

Moderating Effect of Gender on Academic Performance of Social Studies Students: Utilizing Graphics and Pictures

Rachael Emuobome Emudianughe*, Edore Clifford Ogheneakoke, Peter Ogbianugene Dania

Department of Social Science Education, Delta State University, Abraka, Nigeria

**Corresponding Author: stellaemudianughe7@gmail.com*

Received: 01 November 2024 / Accepted: 29 August 2025 / Published: 30 August 2025

Abstract: The study investigated the moderating effect of gender on academic performance of upper basic social studies students in Delta State, using graphics and pictures as visual teaching aids. Two research questions and two hypotheses were formulated and tested using a quasi-experimental research design. A sample of 40 male and 75 female upper basic 8 students of Social Studies from two mixed schools were selected using purposive sampling techniques. The population comprised of 6,912 students across 6 public upper-basic schools in Delta Central Senatorial district. The instrument used for data collection was an academic performance test called the “Social Studies Students Performance Test” (SSSPT), which demonstrated good validity and reliability. Descriptive statistics, including mean and standard deviation, were used to answer research questions, while Analysis of Covariance (ANCOVA) was employed for hypotheses testing at a significance level of 0.05. The study found a significant moderating effect of students' gender on graphics, as a p-value of 0.005 which is lower than the significant level of 0.05 was reported, therefore the null hypothesis was rejected. However, for pictures, a p-value of 0.488 which is higher than 0.05 significant level was reported, therefore the null hypothesis was accepted. Based on the findings, the study recommended that social studies teachers should consider gender when incorporating graphics into social studies instructions in upper basic schools. The study contributed to knowledge by establishing that graphics is moderated by gender and academic performance and demonstrated that the use of graphics is influenced by gender, while the use of pictures is not affected by gender.

Keywords: Moderating effect, gender, visual aids, quasi-experimental, academic performance and social studies

INTRODUCTION

Amid the interdisciplinary tapestry of social studies education, the significance of probing into the role of graphics and pictures within this domain is magnified. The evolution of social studies from its origins of examining isolated individuals within local contexts to a global discipline investigating intricate societal dynamics adds urgency to this inquiry (Ige, 2019). Aligned with the insights of Krutka & Carano (2016), who advocate for cultivating enlightened and globally engaged citizens through social studies education, this research is poised to contribute valuably to this mission. Within the Nigerian educational landscape, where social studies have been seamlessly woven into the curriculum, the prevalent pedagogical methodologies have sparked substantial discourse. Traditional lecture-based approaches, while dominant, have been critiqued for their limitations in fostering active learning and critical thinking (Yore, 2012). These shortcomings obstruct the creation of enriching educational experiences, a concern that underlines the necessity for a paradigm shift.

The concept of academic performance hinges on the extent to which educational objectives are met within the confines of the school system, as asserted by Owan (2012).

Consequently, students' academic performance serves as a measure of their success in achieving these educational goals and objectives. [Erum & Zahoor \(2011\)](#) highlight extensive research on students' academic performance and graduation rates, with a particular focus on identifying the factors that impact secondary students' academic achievement. [Atubi \(2021\)](#) posits that education constitutes a fundamental and indispensable pillar of society, molding the intellectual and cognitive development of forthcoming generations. The importance of employing diverse teaching strategies to enhance student learning experiences has gained increasing recognition.

In addition, pictures offer a window into diverse cultures, traditions, and ways of life. Through visual depictions, students can explore cultural diversity, societal norms, and expressions across regions and periods. This exposure nurtures a comprehensive understanding of social studies topics and contributes to improved academic performance. Analyzing pictures requires students to dissect visual cues, symbols, and contextual details, nurturing critical thinking skills as they extract meaning. These analytical skills are transferable to other aspects of Social Studies and contribute to higher academic achievement ([Punzalan, 2018](#)). This study extends to exploring the moderating effect of gender in the utilization of graphics and pictures as instructional tools and their combined impact on the academic performance of social studies students in upper-basic schools within Delta State, Nigeria.

