EFFECTS OF EDUCATIONAL VIDEOCLIPS IN TEACHING FOR ENHANCING ACADEMIC ACHIVEMENT, INTERESET AND RETENTION AMONG SECOUNDARY STUDENT IN GOMBE STATE

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Abstract

The study investigated the effectiveness of educational video clips in enhancing the performance of Secondary Students in Gombe State, Nigeria. A pre-test post-test quasi-experimental research design was adopted with three research questions and three null hypotheses. The sample consisted of 321 students (149 males and 172 females) two secondary schools from each of the three senatorial districts randomly selected junior (Gombe North, Central, and South). Schools were assigned to either the experimental group or the control group within each district. Data collection instruments include multiple-choice questions and Mathematics Achievement Test, interest and retention (MAT) Questionnaire (MIQ). The instruments were validated and pilot tested, yielding reliability coefficients of 0.75 for MAT and 0.87 for MIQ. Data were analyzed using mean, standard deviation, and t-test statistics at a 0.05 significance level. Findings revealed a significant difference in mean achievement ($t(319) = 5.612$, $p = 0.000$) and retention scores ($t(319) = 8.004$, $p = 0.000$) between students taught using recorded video clips and those taught using conventional methods. A statistically significant difference in mean interest scores was found before and after the intervention ($t(319) = -7.216$, $p = 0.000$). It was recommended that Secondary Schools adopt recorded video clips as a supplementary tool in teaching. The Ministry of Education should allocate multimedia resources to each school to develop high-quality, engaging video clips aligned with curriculum standards.

Keyword: achievement, retention, interest, videoclips

Introduction

In stressing the importance of video instruction in educational settings, Fischer, (2017) offer a complementary approach to the traditional method of instructional delivery system. The view agreed with Zhang, Li, & Liu, (2021) who argued that “the best way to alter the modus operandi in delivering instruction such as; teacher centred approach to a learner centred approach, is to bring technology in the classroom using a new method of instructional design". Pekrum & Goez, (2019) added that video instruction is student-centred and encourages learners to be active and responsible for their learning process with little or no guidance from the teacher. The interactivity embedded in video instruction allows for a flexible and self-paced learning experience. Students can navigate through the material at their own speed, moving forward and backward as needed to ensure comprehension. This adaptability supports individual learning preferences and speeds, enabling a more personalized educational experience (Nie, & Zhang, 2020). Additionally, through incorporating various elements such as text, audio, motion pictures, drawings, and animations, video instruction can make complex concepts more accessible and engaging. Therefore, the integration of video instruction in educational settings not only complements traditional teaching methods but also transforms the learning environment into a more dynamic, interactive, and student-centered space (Seaman, & Seaman, 2020). This shift is crucial in

addressing the current imbalance in the use of technology for educational purposes versus entertainment.

The use of video instruction is evident in the proliferation of instructional resources, including animated graphics, audio players, video players, and other digitized tools that facilitate meaningful teaching and learning. These resources have not only eased instructional delivery but also made teaching and learning more interactive and appealing to learners' senses. Researchers such as Poh-sun and Gary (2018) have emphasized that the more senses involved in an instruction, the more concrete the learning becomes. Consequently, instructors need to understand the impact of instructional resources and how to effectively utilize them in preparing and presenting their lessons. Utilizing instructional resources requires a clear understanding of their varied applications, such as appealing to learners' senses of hearing, seeing, touching, and kinesthetic engagement. David Berlo's (SMCR) model of communication identifies the senses as means of collecting information (Means & Padilla, 2020). This understanding highlights the need to integrate multiple senses in instruction, which is best achieved through video. Video combines elements like audio, moving images, graphics, text, and animation into a synergistic and symbiotic whole, offering greater benefits to learners than any single media element alone (Deng, Yuen, & Wong, 2022). Among these elements, video stands out as a crucial component, demonstrating its importance in creating an effective and engaging learning environment.

The effectiveness of video clips as a technique in teaching cannot be overstated because, videos serve as powerful audio-visual resources that provide recorded information, demonstrate classroom activities, and explain complex ideas, concepts, and theories. They combined sounds with pictures, animations, and moving images to enhance teaching and learning. According to Fischer, (2017), videos are significant instructional resources because they appeal to both the senses of sight and hearing, which are crucial for balancing classroom dynamics and enhancing learning outcomes. Thus, it is researchers' conviction that through concretizing abstract concepts, videos bring distant experiences and resources closer to learners, making them more accessible. Additionally, Cook, Mitchell, & Mullin, (2020) opined that video offer the advantage of follow-up drills for private practice and self-study, overcoming barriers of pace, place, and time. They also provide opportunities for students to self-assess through quizzes, enabling them to evaluate their learning progress.

