Journal of Multidisciplinary Innovations and Perspectives (JMIP)
Maiden Edition
www.fedpodjournal.com
Volume 1; Issue 1; November 2024; Page No. 117-124.

GENDER-BASED DIFFERENCE IN INTEREST IN MATHEMATICS AMONG MIDDLE SCHOOL STUDENTS IN ABUJA MUNICIPAL AREA COUNCIL, ABUJA USING AUDIO-VISUAL INSTRUCTIONAL AIDS.

Uzobuife Frank, Otutu Lucky Absalom, And Adegbite Olumide Ayodeji
Federal Polytechnic Ohodo, Enugu State

Abstract
This study set out to examine gender-based difference in interest and achievement in mathematics among middle school students in Abuja Municipal Area Council using audio-visual instructional aids. The research adopted quasi-experimental research design. Data were collected from a sample of 64 students comprising 32 boys and 32girls from two randomly selected government junior secondary schools in Abuja Municipal Area Council of the Federal Capital Territory. The schools were grouped into one experimental and one control groups. Audio visual assisted instruction (AVAI) was used for the experimental group while the control group was taught using the conventional method. A 50 item instrument called Mathematics Achievement Test (MAT) developed by the researcher with a reliability coefficient of 0.78 using Kuder-Richardson formula 21 and a mathematics Interest scale (MIS) with 14 items and 5 response options were used for data collection, Data collected were analyzed using descriptive statistics of mean and standard deviation for answering the research questions and t-test at coefficient alpha level of 0.05 for testing the hypotheses. The results shows that there is no significant difference between the academic achievement and interest of male and female students who were exposed to Audio visual assisted instruction. Based on these findings, it was recommended that mathematics teachers should be encouraged to use audio visual assisted instructions to teach mathematics at all levels of education and teachers in training should be equipped with knowledge of computer vast enough in to be able to make effective use of audio-visual assisted instruction for mathematics teaching. as it is beneficial to both genders.

Keywords; Gender; Audio; Visual; Teacher; Secondary School

Introduction

Learning involves changes in performance achieved through active engagement in activities, practice, and experiences. According to Oyeniran (2003), learning encompasses acquiring knowledge, developing skills, improving abilities, and progressing through study. However, before knowledge can shape character, there must be an initial interest. The mind must engage deeply with the subject matter to assimilate and internalize it. This underscores the importance of interest as a prerequisite for effective learning. Interest, as defined by Hornby (2010), is an activity or subject that one enjoys and willingly invests time in studying or participating in. Harbor-Peters (2002) characterizes interest as a willingness or enthusiasm to engage in an activity that brings pleasure. Usman and Nwabueze (2011) describe interest as a subjective feeling of curiosity or intentness towards something, manifested through active engagement. Egara (2010) and Owora & Chika (2019) posit that interest serves as a motivational drive that propels individuals towards specific directions. The situation regarding mathematics education in Nigeria, as noted by Obodo (1997), reflects a general lack of interest at all levels of education. Many students find the subject challenging, requiring consistent attendance and attention to grasp its sequential nature. In Nigeria, Sa'ad et al. (2014) report that students perform poorly in mathematics, citing

Cite this article as:
Uzobike, F. et al. (2025). Gender-Based Difference In Interest in Mathematics Among Middle School Students in Abuja Municipal Area Council, Abuja Using Audio-Visual Instructional Aids. *Journal of Multıdıscıplınary Innovatıons and Perspectıves (JMIP), 1*(1) 117-124.

