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EFFECTS OF CANDID VIDEO INSTRUCTION ON ACADEMIC ACHIEVEMENT IN MATHEMATICS ON JUNIOR SECONDARY SCHOOL STUDENTS IN OGUN STATE

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ABSTRACT

The persistent poor achievement in mathematics among junior secondary school students has prompted the exploration of various strategies, yet improvements remain minimal. This study determined the effects of Candid Video Instruction (CVI) on students' achievement in mathematics using pre and post-test control group quasi-experimental design with a 2 x 2 x 2 factorial matrix. The sample comprised 100 junior secondary school students selected from two intact classes from two schools. Study Habit Inventory Scale (SHIS), Numerical Ability Test (NAT) and Mathematics Achievement Test (MAT) were used for data collection. Students taught with CVI achieved higher mean gains in mathematics (M = 3.40) and numerical ability (Mean gain = 10.03). There was a significant main effect of CVI on academic achievement ($F_{(1, 98)} = 12.399$, $P < 0.05$), but no significant effects of CVI and numerical ability ($F_{(1, 98)} = .429$, $P > 0.05$) or interaction effects of strategy and numerical ability ($F(1, 98) = .341$, $P > 0.05$) on students' achievement in mathematics. The three-way interaction of instruction, study habit, and numerical ability was not significant ($F_{(2, 98)} = .327$, $P > 0.05$). The study concluded that CVI is effective in improving students' achievement in mathematics and it should therefore be recommended that teachers should integrate candid video instruction in junior secondary school mathematics classes to foster interactive learning.

Keywords: Instruction Strategy; Study Habit; Numerical Ability; Academic Achievement; Mathematics.
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INTRODUCTION

Mathematics is a fundamental subject taught in junior secondary schools, laying the groundwork for critical thinking, problem-solving, and scientific reasoning (Badru, 2025; Abdulai, 2023). Mathematics fosters creativity, critical thinking, and logical reasoning, which are indispensable for success in any profession (Abiodun; *et al.*, 2022). Students who excel in mathematics often gain a competitive edge in the job market, securing higher-paying roles. The objectives of education in any nation are closely tied to the effective teaching of mathematics, particularly at the junior secondary level which provides the foundation for scientific and technologi-

cal advancements, determining a nation's development. It also empowers individuals with essential numeracy skills for everyday life and problem-solving (Ahmad *et al.*, 2024). In Nigeria, junior secondary education is a critical phase of basic education. The Nigerian Educational Research and Development Council (NERDC) has established specific goals for teaching mathematics at this level. Despite these objectives, the performance of students in mathematics has raised concerns among educators, parents, and curriculum planners (Ahmad *et al.*, 2024; Asare *et al.*, 2024; Rasheed *et al.*, 2023 Factors such as the abstract nature of the subject, teaching methods, and individual student characteristics including motivation and learning styles affect performance (Garcia & Martinez, 2021).

Mathematics has been reported to be inherently challenging due to its reliance on logical reasoning and abstract concepts (Ahmad *et al.*, 2024; Abdulai, 2023). Many junior secondary students struggle with comprehension, leading to anxiety and disengagement (Edem, & Ekon, 2021). These challenges underscore the need for innovative instructional methods to improve learning outcomes. Teachers play a pivotal role in addressing these issues. Studies show that the teachers' competence and ability to convey abstract concepts effectively contribute to students' success (Adams & Brown, 2020).
Numerous interventions have aimed to improve mathematics performance, often focusing on factors like student's interest and gender. However, innovative instructions considering students personal factors should be explored more as it holds potential of addressing students specific challenges with Mathematics. That is, Candid video instruction is one the instructions that holds promise to address students' specific challenges and also provides solution to the way students' perceive the subject. Candid video instruction uses unscripted, real-life videos to demonstrate mathematical concepts and problem-solving techniques in an engaging and relatable manner (Brown, 2021; Ojo, *et al.*, 2021). This approach caters to diverse learning styles by offering a visual and auditory experience, making abstract concepts more concrete and accessible (Garcia, & Martinez, 2021). Unlike traditional methods reliant on textbooks and lectures, video instruction allows students to pause, rewind, and review content, enabling self-paced learning. Research supports the efficacy of video-based lessons. For example, Yusuf and Afolabi (2022) found that students taught using video instruction performed significantly better than those taught through traditional lectures. And Ogunleye (2021) also reported that video instruction reduced anxiety and increased motivation among students, resulting in improved academic outcomes.

