FEDPUKA JOURNAL OF SCIENCE, TECHNOLOGY AND CONTEMPORARY STUDIES VOL 1 ISSUE 1, 2025

AN EVALUATION OF THE ATTITUDE OF MATHEMATICAL CIENCE IN BASIC EDUCATION PROGRAM IN OMOKU COMMUNITY, RIVERS STATE

OKORO JOYCE ADAOBI
ART EDUCATION
FEDERAL COLLEGE OF EDUCATION (TECHNICAL), OMOKU
RIVERS STATE

Abstract

This study examined the attitudes toward mathematical science among students in the basic education program in Omoku Community, Rivers State, Nigeria. Using a mixed-methods approach, data were collected from 384 students across 12 primary and junior secondary schools through structured questionnaires and focus group discussions. The study employed the Mathematics Attitude Scale (MAS) to measure students' attitudes across four dimensions: enjoyment, motivation, confidence, and perceived usefulness. Results revealed predominantly negative attitudes toward mathematics, with mean scores of 2.3 (enjoyment), 2.1 (motivation), 2.0 (confidence), and 2.8 (perceived usefulness) on a 5-point Likert scale. Significant gender differences were observed ($p < 0.05$), with male students showing slightly more positive attitudes. Key factors influencing attitudes included teaching methods, resource availability, parental support, and cultural perceptions. The study recommends implementing student-centered pedagogical approaches, improving resource allocation, and conducting community awareness programs to enhance mathematical literacy and positive attitudes toward the subject.

Keywords: ***Mathematics Attitude, Basic Education, Omoku Community, Rivers State, Mathematical Science Education***

1. Introduction

Mathematics education forms the cornerstone of scientific and technological advancement in any society. The attitude students develop toward mathematics during their formative years significantly influences their academic choices, career paths, and overall mathematical literacy (Hannula, 2022). In Nigeria's basic education system, mathematics remains a compulsory subject from primary through secondary levels, yet persistent challenges in student performance and engagement continue to plague the educational landscape (Okafor & Anaduaka, 2023).

Omoku Community, located in Ogba/Egbema/Ndoni Local Government Area of Rivers State, represents a typical Niger Delta community where educational challenges intersect with socio-economic realities. The community's predominantly agrarian and oil-dependent economy creates unique contexts that may influence students' perceptions of mathematical relevance and utility (Weli & Nwankwoala, 2022).

Research has consistently demonstrated that student attitudes toward mathematics significantly predict academic achievement, persistence in STEM fields, and future career choices (Chen et al., 2024). Negative attitudes often manifest as mathematics anxiety, avoidance behaviors, and

poor academic performance, creating cyclical patterns that perpetuate mathematical illiteracy across generations (Ramirez et al., 2023).

1.1 Statement of the Problem

Despite mathematics being a core subject in Nigeria's basic education curriculum, reports from the West African Examinations Council (WAEC) and National Examinations Council (NECO) consistently show poor performance in mathematics among Nigerian students (Federal Ministry of Education, 2023). In Rivers State particularly, the situation appears more pronounced in rural communities like Omoku, where limited resources, inadequate infrastructure, and socio-cultural factors may compound the challenges.

Preliminary observations in Omoku Community schools suggest that students exhibit negative attitudes toward mathematics, characterized by fear, anxiety, and perceived irrelevance of the subject to their daily lives and future aspirations. However, no systematic study has been conducted to empirically evaluate these attitudes and identify specific factors contributing to the phenomenon.

1.2 Purpose of the Study

This study aims to evaluate the attitudes of students toward mathematical science in the basic education program in Omoku Community, Rivers State, and identify key factors influencing these attitudes.

1.3 Research Questions

1. What are the prevailing attitudes of students toward mathematical science in Omoku Community's basic education program?
2. Are there significant differences in mathematical attitudes based on gender, age, and academic level?
3. What factors influence students' attitudes toward mathematical science in the study area?
4. What strategies can be implemented to improve students' attitudes toward mathematical science?

1.4 Research Hypotheses

H_{01}: There is no significant difference in mathematical attitudes between male and female students in Omoku Community.

H_{02}: There is no significant relationship between students' mathematical attitudes and their academic performance.

H_{03}: There is no significant difference in mathematical attitudes across different academic levels (Basic 4-6 and Basic 7-9).

2. Literature Review

2.1 Theoretical Framework

This study is grounded in the Theory of Planned Behavior (Ajzen, 1991) and Social Cognitive Theory (Bandura, 1986), which emphasize the role of attitudes, beliefs, and social influences in shaping behavior and learning outcomes. These theories provide a comprehensive framework for understanding how students' attitudes toward mathematics develop and influence their academic engagement and performance.

2.2 Conceptual Understanding of Mathematical Attitudes

Mathematical attitude refers to students' emotional disposition, beliefs, and behavioral tendencies toward mathematics as a subject (Di Martino & Zan, 2022). It encompasses multiple dimensions including enjoyment, confidence, motivation, perceived usefulness, and anxiety levels. Research indicates that mathematical attitudes are not innate but develop through interactions with mathematical content, teaching methods, social environment, and cultural contexts (Grootenboer et al., 2023).

2.3 Factors Influencing Mathematical Attitudes

2.3.1 Pedagogical Factors

Teaching methods significantly impact students' mathematical attitudes. Traditional teacher-centered approaches often foster negative attitudes, while interactive, student-centered methods promote positive engagement (Sullivan et al., 2024). The use of technology, manipulatives, and real-world applications has been shown to improve student attitudes and achievement (Zhang & Li, 2023).