students' negative attitudes and lack of innovative teaching methods as the cause. In Kenya, Mbugua et al. (2012) report similar factors for low achievement in mathematics. Peteros et al. (2020) report that, in the Philippines, the level of performance in mathematics in 2020 was low as the majority of students (53.01%) performed below the average. The implication is that many teachers fail to make the mathematics learning process enjoyable for students Despite these challenges, studies such as those by Frenzel et al. (2010), Schukajlow (2015), Ogochukwu (2010), and Ediningrum (2015) highlight a declining interest in mathematics among students, particularly in later years of schooling. Due to poor performance in mathematics and the associated factors, teachers have been innovating and experimenting with various initiatives to promote students' interest in learning the subject to improve achievement. Some of the pedagogical innovations include mobile learning in mathematics (Ndume et al., 2020), mathematics island (Yeh et al., 2019) and task design (Coles and Brown, 2016). Researchers have proven that interest in mathematics can be positively influenced, especially among middle school students, through the use of audio-visual instructional aids. For instance, Anyagh and Abari (2019) explored the impact of audio-visual technology on senior secondary school students' interest in geometry, demonstrating that students taught using this approach showed greater engagement compared to traditional methods. Similarly, Sanni, Aransi, and Adebayo (2019) found that the majority of students believed that audio-visual aids enhanced their interest in learning and improved their academic performance. While studies have proven that there is widespread disinterest in mathematics education and suggest that innovative teaching methods, such as audio-visual aids, can effectively enhance students' interest, engagement and achievement in the subject but little or no consideration on the factor of gender differences. Thus, this study aims to investigate gender-based difference in interest in mathematics among middle school students in AMAC, Abuja using audio-visual instructional aids and explore potential factors that may contribute to this difference. The main objective of this research is to identify if there is a significant difference in interest levels between genders.

Concept of Audio Visual Assisted Instructions

According to Wikipedia, the term "audio visual education" or "multimedia based education" (MBE) refers to instruction where special emphasis is placed on the audio and visual presentation of materials in order to increase comprehension and retention. Audio visual aids are described in the Webster dictionary as training or educational tools that target both the senses of hearing and sight, including video recordings, photos, and other media used in classroom instruction, library collections, and the like. In his illustrations, Ofoegbu (2009) describes audio-visual aids as teaching tools that come in two varieties: verbal and material. The resources, which he referred to as the hardware and software used in education, comprise, among other things, objects, models, photographs, paintings, drawings, diagrams, and films.

In order to facilitate teaching and learning, Talabo (2004) defined audio-visual materials as a collection of audio-visual elements utilized in instructional or learning processes. According to Nwant to-Nzewunwa (2003), the use of audio-visual elements in the teaching-learning process has been developed to improve efficient education. The significance of audio-visual resources in the teaching and learning process is now widely acknowledged on a global scale.

The use of audio visual aids to support the teaching and learning process (instructions) is known as audio visual assisted instruction because using audio visual aids improves the teaching and learning process. The idea of audio visual aids has been around since the seventeenth century, when Bohemian educator John Amos Comenius (1592-1670) published Orbis Sensualiumpictus ("pictures of the sensual world"), which was illustrated with 150 drawings of daily life. It has been discovered that using audio visuals in the classroom is an excellent technique to help pupils understand concepts and ideas (Ouellette, 2004).

Cite this article as:
Uzobike, F. et al. (2025). Gender-Based Difference In Interest in Mathematics Among Middle School Students in Abuja Municipal Area Council, Abuja Using Audio-Visual Instructional Aids. *Journal of Multıdıscıplınary Innovatıons and Perspectıves (JMIP), 1*(1) 117-124.

Concept of Junior Secondary School Mathematics

According to the Mathematical Association of Nigeria (MAN), junior secondary school mathematics is an extensively covered curriculum of mathematics for pupils in upper basic education level (UBE) that was carefully chosen and developed (NERDC). Curriculum and course descriptions for mathematics at both West African Examination Council (WAEC) and National Examination Council (NECO). Primary education is without a doubt the cornerstone upon which the rest of the educational system is built, so the significance of junior secondary mathematics cannot be overstated. Mathematics has been the principal focus of basic education reform among the elementary school topics (Awofala & Awolola, 2011).

The basic level of mathematics education has traditionally been viewed as being centered on the mathematical curriculum (Awofala & Awolola 2011) the revised 9year basic education mathematics curriculum in Nigeria has been authorized and made available to schools by the Federal Ministry of Education through the National Council on Education (NCE). This curriculum is the result of the primary and junior secondary schools' mathematics curricula being redesigned, restructured, reengineered, and realigned to fit into the nine-year basic education program. In the context of this essay, basic education refers to three years of junior secondary school and six years of primary school.