Candid video instruction (CVI) holds significant potential for improving junior secondary school students' academic achievements in mathematics. By addressing challenges such as poor foundational knowledge, limited resources, and individual learning differences, educators can create engaging and effective learning environments. These approaches align with policy directives advocating for ICT integration and modern teaching strategies, ensuring that students are better prepared for the demands of the 21st century. Also, targeted interventions that consider personal characteristics can help to meet the diverse needs of learners, fostering both academic success and lifelong skills in mathematics education.

In Ogun State, widespread availability of mo-

bile devices and internet connectivity provides an opportunity to integrate video-based learning into mathematics education (Yusuf, & Afolabi, 2022). Mobile technology facilitates continuous learning beyond the classroom, bridging the gap between school and home. This aligns with the Nigerian National Policy on Education (2013), which advocates for innovative teaching methods and ICT integration to create dynamic learning environments. Several factors hinder the effective implementation of video instruction. Egwunyenga (2021) highlighted issues such as infrequent practice, limited understanding of mathematical language, weak foundational knowledge, and insufficient parental guidance. Edem and Ekon (2021) noted challenges like power outages, inadequate resources, overcrowded classrooms, and insufficient teacher training. Addressing these barriers is critical for the successful adoption of video-based teaching methods. Students' personal characteristics significantly influence academic performance. For instance, interest in the subject acts as a catalyst for better study habits and academic success. Agommuoh and Nzewi (2024) found that students with a genuine interest in science consistently outperformed their peers. Interest fosters motivation, which in turn enhances study habits which is a critical determinant of academic outcomes.

Students' characteristics like numerical ability, foundational knowledge play a role in academic performance. Numerical ability is the capacity to manipulate numbers and solve problems and is closely linked to mathematics performance. Numerical reasoning skills enable students to interpret data, deduce information, and draw logical conclusions (Bautista, & Dones, 2025; Blume, *et al*., 2021). Adewale and Babatunde (2023); Santos and Boyon (2020) found that numerical and verbal abilities accounted for significant variations in students' performance in aptitude tests. Recent technological advancements offer new possibilities for personalized and immersive learning experiences. Interactive simulations and virtual environments accessible through mobile devices enable self-paced and flexible learning (Yahaya, *et al*., 2020). Integrating these tools into the mathematics curriculum can boost student's performance and motivation, ultimately enhancing learning outcomes.

Another student's personal characteristic that has been reported to have potential to improve achievement in mathematics is study habits. Study habits involve practices that optimize learning, such as structured routines and active engagement with material. Chalse-Ogann and Alamina (2024) emphasized that poor study habits are a common obstacle to students' success. Students with disciplined study routines and positive peer associations tend to excel academically. Numerical ability and study habits have been underexplored (Aljaffer, *et al*., 2024; Martinez *et al*., 2022). Addressing these elements can help create inclusive learning environments that enhance academic outcomes. A holistic approach that considers subject complexity, teaching methods, and student characteristics is essential for meaningful learning experiences.