Gender, being the biological characteristics distinguishing males from females, holds a vital role in educational discourse. Research consistently emphasizes the intricate ways in which gender differences influence learning outcomes. Societal norms and cultural expectations shape gender roles and behaviors, subsequently impacting learning preferences and engagement strategies that, in turn, affect academic performance ([Ibok, 2020](#)). [Oladotun \(2020\)](#) reinforces the established link between gender and academic performance, highlighting the nuanced socio-cultural disparities that shape the academic trajectory of males and females.

This comprehensive exploration delves into the multifaceted dynamics that gender may influence the academic performance of upper-basic social studies students in Delta State, Nigeria. By investigating the impact of graphics and pictures as instructional tools, as well as the moderating effects of gender, the study aspires to shed light on the intricate interplay of factors shaping students' learning experiences and outcomes. Through a rigorous examination of these dimensions, the research seeks to provide insights that contribute to the enhancement of social studies education and the overall academic performance of students within the Nigerian educational context. Therefore, this study seeks to examine the extent to which male and female moderate the effect of graphics and pictures on academic performance of upper basic social studies students.

To guide this inquiry, the study is framed by the following research questions: first, how does gender moderate the effect of graphics on the academic performance of upper-basic social studies students; and second, how does gender moderate the effect of pictures on their academic performance?

Based on these questions, the study tests two null hypotheses: first, that there is no significant moderating effect of gender on the relationship between graphics and academic performance; and second, that there is no significant moderating effect of gender on the relationship between pictures and academic performance.

Theoretical Review

The study was hinged on Paivio's Dual Coding Theory (DCT) (1971), this theory asserts that human cognition operates through two distinct systems for processing information: a verbal system and a non-verbal (imagery) system. This theory suggests that information can be represented in both verbal and visual formats and that utilizing both channels can enhance learning and retention. According to DCT, the verbal system processes information through language, encompassing both spoken and written words, while the visual system handles information through images, diagrams, and other visual representations.

The study is built on this theory because when learners engage with visual aids like graphics and pictures, they create multiple representations of the same information, which aids

comprehension and memory. For example, when a social studies student reads about a scientific concept while simultaneously viewing a diagram or infographic, they can connect the textual information with the visual representation. This dual coding strengthens the encoding of information in memory and facilitates retrieval, leading to improved academic performance.

Conceptual Review

Concept of Academic Performance

Academic performance refers to the extent to which a student achieves their educational goals, typically measured by grades, test scores, and overall academic accomplishments. It reflects the knowledge and skills that a student has acquired in a particular subject or course, and is often assessed through various forms of evaluation (Ntibi & Edoho, 2017). The achievement of students' academic excellence is a fundamental objective shared across global educational paradigms. This focus on academic performance reflects a universal commitment to fostering student success and ensuring that learners attain the knowledge and skills necessary for their future endeavors. As posited by Narad & Abdullahi (2016), academic performance epitomizes the comprehensive knowledge assimilated by students. Educators often assess this knowledge through examinations or tests, which serve as formal evaluations of student learning and understanding. In a parallel vein, Kumar et al. (2021) regard academic performance as a quantifiable manifestation of behavioral attributes exhibited during a designated learning period. This perspective highlights the connection between students' behaviors, such as engagement, participation, and study habits, and their academic outcomes. By observing these behavioral attributes, educators can gain insights into the factors that contribute to a student's success or challenges in the learning process.