The New 9-Year Basic Education Mathematics Curriculum Development Process The National Council on Education (NCE) directed the NERDC to review, re-structure, and realign the current primary and junior secondary curricula in light of the Federal Government of Nigeria's decision to implement the 9-year basic education program as a means of achieving Goal number 2 of the MDGs, which centers on achieving universal primary education by 2015, as well as the need to meet the crucial NEEDS targets. This directive came at the NCE's meeting in Ibadan in December 2005. At the meeting, the NCE authorized a new basic education curriculum framework with the following headings: Lower Basic Education Curriculum (Primary 1-3), Middle Basic Education Curriculum (Primary 4-6), and Upper Basic Education Curriculum (JSS 1-3). A High-Level Policy Committee on Curriculum Development (HLPC), comprised of important stakeholders and presided over by the NERDC, took the initiative to develop the policy guidelines for re-structuring the curriculum in response to this directive.

Methodology

The research design adopted for this study was quasi-experimental as intact classes was used for the research and there was no randomization of the students. The research was carried out in Abuja Municipal Area Council. The target population of the study consists of all JSII students in Public Secondary Schools in Abuja municipal Area council (AMAC) of the Federal Capital Territory. The sample size for the study consists of 64 JSII secondary school students in Abuja Municipal Area council of F.C.T selected from two (2) secondary schools.

The Mathematical Interest Scale (MIS) is a structured inventory made up of two sections viz: Section A which contains bio data of the respondents and section B which comprise structured statements on Interest of students toward Mathematics when taught with AVAI. MIS consisted of 14-items in which respondents were requested to indicate their interest by ticking ($\surd$) the most appropriate response to show the extent to which they agree or disagree with the statement. The 5-point modified Likert rating scale having responses of Strongly Agree, Agree, Undecided Disagree, or Strongly Disagree was used. These items were scored 5, 4,3,2 and 1 respectively and it was administered after the experiment to check the students' interest based on the AVAI.

The MIS was pilot tested in garki secondary school using split half method Thus, Pearson Product moment correlation coefficient(r) was adopted to determine the reliability coefficient of the instrument which gave the 0.78 This indicated that the items were reliable within the acceptable limits. The main objective of pilot test is to determine reliability of the instrument, duration of the test item and appropriateness of the instrument.

Cite this article as:
Uzobike, F. et al. (2025). Gender-Based Difference In Interest in Mathematics Among Middle School Students in Abuja Municipal Area Council, Abuja Using Audio-Visual Instructional Aids. *Journal of Multıdıscıplınary Innovatıons and Perspectıves (JMIP), 1*(1) 117-124.

Data collected through the MIS were classified into pre-test and post-test for the two groups, as well as into male and female, since the study has concern for gender effect. Data collected were analyzed with respect to the research questions and hypotheses formulated for the study. Descriptive statistics of mean and standard deviations was used to answer all the research questions while ANCOVA at coefficient alpha level of 0.05 was used to test all the hypotheses.

Data Analysis and Result (Answers to Research questions and Test of hypotheses)

The research questions were answered using frequency count, mean and standard deviation while hypotheses were tested using ANCOVA

Research Question: What is the difference between the interest of students taught mathematics using audio visual assisted instruction and those students taught mathematics **without using audio -visual assisted instruction?**

Table 1: Mean and Standard Deviation for Audio-visual and Conventional Groups in the MIS

Teaching Approach	No. of Students	Pre-Test	Post-test	Standard Deviation	Mean Gain
Audio-visual Strategy	34	2.42	3.06	1.02	0.64
Conventional Method	30	2.26	2.38	0.96	0.12
Mean Difference		0.16	0.68		**0.52**
Total	**64**				

In table 1, the mean gain in interest of the students taught mathematics using Audiovisual approach was 0.64 while that of the students taught using Conventional method was 0.12. The grand mean difference between the groups was 0.52 which gave an edge to students taught using Audio-visual approach. In essence, the mean interest score of students taught mathematics using Audio-visual aids was higher than their counterparts taught using Conventional Method having a mean gain difference of 0.52. This means that those students taught using Audio-visual approach had a better positive interest than the group exposed to the conventional method.