Technological advancements in Nigeria, especially in Ogun State, have made video-based instruction increasingly feasible. The widespread use of mobile devices and improved internet access create opportunities for integrating CVI into classrooms (Yusuf & Afolabi, 2022). This aligns with national education policies such as the Nigerian National Policy on Education (2013), which

promotes the use of ICT tools in modern teaching. CVI not only supports policy goals but also extends learning beyond the classroom, enabling continuous access to educational resources and strengthening school-home connections. Despite its promise, several obstacles still hinder the full adoption of video instruction. Studies by Egwunyenga (2021) and Edem and Ekon (2021) identify challenges such as inadequate infrastructure, limited teacher training, power outages, and overcrowded classrooms. These factors underscore the need for comprehensive implementation strategies that address both technical and pedagogical barriers. At the same time, understanding the impact of CVI requires consideration of additional variables that shape academic performance, particularly students' numerical ability and study habits.
Numerical ability, defined as the capacity to manipulate numbers, identify patterns, and solve quantitative problems, is foundational to mathematics performance. It not only facilitates comprehension of core concepts but also enhances the learner's ability to apply them in problem-solving scenarios (Bautista & Dones, 2025; Blume *et al.*, 2021). Studies such as Adewale and Babatunde (2023) and Santos and Boyon (2020) confirm that students with stronger numerical reasoning skills perform better on aptitude and mathematics assessments. Numerical ability enables learners to analyze data, draw logical conclusions, and approach problems methodically. Strengthening this skill through instructional approaches like CVI can thus yield substantial gains in academic achievement.

In parallel, study habits are another critical internal factor influencing student success in mathematics. Effective study habits include setting structured routines, managing time efficiently, and actively engaging with instructional materials. Research by Chalse-Ogann and Alamina (2024) indicates that poor study habits remain a major barrier to academic achievement in Nigerian schools. Students with disciplined study routines, positive peer networks, and frequent review practices tend to outperform peers who lack such habits. Martinez *et al.* (2022) and Aljaffer *et al.* (2024) further observe that while many studies recognize the role of instructional methods, few have adequately explored how study habits interact with video-based instruction to influence academic outcomes.

Combining the benefits of candid video instruction with attention to students' numerical abilities and study routines may be a powerful way to support inclusive and responsive mathematics education. A holistic approach that considers not just teaching methods but also individual learner characteristics promises more meaningful and lasting educational outcomes. Despite this potential, the literature on how these variables interact particularly within the context of junior secondary schools in Ogun State is limited. To address these gaps, this study investigated the effects of candid video instruction on academic achievement in mathematics among junior secondary school students in Ogun State. It also examines how numerical ability and study habits moderate or mediate this relationship. By integrating insights from theoretical frameworks, policy directives, and empirical evidence, this study seeks to provide a clearer understanding of how personalized, technology-supported learning environments can transform mathematics instruction and outcomes in Nigerian classrooms.

Objective of the Study

The objectives of this study were to determine:

1. Main effects of treatment, numerical ability and study habit on students' achievement in mathematics
2. Two way moderating effects of treatment and numerical ability; treatment and study habit; numerical ability and study habit on students' achievement in mathematics.
3. Three way moderating effects of treatment, study habit, and numerical ability on students' achievement in mathematics.

Research Questions

What are the mean academic achievement scores of students taught Mathematics using the candid video instructional strategy and those taught using the Conventional method?

Statement of the Hypotheses

The following null hypotheses are formulated:

H_{01}: There is no significant main effect of treatment, numerical ability and study habit on students' achievement in mathematics.

H_{02}: There is no significant interactive effects of treatment and numerical ability; treatment and study habit; numerical ability and study habit on students' achievement in mathematics.

H_{03}: There is no significant interactive effect of treatment, study habit and numerical ability on students' achievement in mathematics.

MATERIALS AND METHODS

Research Design

The study adopted a pre-test, post-test and control group quasi-experimental design, using a 2 x 2 x 2 factorial matrix. Two groups were involved in the administration of both pre and post experiment. The two groups were tagged as the experimental group (EG) and the control group (CG).

The target population of the study consisted of all Junior Secondary (JSII) Students in public schools in Ado-Odo-Ota Local Government in Ogun State. The students' age ranges were between 10 and 14 years old.

The theoretical framework for this study is founded in two prominent educational theories: Constructivist Learning Theory and Cognitive Load Theory. These theories provide a basis for understanding how candid video instruction impacts students' learning and academic achievement in mathematics.