Concept of Graphics

Graphics, which include visual aids like charts, diagrams, and images, have become increasingly recognized as effective tools for improving learning experiences in different educational areas, including social studies. Incorporating graphics into social studies lessons can help students understand complex historical events, geographical issues, and cultural contexts, leading to greater engagement, better comprehension, and enhanced critical thinking skills. Else-Quest et al. (2010) explained that Graphics help connect abstract ideas to real-world examples, making the material more relatable for students. This is especially important in social studies, where topics often involve complicated relationships between historical events, geographical locations, and cultural dynamics. Numerous studies have clearly shown how powerful graphics can be in Social Studies Education. Research by Smith (2022) highlights how incorporating graphics can significantly improve educational effectiveness. This approach not only helps students remember historical information better but also enhances their ability to see connections between different time periods. This skill of linking various historical events is crucial for understanding the broader spectrum of human experiences over time.

Concept of Pictures

Thompson & Patel (2020) and Brown & William (2020) explored how pictures and cultural diversity intertwine in Social Studies Education. Their study highlighted the significant role of pictures in promoting transcultural understanding. They showed that pictures, while seemingly static, act as dynamic tools that help students engage with diverse cultures in meaningful ways. By using visuals, students could better grasp the complexity of different cultural identities and the global interconnectedness that transcends geographic boundaries.

According to Riegle-Crumb et al. (2012) and Johnson & Martinez (2017), pictures have emerged as powerful instructional tools in the realm of Social Studies Education, offering a visual avenue to convey complex historical narratives, cultural contexts, and geographical information. The utilization of pictures in social studies instruction is grounded in the belief that visual representations can enhance students' understanding, critical thinking, and engagement. Pictures, as visual aids, hold the potential to bridge the gap between abstract concepts and concrete

understanding. In social studies, where students often grapple with comprehending historical events or cultural practices, pictures serve as windows into the past, making otherwise distant narratives more relatable. Distinguished scholars, exemplified by the likes of [Brown & Garcia \(2017\)](#) and [Atubi \(2021\)](#), eloquently advocate for the pivotal integration of visual stimuli within the intricate fabric of Social Studies Education.

Concept of Gender and Academic Performance

Gender differences in academic performance have been a topic of consistent interest in educational research, exploring the potential disparities between male and female students in various academic contexts. Numerous scholars have engaged in investigations to comprehend the nuanced relationship between gender and academic achievement. The inquiry into the potential impact of gender on academic performance has been a longstanding focus of educational research. The investigation seeks to discern whether gender differences indeed have a notable influence on students' academic performance with regards to gender, graphics and picture. [Salihu et al. \(2020\)](#) discovered that female students performed higher in academics than their male counterparts. In a similar vein, [Ullah & Ullah \(2019\)](#) reported the same findings in their study. Therefore, the findings from the present study will either support or contradict whether gender difference exist in academic performance of students taught with visual aids such as graphics and pictures.

An influential contribution to this discourse was made by [Hyde & Mertz \(2009\)](#), whose work underscored the necessity of delving deeper into the intricacies of gender-related distinctions in academic outcomes. Hyde and Mertz's study emphasized a crucial shift from viewing gender differences as dichotomous and fixed to recognize the diversity that exists within each gender group. The researchers illuminated the significance of moving beyond sweeping generalizations that categorically associate academic strengths or weaknesses with a specific gender. They advocated for a more nuanced understanding that acknowledges the considerable variation in academic abilities within both male and female populations.

Central to their argument was the call to dispel the notion of gender as an exclusive determinant of academic prowess. Hyde and Mertz stressed that focusing solely on gender overlooks the substantial overlap in academic performance between males and females. Their research emphasized the need to appreciate that while certain trends might be discernible, they should not overshadow the substantial shared territory in academic abilities. This study's significance lies in its challenge to traditional assumptions and stereotypes surrounding gender and academic performance. By advocating for a comprehensive perspective that accounts for the wide range of abilities within each gender group. Thus, Hyde and Mertz provided a compelling argument against rigid gender-based expectations in education. Most research that have been carried out concentrate on usage of visual aids without considering other intervening or moderating variables such as gender, but this research investigated the effect of gender differences on usage of visual aids for promoting the academic performance of social studies students. This is an empirical gap, which has been filled by the findings in this study.