Research Question Two: What is the difference in the mean interest scores of male and female students who were taught mathematics using Audio-visual approach?

Table 2: Mean and Standard Deviation on Interest for Male and Female Students Exposed to Audio-visual assisted instruction Gender No. of Mean Scores, Standard Mean

	Students	Pre-test	Post-test	Deviation	Gain
Male	18	2.42	3.44	1.00	1.02
Female	16	2.40	2.98	1.14	0.58
Mean Difference		0.02	0.46	0.14	**0.44**
Total	34				

Table 2 shows that the mean gain in interest of the male students taught mathematics using Audio-visual approach was 1.02 while those of the female students was 0.58. The grand mean difference between the groups was 0.44. In essence, the mean interest score of male and female students taught mathematics using Audio-visual assisted instruction was low mean gain difference of 0.44.

Cite this article as:
Uzobike, F. et al. (2025). Gender-Based Difference In Interest in Mathematics Among Middle School Students in Abuja Municipal Area Council, Abuja Using Audio-Visual Instructional Aids. *Journal of Multıdıscıplınary Innovatıons and Perspectıves (JMIP), 1*(1) 117-124.

Table3 : Analysis of Covariance (ANCOVA) on the of Audio-Visual Instruction and Conventional Method on Students Interest in Mathematics

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	1.53 a	2	1135.719	20.29	.000
Intercept	38.27	1	38.27	172.33	.000
Pretest	.24	1	.24	2.15	.004
Method	1 .94	1	1.95	3.56	.000
Error	8.765	59	3.132		
Total	1002.580	64			
Corrected Total	10.26	63			

R Squared = .130 (Adjusted R Squared = .145)

Table 4 below presents ANCOVA report on the effect of Audio- Visual on students' interest in mathematics. The table reveals that $F_{(1, 59)} = 3.56$ and P= .000. With P<.05, the test statistics was found to be significant. The null hypothesis of no significant difference in the Interest students taught mathematics using audio visual assisted instruction and students those taught mathematics without using audio -visual assisted instruction was therefore rejected. This indicates that, the mean difference between the students in the experimental group and control group was statistically significant. The study this concludes that the students taught using audio visual assisted instruction significantly achieved higher mean interest ratings as compared to those who were taught without using audio visual assisted instruction.

H_{04}: There is no significant difference in the interest of male and female students taught mathematics using audio visual assisted instructions

Table 4: Analysis of Covariance (ANCOVA) on the of Audio-Visual Instruction on Male and Female Students' Interest in Mathematics

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	1.55 a	2	.89	17.74	.000
Intercept	32.86	1	32.86	125.81	.000
Pretest	1.40	1	1.40	3.22	.006
Gender	.09	1	.09	1.47	.030
Error	6.25	32	0.08		
Total	1128.245	34			
Corrected Total	6.08	33			

a. R Squared = .145 (Adjusted R Squared = .175)

Table 4. presents the summary of ANCOVA on the effect of Audio Visual on male and female students' interest in mathematics. The table reveals that $F_{(1, 32)} = 1.47$ and P= .030. With P>.05, the test statistics was considered not to be significant. The null hypothesis of no significant difference in the interest of male and female students taught mathematics using audio visual assisted instructions was not rejected.

This indicates that the difference between the male and female students' mean interest ratings in the experimental group as reported was not statistically significant. The study concludes that gender was not a significant factor to determine students' interest in mathematics when taught using audio visual assisted instructions, thus the male and female equally benefited from audio visual assisted instructions in mathematics.

Cite this article as:
Uzobike, F. et al. (2025). Gender-Based Difference In Interest in Mathematics Among Middle School Students in Abuja Municipal Area Council, Abuja Using Audio-Visual Instructional Aids. *Journal of Multıdıscıplınary Innovatıons and Perspectıves (JMIP), 1*(1) 117-124.