Sample and Sampling Technique

The sample size was determined using a power analysis approach, taking into consideration the number of schools and Junior Secondary School (JSSII) classes available in Ado-Odo-Ota Local Government in Ogun State. To enhance the statistical power of the study, a minimum sample size of 100 participants were targeted. Purposive sampling technique was adopted to select two (2) government owned co-educational schools from Ado-Odo-Ota Local Government. The selection process also involved the use of purposive sampling technique based on the following criteria:

a. Readiness of the school authority to allow the administration of the instruments
b. Readiness and willingness of students to participate in the study
c. Readiness and willingness of the subject teacher to participate in the study

Prompt and conveniences

Instrument for Data Collection

***Study Habit Inventory Scale (SHIS*):** The study habit questionnaire was adapted from Munoz (2020). It consisted of 25 items for measuring the study habit of students on mathematics, which participants responded to. The 4-likert scale responses were used thus: Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD).The instrument was administered on selected students. Expert reviews were conducted by professionals specialized in mathematics education, instructional design, and educational technology. These comprehensive reviews assessed the alignment of the instruments with the research objectives and their ability to accurately capture students' perceptions, habits and abilities related to mathematics. These feedbacks from them assisted to enhance the clarity, relevance and comprehensibility of the instruments. The instruments demonstrated high reliability value of 0.80, thereby enhancing the credibility and trustworthiness of the study's findings.

Numerical Ability Test (NAT): The numerical ability questionnaire was adapted from Ugo (2021). It consisted of 20 items with each item having options. It was for measuring the extent to which the students could manipulate figures and solve problems on mathematics by deep reasoning, which the participants responded. The instruments utilized in this study undergone a thorough validation process to ensure their appropriateness and effectiveness in measuring the intended constructs. Expert review were conducted by professionals specialized in mathematics education, instructional design, and educational technology. This comprehensive review assessed the alignment of the instruments with the research objectives and their ability to accurately capture students' perceptions, habits, and abilities related to mathematics. The instrument demonstrated high reliability value of 0.75, thereby enhancing the credibility and trustworthiness of the study's findings.

Mathematics Achievement Test (MAT): Mathematics achievement test was a multiple test consisting of 110 items with four options per item. The mathematics achievement test scores was used to determine the students' achievement in mathematics. The selected items were from field of validated past questions of Junior Secondary School Certificate Examination (JSSCE) in Ogun State selected randomly across the years that correspond with the study topics. The topics were: mean, median, mode, pie chat, and histogram and bar chat. A table of specification was drawn to guide the development of the test items.

Method of Data Analysis

Analysis of covariance (ANCOVA) was used for data analysis because of its effectiveness in determining the effects of independent variables on the dependent measures and allows further test in the case of any interaction effects.

Procedure for Data Collection

The procedure for data collection involved passage through three stages: pre-treatment, treatment and post-treatment stages. The pre -treatment stage involved visiting schools that were involved in the study to seek permission from the school heads, securing the commitment of the participants, training of the research assistants and administering the pre-test.

The treatment stage involved exposing the

Experimental Group (EG) to peer simulation with virtual instruction and also exposing the Control Group (CG) to convectional teaching method. The post-test stage involved administration of the post – test to the two groups (EG and CG).

RESULTS

There were 48 (48.0%) male participants and 52 (52.0%) female participants in the study (Table 1). This implied that female students were more involved than their male counterpart in the study. There were 50 (50.0%) participants in the control group and also 50 (50.0%) participants in the experimental group (candid video). This means that the number of students that participated in the Control group were the same with the number of students that participated in the Experimental group (Table 1).

Demographic Characteristics of the Participant in the Study

Table 1: Gender and Treatment of the Students

Gender	Frequency distribution	Percentages
Male	48	48.0
Female	52	52.0
Total	**100**	**100**
Group		
Convectional	50	50.0
candid video	50	50.0
Total	**100**	**100**

Field Study, 2024

Research Question 1: What are the mean academic achievement scores of students taught Mathematics using the candid video instructional strategy and those taught using the Conventional method?