METHOD

This study employed a quasi-experimental research design, which involved the implementation of pre-test and post-test assessments on both gender groups within non-randomized (intact) classes. The study's population encompassed all upper basic 8 social studies students in Delta State, totaling 6,912 students. Utilizing purposive sampling approach, a sample size comprising 115 Upper Basic 8 male and female Social Studies students were selected. This small sample was used due to the nature of the study, since it is a quasi-experimental design, using too many students as a sample could affect the ability of the researchers to control extraneous variables that may interfere with the results of the study. The primary tool employed for this research was the Social Studies Performance Test (SSPT), consisting of 50 multiple-choice questions, the SSPT was diligently structured from three topics chosen from the social studies upper basic syllabus. The instrument was validated by an expert of measurement and evaluation and a professor of social

studies at the Delta State University, Abraka, Nigeria. The made useful corrections to the instrument which were effected before producing a final draft of the instrument used for the study. The reliability of the SSPT was done through the utilization of the test-retest method, using the Pearson Product Moment Correlation Coefficient (PPMC) statistic. The analysis resulted in a coefficient value of 0.69.

For collection of data, a pre-test was given, before intensive teaching with graphics and pictures for the two experimental groups for the selected topics; it consisted of explanations, drills, and visual applications for six weeks. The topics were the same as social studies topics taught in that term. The students were free to study and visualize the photographs and images displayed, express themselves, ask questions, and contribute to the lesson, while the teachers explained, and observed performance and progress. The teachers made sure that the students understood and master one topic/unit very well before proceeding to the next topic. After treatment, a post-test was administered, data was then collated and research questions were analyzed with mean, while ANCOVA was used to test all two hypotheses.

RESULTS

Moderating Effect of Gender on Graphics and Academic Performance

The first research question examined how gender moderates the effect of graphics on the academic performance of upper basic social studies students. The descriptive statistics for this analysis are presented in [Table 1](#).

Table 1. Test of the Moderating Effect of Gender on Graphics

Group	N	Pretest		Post-test		Mean Gain
		Mean	SD	Mean	SD	
Male	40	35.25	8.73	71.05	15.72	35.8
Female	75	35.76	10.32	73.76	16.56	38.0
Total	115					

[Table 1](#) outlines the moderating effect of gender on the use of graphics as an instructional resource and its relationship with academic performance. The data shows changes in the mean scores of male and female students exposed to graphics-based instruction. Male students demonstrated a pretest mean of 35.25 and a post-test mean of 71.05, resulting in a mean gain of 35.8. Female students began with a slightly higher pretest mean of 35.76 and achieved a post-test mean of 73.76, yielding a mean gain of 38.0. This indicates that both male and female students experienced substantial improvements in their academic performance following the intervention. However, the mean gain for female students was approximately 2.2 points higher than that of male students, suggesting that, on average, female students derived a marginally greater benefit from the graphics-based teaching method.

To determine the statistical significance of this moderating effect, an Analysis of Covariance (ANCOVA) was conducted, with the results summarized in [Table 2](#).

Table 2. ANCOVA Summary on the Moderating Effect of Gender on Graphics and Academic Performance

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Decision
Gender and Graphics	993.298	2	496.649	5.629	.005	Hypotheses rejected
Error	9882.66	113	88.238			
Total	156480.00	115				

The ANCOVA results reveal a statistically significant interaction between gender and the use of graphics on academic performance ($F(2, 113) = 5.629, p = .005$). Since the obtained p-value of 0.005 is less than the alpha level of 0.05, the null hypothesis stating no significant moderating effect is rejected. This confirms that gender is a significant moderator in the relationship between graphics-based instruction and academic performance. The nature of this interaction is further illustrated in [Figure 1](#).