Summary of Major Findings

1. There was significant difference between the mean interest scores of experimental group exposed to Audio-visual teaching strategy and their counterparts in the control group.
2. 2.There was no significant difference between the mean interest scores of male and female students exposed to Audio-visual teaching strategy

Discussion of Findings

The purpose of this study was to find gender based difference in interest in mathematics among middle school students using audio-visual instructional aids, two research questions and two hypotheses were raised, means, standard deviation to answer the research questions while ANACOVA covariance was used to test the hypotheses. Result in the table 1 showed that there was significant difference between the interest scores of experimental group exposed to Audio-visual instructional aids and their counterparts in the control group taught without using audio-visual instructional aids. This is because as seen from the table the audio-visual method is significant at P-value of 0.000 and therefore at a higher p-value of 0.05, method is also significant. The finding of the study agreed with Lapada (2015) that students in experimental group taught with audio-visual aids, performed well than those in the control group this further justified that audio-visual aided instruction is significantly more effective than traditional instructions to promote long-term retention of knowledge and skills acquired during the learning experience. This finding also agreed with Ekanem & Obodom(2017) that audio-visual (AV) has a significant impact on the academic performance of science students than conventional approach. The use of audio-visual materials promotes students' motivation in learning mathematics and enhances learning and re-learning among students as their interest significantly improved.

The experimental group had a higher mean score than their counterparts in the control group in mathematics interest scale. The result of ANCOVA as reported in Table 3 showed that there was a statistically significant difference between mean interests of students exposed to mathematics with audio-visual instruction aids and those taught mathematics without audio- visual instructional aids as The finding confirms that of Anyagh and Abari (2019) that students taught geometry using the audio-visual teaching approach showed more interest in geometry than those taught with conventional teaching approach. This also line with Sanni, Aransi & Adebayo (2019) who noted that students agreed that the use of audio-visual aids increase their interest to learn as well as ability to learn and remember the contents. The empirical outcomes indicated that audio-visual aids are effective in increasing the understanding of students in junior secondary schools. Students were observed to be more attentive when audio-visual aids were played and by this develop more interest in learning of mathematics than those in control group.

The result of ANCOVA as reported in Table 4 showed that there was no statistically significant difference between mean interests of male and female students exposed to mathematics with audio-visual assisted instruction as The table reveals that $F_{(1, 32)} = 1.47$ and P= .030. With P>.05, the test statistics was considered not to be significant. This implies that both male and female students in experimental group have similar level of interest in exposed to mathematics with audio-visual assisted instruction. This confirmed Anyagh and Abari (2019) that both male and female students in experimental group indicated similar interest in learning geometry. This is possible because both genders show much interest to mathematics as a result of audio-visual assisted instruction since both were exposed to audio-visual assisted instruction at the same time their teachers did not allowed a particular gender to have more access to audio-visual assisted instruction than another. This could also be that in the presence of audio-visual materials the attention is attracted, interest roused and suitable atmosphere for proper understanding is automatically created, inspire of the best and sincere efforts on the side of the teacher the net effect as regards understanding or learning in general is quite negligible.

Cite this article as:
Uzobike, F. et al. (2025). Gender-Based Difference In Interest in Mathematics Among Middle School Students in Abuja Municipal Area Council, Abuja Using Audio-Visual Instructional Aids. *Journal of Multıdıscıplınary Innovatıons and Perspectıves (JMIP), 1*(1) 117-124.

Conclusion

From the findings of the study the following conclusions could be drawn: students learn better through the uses of audio visuals, this improve their interest in the learning of mathematics, especially at the junior secondary school level.

However there is no significant difference in the interest of male and female students exposed to audio visual assisted instruction, This suggest that audio visual assisted instructions is beneficial to both genders, This is because in the cause of the lesson more than two senses of the students were appealed to which makes it possible for everyone (male and female) to learn.

Recommendations

Based on the results and findings of this study, the following recommendations were made:

1. Mathematics teachers should be encouraged to use audio visual aids to teach mathematics.
2. For students to achieve maximally, conventional method should not be used to teach mathematics to students at any level in secondary school education irrespective of gender.