In the Conventional group, (N = 50) recorded pre-test mean score was 19.62 with SD of 3.44 while the post-test mean score was 23.06 (SD =1.30), showing average achievement gain of 3.44 (Table 2). The Candid Video Instruction group students (N = 50) had a pre-test mean score of 12.36, SD = 3.47 and post-test mean score of 22.40 (SD = 1.85), showing 10.04 mean achievement gain (Table 2).

Table 2: Students Mean Academic Achievement Scores in Mathematics according to Candid Video Instruction and Conventional method

Treatment	N	Mean	S.D.	Mean Gain
Conventional Group				
Pre-test	50	19.62	2.92	3.44
Post-test		23.06	1.30	
Candid Video Instruction				
Pre-test	50	12.36	3.47	10.04
Post-test		22.40	1.85	

Field Study, 2024

Test of Hypotheses

Hypothesis 1: There is no significant main effect of treatment on students' achievement in mathematics.

The result showed significant main effect of treatment ($F_{(1, 98)} = 12.399$, $P < 0.05$), since the value of P less than 0.05 level of significant therefore the hypothesis 1 was rejected (Table 3). This indicated that there is significant main effect of treatment on students' achievement in mathematics. This means that candid video instruction group and control group differ in scores obtained in post-test mean score in Mathematics test after the treatment and the difference is significant at .05 level of significance. Hence, there is significant effect of instructional strategy on students' achievement in Mathematics.

Multiple Classification Analysis (MCA) was further carried out to determine the magnitude of students' achievement in Mathematics in terms of treatment levels and a grand mean was 22.73 (Table 4). Specifically, students in the control group (conventional method) recorded adjusted post-test mean achievement score of 22.26 while students taught with candid video instruction strategy recorded adjusted post-test mean achievement score of 22.28. This outcome shows that students taught with candid video instruction recorded higher adjusted post-test mean achievement score in Mathematics.

Hypothesis 4: There is no significant interaction effect of treatment and numerical ability on students' achievement in mathematics

Analysis of the interaction effect of treatment and numerical ability on students' achievement in Mathematics showed ($F_{(1, 98)} = .341$, $P > 0.05$) which implied that there was no significant difference. This outcome indicates that student post-test mean achievement scores in Mathematics in the levels treatment (candid video instruction and control) did not vary across the two levels of numerical ability: High and Low (Table 4).

There was no significant interaction effect of treatment, study habit and numerical ability on students' achievement in mathematics. The result of the 3-way interaction effect in Table 4 shows no significant interaction effect of treatment, numerical ability and study habit on students' achievement in Mathematics ($F_{(2, 98)} = .327$, $P > 0.05$). This outcome implies that the students' post-test mean achievement scores in mathematics across the three levels of instructional strategy used in the study do not vary significantly across all the possible levels of numerical ability (high and low)-study habit (high and low) combinations.

Table 4: MCA of Students Post-test Mean Score in Mathematics according to Treatment Grand Mean = 22.73

		N	Deviation			
			Unadjusted	Eta	Adjusted for Factors	Beta Adjusted for Factors
Treatment	Control	24	-.339		-.468	
	Experimental	24	.325	.203	.450	.281

DISCUSSION

The study investigated the effects of candid video instruction, numerical ability, and study habits on junior secondary school students' mathematics achievement in Ogun State. It also examined the interaction effects of these variables on students' performance.

Candid Video Instructional teaching method led to higher mean gains compared to Conventional teaching method. This result might stem from students' unfamiliarity with video-based learning and lack of post-class access to the videos. However, the use of candid video instruction aligns with prior studies (e.g., Agommuoh & Nzewi, 2024; Yusuf & Afolabi, 2022; Ojo *et al.*, 2021) that highlight the potential of video materials in fostering better retention and engagement.