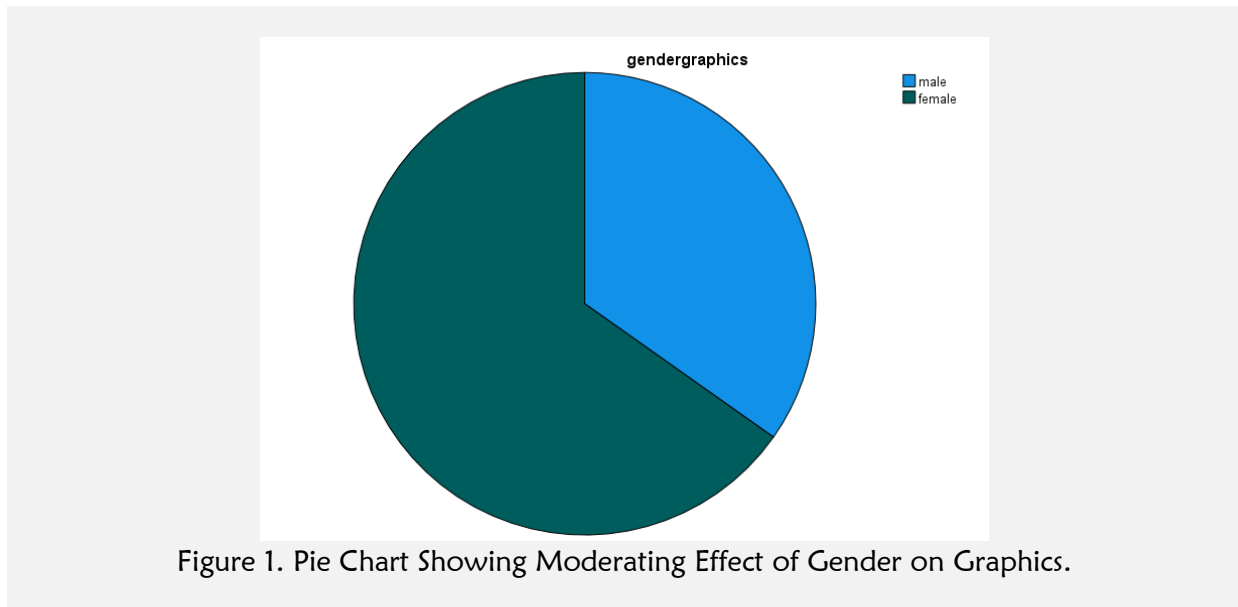


Figure 1. Pie Chart Showing Moderating Effect of Gender on Graphics.

Moderating Effect of Gender on Pictures and Academic Performance

The second research question investigated how gender moderates the effect of pictures on the academic performance of upper basic social studies students. The descriptive statistics for this analysis are detailed in [Table 3](#).

Table 3. Test of the Moderating Effect of Gender on Pictures

Group	N	Pretest		Post-test		Mean Gain
		Mean	SD	Mean	SD	
Male	44	37.70	13.44	71.05	15.72	33.35
Female	66	33.32	9.72	63.89	16.29	30.57
Total	110					

[Table 3](#) presents the moderating effect of gender on the use of pictures as an instructional resource. The data illustrates the changes in mean scores for male and female students within the pictures group. Male students exhibited a pretest mean of 37.70 and a post-test mean of 71.05, resulting in a mean gain of 33.35. Female students began with a pretest mean of 33.32 and achieved a post-test mean of 63.89, yielding a mean gain of 30.57. The results confirm that both male and female students experienced significant increases in their academic performance after the picture-based teaching intervention. The data further indicates that the mean gain for male students was approximately 33.35 points, which is 2.78 points higher than the mean gain for female students, which was 30.57 points. This suggests that, on average, male students experienced a slightly greater improvement in academic performance compared to female students following the picture-based instruction.

The statistical significance of this moderating effect was tested using ANCOVA, and the results are presented in [Table 4](#).