Reference

Anyagh, P. I., & Abari, M. T. (2019). Effect of audio-visual technology on senior secondary school students' interest in geometry in Makurdi metropolis of Benue State. Biomedical Journal of Scientific and Technical Research, 17(4), 12916-12921.

Coles, A., & Brown, L. (2016). Task design for ways of working: Making distinctions in teaching and learning mathematics. Journal of Mathematics Teacher Education, 19, 149-168. https://doi.org/10.1007/s10857-015-9337-4

Ediningrum, W. R. (2015). Accelerated learning berbantuan software Maple sebagai upaya meningkatkan kemampuan komunikasi dan minat belajar siswa SMA (Unpublished master's thesis). Universitas Pendidikan Indonesia, Bandung.

Egara, O. F. (2010). Effect of computer simulation on achievement and interest of students in algebra at junior secondary school level (Unpublished master's thesis). University of Nigeria, Nsukka.

Frenzel, C. A., Goetz, T., Pekrun, R., & Watt, H. M. G. (2010). Development of mathematics interest in adolescence: Influences of gender, family, and school context. Journal of Research on Adolescence, 20(2), 507-537. https://doi.org/10.1111/j.1532-7795.2010.00645.x

Harbor-Peters, V. F. A. (2002). Attitude and interest of the students to the mathematical sciences in Nigeria. A commissioned paper for the Mathematical Sciences Education Summit, organized by the National Mathematical Centre, Abuja.

Hornby, A. S. (2010). Oxford advanced learners dictionary of current English (8th ed.). Oxford University Press.

Mbugua, Z., Kibet, K., Muthaa, G., & Nkonke, G. (2012). Factors contributing to students' poor performance in mathematics at Kenya Certificate of Secondary Education in Kenya: A case of Baringo County, Kenya. American International Journal of Contemporary Research, 2(6), 87-91. Retrieved from https://kerd.ku.ac.ke/handle/123456789/1013

Ndume, V., Songoro, M., & Kisanga, D. (2020). Enriching performance of mathematics in secondary schools using mobile learning. International Journal of Education and Development Using Information and Communication Technology, 16(2), 223-241.

Obodo, G. C. (1997). Principle and practice of mathematics education in Nigeria. Enugu: General Studies Division, Enugu State University of Science and Technology.

Ogochukwu, N. V. (2010). Enhancing students' interest in mathematics via multimedia presentation. African Journal of Mathematics and Computer Science Research, 3(7), 107- 113.

Owora, N. O., & Chika, C. U. (2019). Strategies for arousing students' interest in mathematics. ABACUS: Journal of the Mathematical Association of Nigeria, 44(1), 201-210.

Peteros, E., Gamboa, A., Etcuban, J. O., Dinauanao, A., Sitoy, R., & Arcadio, R. (2020). Factors affecting mathematics performance of junior high school students. International Electronic Journal of Mathematics Education, 15(1), 1-13. https://doi.org/10.29333/iejme/5938

Sa'ad, T. U., Adamu, A., & Sadiq, M. A. (2014). The causes of poor performance in mathematics among public senior secondary school students in Azare metropolis of Bauchi State, Nigeria. IOSR Journal of Research and Method in Education, 4(6), 32-40. https://doi.org/10.9790/7388-04633240

Schukajlow, S. (2015). Effect of enjoyment and boredom on students' interest in mathematics and vice versa. In Proceedings of the 39th Conference of the International Group for the Psychology of Mathematics Education (Vol. 4, pp. 137-144).

Usman, K. O., & Nwabueze, M. U. (2011). Promoting students' interest in quadratic equation area-tiles to approach mathematics instruction. ABACUS: Journal of the Mathematical Association of Nigeria, 36(1), 74-84.

Yeh, C. Y. C., Cheng, H. N. H., Chen, Z. H., Liao, C. C. Y., & Chan, T. W. (2019). Enhancing achievement and interest in mathematics learning through Math-Island. Research and Practice in Technology Enhanced Learning, 14(5), 1-19. https://doi.org/10.1186/s41039- 019-0100