Numerical ability significantly influenced mathematics achievement, with students of higher numerical ability performing better. This supports Adewale and Babatunde (2023); Blume *et al.* (2021); Yahaya, *et al.* (2020) who identified numerical proficiency as crucial to academic success in mathematics. Study habit, however, showed no significant main effect on mathematics achievement, contradicting findings by Bautista and Dones (2025); Joshelle (2024) but aligning with Santos & Boyon, 2020). This suggests that study habits may not play a critical role when students engage with innovative teaching strategies like candid video instruction.

The findings indicated no significant interaction effect between candid video instruction versus traditional instruction and numerical ability (high versus low) on students' mathematics achievement. This suggests that the efficacy of candid video instruction does not

vary significantly between students with high numerical ability and those with low numerical ability. While students with higher numerical ability generally perform better in mathematics, this advantage did not translate into a differential benefit from the candid video instruction compared to traditional methods. This result aligns with the findings of Olawale, and Adebola (2020), which emphasized the consistent impact of numerical ability on mathematics achievement but did not find significant variability across instructional strategies. However, it diverges from studies like Blume, *et al.* (2021); Yahaya, et al. (2020), which observed nuanced effects of instructional methods on students with varying numerical proficiencies. It could be implied from the results that candid video instruction might equally cater to students across numerical ability levels, provided they have access to adequate support to process the material.

The analysis also revealed no significant interaction effect between treatment and study habit on mathematics achievement. This suggests that candid video instruction benefits students, irrespective of whether they have high or low study habits. The outcome underscores that study habits alone may not significantly influence how students respond to video-based instructional strategies. Contrary to studies like Anggeraini, et al. (2024); Chalse-Ogann and Alamina (2024); Nwizuzu (2024), which identified study habits as critical to academic performance, the current findings suggest that when engaging with candid video instruction, study habits may not play a decisive role. A possible explanation is that the structured nature of video instruction provides a learning framework that compensates for variances in individual study behaviors, thereby leveling the playing field.
The interaction effect between numerical ability and study habit was also found to be non-significant. Students' mathematics achievement did not vary significantly across the different combinations of numerical ability (high/low) and study habits (high/low). This suggests that neither high numerical ability nor effective study habits significantly amplify each other's impact on achievement within the scope of this study. While the role of numerical ability in mathematics achievement is well-documented (e.g., Bautista, & Dones, 2025; Olawale, & Adebola, 2020), the lack of interaction with study habits points to the unique characteristics of mathematics as a subject. It is possible that mathematical problem-solving skills rely more heavily on cognitive factors, such as numerical proficiency, than behavioral habits like study practices. This is in line with findings by Chalse-Ogann and Alamina (2024), who observed that study habits might have less relevance to subjects demanding specific cognitive skills like mathematics.

The study further examined the three-way interaction effect among treatment, numerical ability, and study habit. The results showed no significant interaction effect, indicating that the combined influence of these three factors did not lead to a differential impact on students' mathematics achievement. This finding suggests that candid video instruction provides a consistent learning environment across diverse student profiles, accommodating variations in numerical ability and study habits without significant disparities in outcomes. While previous studies (e.g. Agommuoh and Nzewi (2024), have highlighted the potential of video-based instruction to enhance learning outcomes, this study reveals its uniformity in effect regardless of students' cognitive and behavioral

attributes. From a practical perspective, this positions candid video instruction as an inclusive strategy suitable for heterogeneous classrooms.

The results collectively suggest that candid video instruction creates a balanced learning environment that is not overly dependent on students' pre-existing numerical ability or study habits. Educators can adopt this strategy with confidence that it will equally benefit a wide range of students. However, additional supports, such as access to videos outside of class and supplementary guidance for students with lower numerical ability or less effective study habits, may further enhance its effectiveness.

CONCLUSION

Candid video instruction remains a promising approach for engaging students in mathematics as the results imply that treatment, numerical ability, and study habits impact performance independently. Further refinement of candid video instruction, including student access to materials post-class, may enhance its effectiveness.