Table 4. ANCOVA Summary on the Moderating Effect of Gender on Pictures and Academic Performance

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Decision
Gender and pictures	385.327	2	192.664	.723	.488	Hypotheses accepted
Error	28521.846	107	266.559			
Total	487309.000	110				

The ANCOVA results show that the interaction between gender and the use of pictures on academic performance was not statistically significant ($F(2, 107) = 0.723, p = .488$). As the obtained p-value of 0.488 is greater than the 0.05 alpha level, the null hypothesis stating no significant moderating effect is accepted. Therefore, it is concluded that gender does not significantly moderate the relationship between picture-based instruction and the academic performance of upper basic social studies students. This relationship is further depicted in [Figure 2](#).

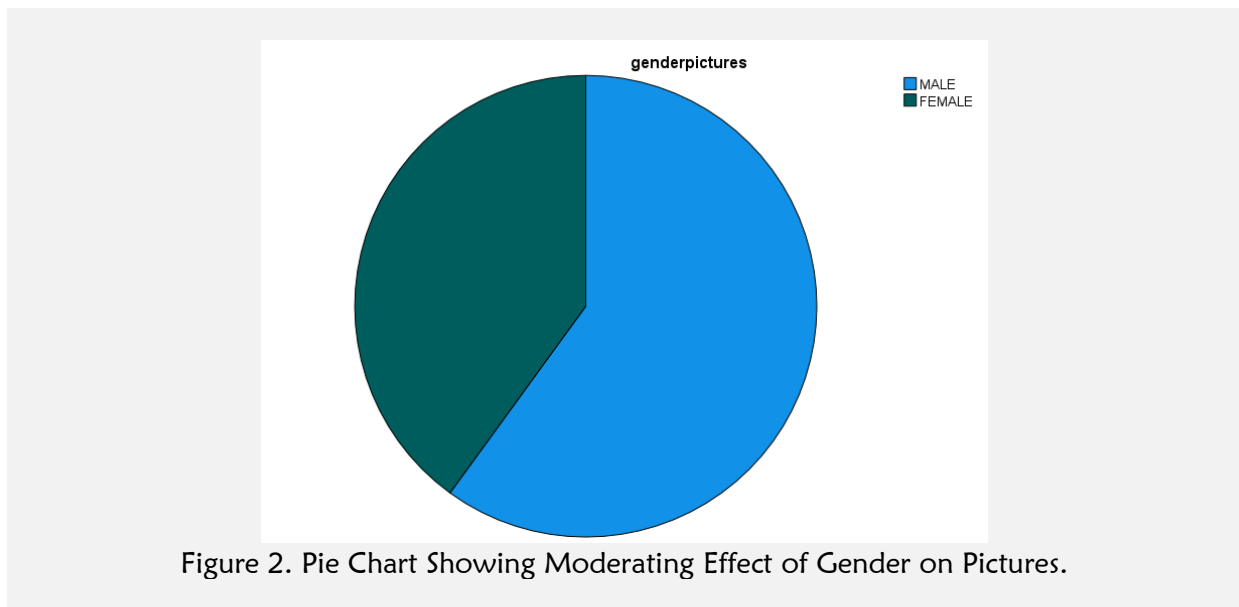


Figure 2. Pie Chart Showing Moderating Effect of Gender on Pictures.

DISCUSSION

The first finding revealed that Gender has a significant moderating effect on graphics and the academic performance of upper basic social studies students. This is due to differing cognitive styles and preferences between genders, such as males gravitating towards spatial processing and females excelling in verbal processing. Societal conventions and cultural expectations around gender roles may also alter students' responses to visual cues, as gender stereotypes and biases might influence their judgments of their abilities and interests in certain disciplines. Furthermore, self-confidence and efficacy levels can also influence the interplay between gender and graphics. Studies ([Oladotun, 2020](#); [Salihu et al., 2020](#); and [Ullah & Ullah, 2019](#)) have revealed that males and females have differing levels of self-assurance and conviction in their talents, which can alter their desire to engage with and employ visual aids in learning. Gender-based inequalities in self-perception and confidence may modulate the degree to which students of various genders harness graphics for academic advancement. Instructional methods and classroom conditions also play a role in influencing the interaction impact of gender and graphics on academic performance. Educators' teaching styles, attitudes, and interactions within the classroom may unwittingly perpetuate or ameliorate gender differences in students' engagement with visual resources. [Else-Quest et al. \(2010\)](#) and [Hyde & Mertz \(2009\)](#) established an open and supportive learning