The availability of video recording, editing, and playing facilities has revolutionized the creation and use of videos in educational settings. Nie, & Zhang, (2020) posits that advancements in technology have facilitated the manipulation of video recordings for classroom instruction, leading to the creation of various types of educational videos. These include instructor-made videos using camcorders, iPhones, smartphones, webcams, and digital cameras; re-created video content from existing materials; and the direct use of pre-prepared educational videos available online through platforms like YouTubeEdu, TEDEd, and iTunes. Additionally, Song, & Liu, (2020) stated that instructors can record demonstration videos of classroom activities, and animated videos can be created using inanimate objects, screenshots, images, graphics, and computer-generated characters. These diverse video formats provide multiple ways to enrich mathematics instruction, making learning more engaging and effective.

The production style of educational videos can significantly impact their learning effectiveness. Therefore, selecting a video production style should consider the subject, type and the learners' needs holistically (Song, & Liu, (2020). To align videos with instructional objectives, Zhang, Li, & Liu, (2021) identified six basic video production styles that directly address learners' needs: 1) Classroom lecture with the instructor at the blackboard, 2) Talking head of the instructor at a desk, 3) Digital drawing board (Khan-style), 4) Slide presentation, 5) Studio without an audience, and 6) Computer coding sessions. These styles are typically created by the instructor with technical assistance, following a meticulous presentation format.

Instructor-led instructional videos can be presented in various formats, including direct classroom recordings with a stationary camera, whiteboard illustrations, and screencasts with voice-over narration. According to Zhang, Li, & Liu, (2021), the most popular format is the direct recording of classroom activities facilitated by the course instructor on camera. This format is preferred because students find the presence of the instructor or a human-like animated character (with voice, eye contact, and gestures) more engaging. However, it remains unclear whether learners prefer real human voices over computerized voices in instructional videos. To address these preferences, researchers need to investigate which video production patterns, such as recorded videos and classroom demonstrations, most effectively enhance secondary school students' achievement, retention, and interest. Video clips in this context is a pre-recorded lesson where the instructor delivers instructions with illustrations, dictations, and demonstrations, mimicking conventional classroom settings. These videos provide learners with practical descriptions of concepts, theories, and principles that might otherwise be conveyed verbally. The use of recorded video clips can enhance learning achievement compared to traditional lecture methods, increase students' retention concepts, and revive students' interest in learning especially subject like mathematics (Antell, & Falk, 2020)

Moreover, proficiency in Mathematics is critical for students' academic success and future career opportunities. The subject's rigor and precision prepare students for STEM (Science, Technology, Engineering, and Mathematics) disciplines, which are increasingly in demand in the modern job market (Dowker, 2022). Secondary students both genders who develop a strong mathematical foundation are better positioned to excel in subjects that require quantitative analysis and critical thinking. As such, effective instruction at this level is vital, making the exploration of innovative teaching methods, such as recorded video instruction, essential for enhancing student engagement, understanding, and long-term retention of concepts. This study aims to explore how recorded video clips can significantly affect students' achievement, interest, and retention, considering gender differences. It seeks to investigate effectiveness of utilizing recorded video clips as a technique to enhance the performance of secondary students in Gombe State.

Statement of the Research Problem

The study delves into the effect of educational video clips as a means to bolster the academic performance of junior secondary students in Mathematics across Gombe State. This focus stems from documented evidence of consistently results among students, particularly evident in the Basic Education Certificate Examinations (BECE) of 2021, 2022, and 2023. These assessments revealed widespread difficulty in grasping and applying concepts,

resulting in inadequate academic outcomes. Numerous factors contribute to this issue, including inadequate access to high-quality educational resources, conventional teaching methods that may not sufficiently engage students, and varying levels of proficiency among teachers in delivering instruction. Past interventions, such as teacher workshops and curriculum revisions, have been implemented, alongside limited integration of multimedia resources. However, these efforts have often lacked comprehensive evaluation regarding their impact on students' achievement.