RECOMMENDATIONS

Teachers should integrate candid video instruction in junior secondary school mathematics classes to foster interactive learning. Regular training for teachers on effective utilization of instructional videos is essential. Educational stakeholders should promote the use of innovative teaching methods through workshops and curriculum reforms. Future research should involve larger and more diverse samples to ensure broader applicability

REFERENCES

Abdulai, B. I. 2023. Students' characteristics and academic performance in mathematics: A Study of senior secondary schools in Nigeria. *International Journal of Educational Psychology* 9(1): 59–73.

Abiodun, T., O., Asanre, A., A., Ogundeji, M., A., Odupe, T., A., & Rasaki, M. G. 2022. Effect of Think-Pair-Share Strategy on Student Achievement in Senior Secondary School Mathematics. *Journal of Mathematics and Science Education.* 3 (2): 20-36. ISSN: 2814- 0885 e-ISSN: 2814-2931.

Adams, L., Brown, K. 2020. The role of teachers in mathematics education. *Journal of Educational Research* 45(2): 123-135.

Adewale, R., T. Babatunde, E., O. 2023. Spatial and Numerical Abilities as Correlates of Academic Achievement in Economics. *Journal of General Education and Humanities,* 2 (3): 165-176. https://doi.org/10.58421/gehu.v2i3.76

Agommuoh, P. C., Nzewi, U. M. 2024. Effect of videotaped instruction and the learning cycle constructivist model on secondary school physics students' interest and achievement. *IOSR Journal of Research & Method in Education* 14(2): 15–24.

Ahmad, M., U., Isa, A., D., & Zakariyya, A., A. 2024. Interest as predictor of mathematics achievement among senior secondary school students in Bida Educational Zone, Niger State, Nigeria. *Journal of Instructional Mathematics* 5(1): 13–23.

Aljaffer, M., A., Almadani, A., H., AlDughaither, A., S., Basfar, A., A., AlGhadir, S., M., AlGhamdi, Y., A., AlHubaysh, B., N., AlMayouf, O., A., AlGhamdi, S., A.,

Ahmad, T., Abdulghani, H., M., 2024. The impact of study habits and personal factors on the academic achievement performances of medical students. *BMC Medical Education* 24(1): 886-889.

Anggeraini, Y., Episiasi, E., Nandaini, S., P. 2024. The Relationship between Study Habits and Academic Achievement in English Education Study Program at Baturaja University. *ELT Lectura* 11(2): 102-109.

Asare, B., Welcome, N., B., Arthur, Y., D. 2024. Investigating the impact of classroom management, teacher quality, and mathematics interest on mathematics achievement. *Journal of Pedagogical Sociology and Psychology* 6(2): 30–46.

Badru, A., K. 2025. Effect of Think-Pair-Share Instructional Strategy in Senior Secondary School Students' Academic Achievement in Mathematics in Ogun State. *Humanika, Kajian Ilmiah Mata Kuliah Umum* 25(1): 11-22. DOI: 10.21831/hum.v25i1.79373.

Barcenas, J., M., A. Bibon, M., B. 2022. The Influence of Study Habits in the Academic Performance of Senior High School Students in Cagraray Island, Philippines. *International Journal of Science Research in Multidisciplinary Studies* 8(1): 45-52.

Bautista, W., Dones, M. 2025. Numeracy Skills and Attitude towards Mathematics of Students in Relation to Performance: Basis for Intervention Program. *Psychology and Education A Multidisciplinary Journal* 33(2): 167-185.

Blume, F., Dresler, T., Gawrilow, C., Ann-Christine, E., C., Goellner, R. Moeller, K. 2021. Examining the relevance of basic numerical skills for mathematical achievement in secondary school using a within-task assessment approach. *Acta Psychological* 215: 231-245.

Brown, A. 2021. Enhancing junior secondary students' academic achievement in mathematics through peer simulation with virtual instruction. *Journal of Mathematics Education* 30(3): 201-215.

Brown, J. 2021. *Candid video instruction in mathematics education*. Edu-Tech Press.

Brown-Kramer, C., R. 2021. Improving students' study habits and course performance with a "learning how to learn" assignment. *Teaching of Psychology* 48(1): 48-54.