atmosphere that encourages active involvement and equitable access to resources might help alleviate gender-related hurdles to academic performance. The first finding in this study is in line with Ullah & Ullah (2019) and Salihu et al. (2020) that discovered gender difference in spatial and verbal preferences, in favour of female students.

The second finding shows that there is no significant moderating effect of gender on pictures and academic performance of social studies students in Delta State, hence gender had no effect on the use of pictures on the students' academic performance. This implies that pictures is not gender, sensitive as it did not determine the effect of the instructional resources on academic performance of students. This finding indicates that the use of pictures did not Favour one respective gender against the other as p value was below 0.05 level of significance. Meaning being a boy or a girl has no effect as it concerns the usage of pictures resource in the social studies classroom. This may be because the resource is new to all students hence, they all have a similar standing. This finding contradicts other studies such as Brown & William (2020); Johnson & Martinez (2017) and Kumar et al. (2021), these studies reported significant effect of pictures and gender on academic performance of students. However, the result corresponds with Hyde et al. (2009) and Riegle-Crumb et al. (2012) that found no statistical effect of gender on the academic performance of male and female students. Therefore, this study submitted that gender has no positive effect on academic performance of social studies students taught with pictures.

CONCLUSION

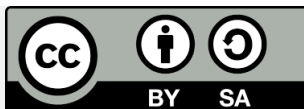
The findings from this study suggested that there is a strong moderating influence of gender on graphics, however gender did not moderate pictures and academic performance. Gender only tempered the influence of graphics, but did not moderate pictures resources. The moderating effect demonstrated that graphics favored male students more than their female counterparts. As a consequence of this study, it can be concluded that if graphics are incorporated in Social Studies classroom interactions, it will have a good effect on the academic performance of both male and female students by improving their test results.

Though the findings from this study provides valuable insights into gender differences in learning with visual aids. It is not without some limitations. For instance, the study was carried out in Delta State, Nigeria. Thus, it has some cultural and gender norms, in Delta state male children are culturally seen as superior to female students, thereby this cultural belief may limit the implication of the findings. Secondly, the findings have implication for teacher training in social studies, as more females may be regarded for teacher training programmes than male students, since the findings is in line with the assertion. Finally, the six weeks' timeline for the study, may not have been enough time for the students to capture enough retention, hence future studies should consider increasing the timeline for this type of study.

REFERENCES

- Atubi, F. O. (2021). Influence of Multimedia Resources on Social Studies; Exploring Teachers and Students Experiences in Delta State, South South Nigeria. *Library, Philosophy and Practice*, 5319. <https://digitalcommons.unl.edu/libphilprac/5319>.
- Brown, L. & Williams, S. (2020). Culturally Relevant Pictures and Academic Performance in Social Studies. *Journal of Educational Psychology*, 115(3), 402-418.
- Brown, L. S., & Garcia, R. D. (2017). Picturing the past: Using visuals to enhance historical empathy in social studies. *Social Studies Research and Practice*, 12(2), 87-102.
- Else-Quest, N. M., Hyde, J. S., & Linn, M. C. (2010). Cross-national patterns of gender differences in mathematics: A meta-analysis. *Psychological Bulletin*, 136(1), 103-127. <https://psycnet.apa.org/doi/10.1037/a0018053>
- Erum, S., & Zahoor, A. (2011). A study on academic performance of university students. In *Proceeding of 8th International Conference on Recent Advances in Statistics* Lahore, Pakistan – February 8-9; 255–268.
- Hyde, J. S., & Mertz, J. E. (2009). *Gender, culture, and mathematics performance*. Proceedings of the National Academy of Sciences, 106(22), 8801-8807. <https://doi.org/10.1073/pnas.0901265106>