Given the persistent gap between current teaching methodologies and effective student engagement in classroom activities, there is a pressing need for innovative instructional strategies. The proposed approach involves leveraging recorded video instruction, which offers visual and auditory explanations tailored to diverse learning styles and allows for self-paced learning experiences. These strategies are envisioned to enhance student' achievement, retention, interest, and close gender gaps in learning, thereby aiming to address the longstanding challenge of poor performance in secondary students in Gombe State.

Aim and Objectives of the Study

The aim of this study is to explore the effectiveness of recorded video clips in teaching as a technique in enhancing the academic achievement, interest and retention secondary students in Gombe State. The objectives of the study are to:

1. analyze the effect of using video clip in teaching on academic achievement of secondary school students in Gombe state.
2. investigate the influence of video clips in teaching on secondary school students' interest in Gombe state
3. examine the influence on the retention of secondary school students taught using recorded video clips in Gombe state

Research Questions

The following research questions will guide this study:

1. What is the effect of using video clip in teaching on academic achievement of secondary school students?
2. What is the influence of video clips in teaching on secondary school students' interest in Gombe state?
3. What is the influence on the retention of secondary school students taught using recorded video clips in Gombe state

Hypotheses

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

1. There is no significant difference in the mean achievement scores between secondary school students taught using recorded video clips and those taught using conventional class demonstration methods.

2. There is no significant difference in the mean retention scores between secondary school students taught using recorded video clips and those taught using conventional class demonstration methods.

3. There is no significant difference in the student's pre-intervention and post-intervention interest exposed recorded video clips in experimental group.

Significance of the Study

The study is significant to students, teachers, educational policy makers, curriculum developers, students, parents and guardians, researchers, and academics alike, offering insights into how recorded video clips can enhance the teaching and learning of Secondary school students in Gombe State. Teachers can benefit significantly from this study by gaining insights into effective instructional strategies using recorded video clips. They can learn how to integrate multimedia resources into their teaching practices, which can enhance student engagement and understanding. Through adopting these strategies, educators can create more dynamic and interactive learning environments that cater to diverse learning styles. Moreover, they can refine their teaching methods based on empirical evidence from the study, ensuring that instructional techniques align more closely with the needs and preferences of their students. Educational policy makers can utilize the findings of this study to inform and shape policies aimed at integrating multimedia resources into the curriculum.

Conceptual Framework

The conceptual framework of this study posits that the independent variables, namely video instruction and classroom demonstration, will be applied to experimental and control groups, respectively. These variables are expected to influence the dependent variables—achievement, retention, gender, and interest—in secondary students studying in Gombe State. At the conclusion of the study, the impact of these instructional methods on the aforementioned outcomes will be evaluated.

Instructional media and resources

Instructional media make learning real, permanent, and immediate by providing opportunities for learners to study at their own pace, rate, and convenience (Bergmann & Sams, 2019). These tools help focus attention and motivate learners, bringing elements into the classroom that are not in the immediate environment of the students. Additionally, they save time and energy for both instructors and learners in the teaching and learning processes (Bao & Lin, 2021). Instructional media can be used for individual, small, or large groups of learners, and they are designed to enhance and simplify the understanding of topics being taught, coming in various forms and classes (Cook, Mitchell, & Mullin, 2020). Instructional media are classified into different groups depending on the perspective from which they are viewed. There is no rigid classification of instructional media; however, all educational media generally fall into one of three categories: audio media, visual media, and audiovisual media (Cook, Mitchell, & Mullin, 2020). Each type serves to enhance the educational experience by catering to different learning styles and making complex concepts more accessible and engaging for students (Bergmann & Sams, 2019). Audio media play a crucial role in enhancing the learning experience by engaging the sense of hearing. These instructional tools range from simple audio tapes to sophisticated audio CDs and radio broadcasts. Understanding and effectively utilizing audio media can significantly improve students' comprehension and retention of concepts

Academics Achievement

It refers to the successful attainment of goals exemplified by accomplishing tasks. It encompasses the quantity of knowledge, skill, or perseverance possessed by the students. Frey and Fisher, (2020) opined that achievement is the successful accomplishment of goals, representing the extent of learning acquired by students. When a task is completed successfully through exertion, skill, practice, or perseverance, it is considered an achievement. Despite controversies about what constitutes achievement, key aspects include understanding the shapes, angles, formulas according to system rules, building skills, and increasing calculation speed. These parameters can serve as benchmarks for evaluating students' achievement. Luo and Xu, (2021) noted, achievement often measures the number of problems a learner can solve correctly per specified period, usually assessed through tests. Tests of achievement assess what learners have acquired in school, using standardized or instructor-made tests to measure success and failure in specific areas of the mathematics course. These tests bring either joy or grief to students, depending on their results (Frey, & Fisher, 2020). Achievement is marked by the ability to solve a number of specific problems including abstract algebra, with students reaching levels of mastery to they may be considered to have attained various achievement milestones.