Chalse-Ogann, O., Alamina, P., J. 2024. Study habits and academic performance of secondary school students in Rivers State. *Journal of Education and Practice* 15(12): 162–168.

Edem, A., & Ekon, E. 2021. Challenges of integrating technology in Nigerian classrooms. *Journal of Education and Technology* 8(2): 1-10.

Egwunyenga, E., J. 2021. Contextualized learning experiences and academic outcomes in Nigerian secondary schools. *Journal of Educational Research and Reviews* 16(3): 105-112.

Gahir, S., Sahu, S., Sahoo, S. 2022. Relationship between Study Habits and Academic Achievement of Secondary School Students. *Contemporary Research in Education and English Language Teaching* 4(1): 1-9.

Garcia, M., Martinez, R. 2021. Learning styles and their effect on mathematics

Comprehension. *Education Sciences* 11(7): 350.

Joshelle, N., A. 2024. Effects of QD2R Numeracy Enhancement Strategy on the Mathematics Performance of Grade 10 Students. *Journal of Contemporary Educational Research* 34(2): 231-252.

Lee, H., Kim, Y. 2020. Exploring the impact of peer simulation and virtual instruction on students' academic performance in mathematics. *Journal of Mathematics Education* 30(3): 301-315.

Mao, S., Zhang, L., Wang, Y. 2019. The use of interactive simulations and virtual environments in education. *Journal of Computers in Education* 6(2): 187-200.

Munoz, C. 2020. Study habit inventory scale development and validation. *Journal of Educational Measurement 57(3): 456 – 475.*

Nigerian National Policy on Education. 2013. *National Policy on Education*. NERDC Press.

Nwizuzu, C., B. 2024. Students' Study Habits as Correlates of Academic Achievement in Public Secondary Schools in Anambra State Nigeria. *A Journal of Multidisciplinary Studies* 5(3): 49-58.

Nwokolo, C., N. Duaka, B., N. 2023. Relationship between Study Habits and Academic Achievement among Secondary School Students in Anambra State. *Journal of Guidance and Counselling Studies (JGCS)* 7(1): 1 -14.

Ojo, A., Bello, T., Musa, R. 2021. Enhancing problem-solving skills in mathematics through candid video instruction. *Journal of Education and Practice* 12(5): 1-10.

Okeke, C. I., Adeyemi, K. E. 2021. Impact of study habits on students' academic achievement in Nigerian schools. *Journal of Education and Practice* 12(10): 80-87.

Olatunde, B., Ogunleye, R. 2021. The effect of video instruction on mathematics anxiety and motivation. *Journal of Educational Technology Development and Administration* 9(1): 1-12.

Olawale, S., Adebola, J. 2020. The role of numerical ability and innovative teaching methods in mathematics education. *International Journal of Mathematics Education in Science and Technology* 51(8): 1279-1290.
Piaget, J. (1970). *Genetic epistemology*. Columbia University Press.

Rasheed, S., T., Shoaga, O., Oni, A. 2023). The effect of Scaffolding strategy on mathematics achievement of Preschool children. *Journal of Early Childhood Association of Nigeria,* 12: 232-251.

Santos, J., C., D. Boyon, M., C., L. 2020. Numerical and Verbal Reasoning Aptitudes as Predictors of STEM Students' Performance on Limits and Continuity. *Educational Measurement and Evaluation Review* 11(1): 14–24.

Ugo, A. 2021. Numerical ability test: Development and validation. *Journal of Psychometrics 2: 1 – 8.*.

Vygotsky, L. S. 1978. *Mind in society: The development of higher psychological processes.* Harvard University Press.

Yahaya, W., O. Akanbi, A., O. & Shehu,

A., A. 2020. Numerical Ability: Predictor of Senior School Students Academic Performance in Physics in Ilorin. *Journal of Library, Science Education and Learning Technology (Jolselt)* 2(1): 118-122.

Yusuf, A., Afolabi, B. 2022. Effectiveness of candid video instruction in Nigerian secondary schools. *Journal of Educational Media and Technology* 15(2): 1-12.

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