMENDATIONS

There was a significant difference between the post-test achievement mean score of students in Basic Science and Technology in the experimental and control groups. The finding also revealed that there was no significant effect of gender on academic achievement of students in Basic Science and Technology after exposure to treatment. Based on the following, the following recommendations are made:

1. The use of video clips: instructional strategy should be adopted in schools for teaching Basic Science and Technology.
2. Educational interventions in Basic Science and Technology should be designed to be gender-neutral, ensuring equal opportunities for both male and female students.

3. Teachers should be trained on how to effectively use video clips in classroom instruction to maximize student engagement and improve learning outcomes.

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