Retention

Refers to a learner's ability to internalize and recall knowledge and skills when needed. It involves capturing, storing, and retrieving information effectively, influenced by proper assimilation., retention is assessed by having students accurately remember steps in calculating an area of a cylinder, and present answers correctly. However, the challenge of remembering and applying previously learned knowledge and skills can discourage students. Therefore, building students' retention faculty is critical for constructing accurate shapes and is significantly related to students' mastery (Goodman, & FitzGibbon, 2023). Effective retention enhances the ability to calculate an area of a cylinder correctly, while poor retention often results in incorrect calculations, as noted by (Kizilboga, & Soylu, 2021). For example, students who fail to remember shapes and circles of an area of a cylinder correctly may be attributed to poor interest in mathematics and by extension, indicating poor retention.

Interest

Refers to the curiosity and enthusiasm for and the unique steps used in solving the problems. This interest manifests when students regularly attend classes, participate in solving examples, and engage in private study (Frenzel, Pekrun, & Goetz, 2020). The motivation for learning is driven by inherent forces that propel students towards immersive learning. These forces encourage action, especially when the learning process offers direct benefits to their intended careers (Gu, & Hannula-Ross, 2021). However, students' interest in mathematics can fluctuate throughout the study period, influenced by factors such as gender and perceived benefits. Turner, & Kjørholt, (2020) observed that students often start with high interest, feel bored during the subject, and regain some level of interest at the end. These fluctuations are likely related to the teaching methods employed by mathematics instructors. Gu, & Hannula-Ross, (2021) suggested that sustaining students' interest requires using a variety of teaching techniques that appeal to their senses of sight, touch, and hearing. Therefore, employing diverse instructional methods and resources, such as recorded video

clips, can effectively enhance students' interest in learning mathematics and might close gender gaps in education.

Methodology

This study utilizes a quasi-experimental design, specifically a pre-test, post-test non-randomized control group design. This approach is chosen due to the inability to randomize subject assignment without disrupting the school environment. The independent variable has two levels: recorded video clips and conventional classroom demonstration methods. The dependent variables are assessed at three levels: achievement, retention, and interest.

RESULTS and DISCUSSION

Table1

Mean and standard deviation of students' achievement, interest and retention through recorded video instructions and those taught through conventional method

Group	N	Pre-test		Post-test		Mean Gain
		$\overline{X}$	SD	$\overline{X}$	SD	
Experimental	167	56.34	24.416	76.38	17.010	20.04
Control	154	56.92	23.500	60.71	31.420	3.79

Key: *N= Number in samples, $\overline{X}$ = Mean, SD= Standard Deviations*

The table 1 above shows the mean and standard deviation of achievement, interest and retention scores for the experimental group (taught with recorded video instruction) and the control group (taught with conventional class demonstration) at both pretest and posttest stages. The experimental group's mean achievement scores increased from 56.34 (SD = 24.41) at pretest to 76.38 (SD = 17.01) at posttest, reflecting a mean gain of 20.04. In contrast, the control group's mean achievement scores rose from 56.92 (SD = 23.50) at pretest to 60.71 (SD = 31.42) at posttest, indicating a mean gain of 3.79. The finding suggest that the recorded video instruction had a more substantial impact on students' achievement, interest and retention compared to the conventional class demonstration method.

Table 2

Summary of t-test Results of students' achievement exposed through recorded video clips and conventional class demonstration method

Group	N	Df	Mean	SD	*t*-value	*p*-value	Decision
Experimental	167		76.38	17.010			
		319			5.612*	0.000	Ho_1 Rejected
Control	154		60.71	31.420			

Key: *N= Number in samples, $\overline{X}$ = Mean, SD= Standard Deviations*

Table 2 an independent sample t-test was conducted to compare the achievement of secondary school students taught mathematics using recorded video clips and those taught using conventional class demonstration methods. The results revealed a statistically significant difference between the two groups, $t(319) = 5.612$, $p = 0.000$ ($p < 0.05$). Therefore, hypothesis one was rejected. The finding indicates that students in the experimental group,

who were taught using recorded video clips, achieved higher scores than those in the control group, who were taught using traditional methods.