- Ibok, A. (2020). Concept Mapping Strategy and Academic Performance in Basics Science. *Journal of Science Education*, 73(11), 1-10.
- Ige, O. A. (2019). Using action learning, concept-mapping, and value clarification to improve students' attainment in ict concepts in social studies: The case of rural learning ecologies. *Journal of Social Studies Education Research*, 10(1), 301-322.
- Johnson, L., & Martinez, A. (2017). The Power of Pictures: Visual Communication and Its Impact on Society. *Journal of Visual Studies*, 34(5), 397-410.
- Krutka, D. G., & Carano, K. T. (2016). Preparing Preservice Teachers for Citizenship Education: Social Studies and the Call for Developing Informed and Engaged Citizens. *The Educational Forum*, 80(3), 265-276.
- Kumar, A., Kumari, A., & Mahto, R. (2021). Impact of demographic variables on academic achievement of secondary school students. *Journal of Contemporary Issues in Education*, 16(1), 64-76.
- Narad, H. M., & Abdullahi, A. (2016). School location and students' academic performance in the entrance examinations of junior secondary school in Nigeria. *Academic Journal of Interdisciplinary Studies*, 5(2), 152-159.
- Ntibi, O., & Edoho, E. (2017). School location and academic achievement in mathematics and science: A cross-sectional analysis. *International Journal of Educational Research*, 32(4), 410-425.
- Oladotun, O. O. (2020). Cognitive styles and gender as predictors of students' achievement in summary writing in selected secondary schools in Ibadan, Nigeria. *Education Research International*, 2020(1), 8462368. <https://doi.org/10.1155/2020/8462368>
- Owan, V. J., Nwannunu, B. I. & Madukwe, E. C. (2018). Problems of school management and students' academic performance in secondary schools in Calabar education zone, Cross River State, Nigeria. *International Journal of Research and Innovation in Social Science*, 2(10), 120-127.
- Punzalan, J. F. (2018). The impact of visual arts in students' academic performance. *International Journal of Education and Research*, 6(7), 121-130.
- Riegle-Crumb, C., King, B., Grodsky, E., & Muller, C. (2012). The more things change, the more they stay the same. Prior achievement fails to explain gender inequality in entry into STEM college majors over time. *American Educational Research Journal*, 49(6), 1048-1073. <https://doi.org/10.3102/0002831211435229>
- Salihu, J. J., Usman, A., & Buhari, Y. S., (2020). Effects of gender on upper basic Social Studies students' achievement in educational field trips learning environment in Kaduna State, Nigeria. *Sapientia Foundation Journal of Education, Science and Gender Studies (SFJESGS)*, 2(3), 239-246.
- Smith, J. A. (2022). Influence of graphics on Social Studies Education. *Educational Insights*, 8(2), 45-60.
- Thompson, E. J., & Patel, S. K. (2020). Exploring visual representations in fostering transcultural understanding in social studies. *Journal of Multicultural Education*, 14(1), 32-48.
- Ullah, R., & Ullah, H. (2019). Boys versus Girls' Educational Performance: Empirical Evidences from Global North and Global South. *African Educational Research Journal*, 7(4), 163-167. <https://doi.org/10.30918/AERJ.74.19.036>
- Yore, L. D. (2012). The Learning and Teaching of Science as Controversial/ Socially Situated. *International Journal of Science Education*, 34(15), 2245-2269.



Copyright (c) 2025 by the authors. This work is licensed under a Creative Commons Attribution-ShareAlike 4.0 International License.