Table 3

Summary of t-test Results of Students' retention exposed to through recorded video clips and conventional class demonstration methods

Group	N	Df	Mean	SD	*t*-value	*p*-value	Decision
Experimental	167		60.45	18.717			
		319			8.004*	0.000	Ho_2 Rejected
Control	154		45.91	13.085			

Key: *N= Number in samples,* $\overline{X}$ *= Mean, SD= Standard Deviations*

Table 3 an independent sample t-test was conducted to compare the retention of secondary school students taught mathematics using recorded video clips and those taught using conventional class demonstration methods. The results showed a statistically significant difference between the two groups, $t(319) = 8.004$, $p = 0.000$ ($p < 0.05$). Consequently, hypothesis two was rejected. The finding indicates that students in the experimental group, who were taught using recorded video clips, had better retention of the material than those in the control group. The significant difference in retention scores suggests that recorded video clips are a highly effective instructional tool for enhancing students' long-term retention.

Table 4

Summary t-test Results of Students' Pre-intervention and post-intervention interest exposed through recorded video clips in Experimental Group

Group	N	Df	Mean	SD	*t*-value	*p*-value	Decision
Pre-intervention interest	167		42.35	21.550			
		319			-7.216*	0.000	Ho_3 Rejected
Post-intervention interest	167		62.09	27.313			

Key: *N= Number in samples,* $\overline{X}$ *= Mean, SD= Standard Deviations*

Table 4 an independent sample t-test was conducted to compare the pre-intervention and post-intervention interest in mathematics among students in the experimental group who were exposed to recorded video clips. The results showed a statistically significant difference between the two groups, $t(319) = -7.216$, $p = 0.000$ ($p < 0.05$). Consequently, hypothesis three was rejected. This indicates that the recorded video clips effectively increased students' interest in mathematics. This finding indicates that the significant difference in mean interest scores before and after the intervention confirms the effectiveness of recorded video clips in sustaining students' interest

The findings of the study as follows;

1. The findings indicate that the recorded video instruction had a greater impact on students' academic achievement compared to the conventional class demonstration method. The null hypothesis finding shows that students in the experimental group, taught with recorded video clips, achieved higher scores than those in the control group, taught with traditional methods.

2. Both groups experienced a decline in retention, with a slightly greater loss observed in the experimental group compared to the control group. The null hypothesis finding indicates that students in the experimental group, taught with recorded video clips, retained the material better than those in the control group.
3. Recorded video clips significantly enhanced students' interest. The null hypothesis finding indicates that recorded video clips effectively increased students' interest.

Conclusion

Based on the findings, the following conclusions are drawn;

1. It was concluded that recorded video instruction significantly enhanced students' mathematics achievement compared to conventional class demonstration methods. The findings indicate that students in the experimental group, taught with recorded video clips, achieved higher scores than those in the control group taught with traditional methods.
2. It was concluded that both groups experienced a decline in retention, with a slightly greater loss observed in the experimental group compared to the control group. Despite this, students in the experimental group retained the material better than those in the control group, as indicated by the null hypothesis finding.
3. It was concluded that recorded video clips were found to significantly enhance students' interest in mathematics. The results suggest that recorded video clips effectively increased students' interest in the subject, as supported by the null hypothesis finding.

Recommendations

Based on the findings of the study, the following recommendations are made:

1. It is recommended that the school administration at Junior Secondary Schools should adopt recorded video clips as a supplementary tool in mathematics teaching. The significant enhancement in students' mathematics achievement observed with recorded video instruction suggests its beneficial role in augmenting traditional teaching methods.
2. Teachers should incorporate periodic review sessions and quizzes to mitigate the slight decline in retention observed among students taught with recorded video clips. This strategy can help reinforce learning and improve long-term retention of mathematical concepts.
3. The Ministry of Education should allocate multimedia resources in each school for developing high-quality recorded video clips that are engaging and aligned with curriculum standards. Investing in multimedia resources can enhance students' interest in mathematics, as evidenced by the positive impact of recorded video clips on student engagement.
4. The Ministry of Education should provide professional development opportunities to teachers to enhance their proficiency in integrating recorded video clips into classroom instruction effectively. Training should focus on leveraging multimedia tools to cater to diverse learning styles and maximize learning outcomes for both male and female students.

5. Parents should support their children in acquiring digital devices that can accommodate recorded video clips in various subjects in order to position them for gender-specific instructions that optimize the retention of mathematical concepts.

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