2.3.2 Environmental Factors

School environment, including resource availability, classroom climate, and peer interactions influences mathematical attitudes of students. Well-equipped schools with supportive learning environments tend to foster more positive attitudes (Johnson et al., 2023). Rural schools often face resource constraints that may negatively impact student attitudes (Thompson & Davis, 2024).

2.3.3 Socio-Cultural Factors

Cultural beliefs about mathematics, parental attitudes, and community perceptions significantly influence student attitudes. In many African contexts, mathematics is often perceived as difficult and abstract, contributing to negative attitudes (Mbugua et al., 2023). Gender stereotypes and cultural expectations also play crucial roles in shaping mathematical attitudes (Ahmed & Hassan, 2024).

2.4 Mathematical Attitudes in Nigerian Context

Studies in Nigeria have revealed predominantly negative attitudes toward mathematics among students at various educational levels. Adebayo and Kolawole (2023) found that 68% of secondary school students in Lagos State exhibited negative attitudes toward mathematics. Similarly, Ugwu et al. (2024) reported high levels of mathematics anxiety among primary school students in Enugu State.

Research in Rivers State specifically has highlighted unique challenges related to the Niger Delta context. Wokoma and Oko (2023) identified environmental degradation, economic instability, and limited educational infrastructure as factors contributing to poor mathematical attitudes in the region.

2.5 Gender Differences in Mathematical Attitudes

Gender differences in mathematical attitudes remain a contentious issue in educational research. While some studies report male advantages in mathematical confidence and performance (Williams & Brown, 2024), others suggest that gender gaps are narrowing or reversing in certain contexts (Martinez et al., 2023). Cultural factors appear to mediate these relationships significantly.

2.6 Gap in Literature

Despite extensive research on mathematical attitudes globally, limited studies have focused specifically on rural Nigerian communities like Omoku. Most existing research concentrates on urban areas, leaving a significant gap in understanding the unique challenges and opportunities in rural educational contexts. This study addresses this gap by providing empirical data from Omoku Community.

3. Methodology

3.1 Research Design

This study employed a mixed-methods sequential explanatory design, combining quantitative survey data with qualitative focus group discussions. This approach provides comprehensive insights into students' mathematical attitudes while allowing for deeper exploration of underlying factors (Creswell & Plano Clark, 2023).

3.2 Study Area

The study was conducted in Omoku Community, located in Ogba/Egbema/Ndoni Local Government Area of Rivers State, Nigeria. Omoku serves as the headquarters of the local government area and hosts several primary and secondary schools serving surrounding communities. The area is characterized by mixed economic activities including agriculture, trading, and oil-related services.

3.3 Population and Sample

The target population comprised all basic education students (Primary 4-6 and Junior Secondary School 1-3) in Omoku Community. Using Krejcie and Morgan's (1970) formula, a sample size of 384 students was determined from a population of approximately 2,400 students across 12 schools.

3.4 Sampling Technique

A multi-stage sampling approach was employed:

1. **Stage 1:** Purposive selection of 12 schools (8 primary, 4 secondary) based on enrollment and accessibility
2. **Stage 2:** Stratified sampling by gender and academic level
3. **Stage 3:** Simple random sampling of students within each stratum

Additionally, 48 students (4 from each school) were purposively selected for focus group discussions based on their willingness to participate and diverse academic performance levels.

3.5 Research Instruments

3.5.1 Mathematics Attitude Scale (MAS)

A standardized 32-item Mathematics Attitude Scale was adapted from Tapia and Marsh (2004) and modified for the Nigerian context. The scale measures four dimensions:

- **Enjoyment** (8 items): Pleasure derived from mathematical activities
- **Motivation** (8 items): Drive to engage with mathematical tasks
- **Confidence** (8 items): Self-belief in mathematical abilities
- **Perceived Usefulness** (8 items): Recognition of mathematics' practical value

Items were rated on a 5-point Likert scale (1 = Strongly Disagree, 5 = Strongly Agree).

3.5.2 Demographic Questionnaire

A structured questionnaire collected information on age, gender, academic level, family background, and academic performance.

3.5.3 Focus Group Discussion Guide

Semi-structured discussion guides explored factors influencing mathematical attitudes, learning experiences, and suggestions for improvement.

3.6 Validity and Reliability

Content validity was established through expert review by three mathematics education specialists and two research methodologists. The instrument was pilot-tested with 40 students from a neighboring community, yielding Cronbach's alpha values of:

- Enjoyment: $\alpha = 0.84$
- Motivation: $\alpha = 0.81$
- Confidence: $\alpha = 0.87$
- Perceived Usefulness: $\alpha = 0.79$
- Overall Scale: $\alpha = 0.89$

3.7 Data Collection Procedure

Data collection was conducted over four weeks in November 2024. Research assistants who were trained for two days administered questionnaires during school hours with teachers' permission. Focus group discussions, lasting 45-60 minutes each, were conducted in English and local languages as appropriate, with sessions audio-recorded and transcribed.

3.8 Data Analysis

Quantitative data were analyzed using SPSS version 28.0. Descriptive statistics (means, standard deviations, frequencies) described mathematical attitudes. Inferential statistics included:

- Independent samples t-tests for gender comparisons
- One-way ANOVA for academic level comparisons
- Pearson correlation for relationship analysis
- Multiple regression for predictive modeling

Qualitative data were analyzed using thematic analysis, with codes and themes emerging through iterative review of transcripts.

3.9 Ethical Considerations

Ethical approval was obtained from the Rivers State Ministry of Education. School principals provided institutional consent, while students and parents gave informed consent/assent. Participation was voluntary, with assured anonymity and confidentiality.

4. Results

4.1 Demographic Characteristics

The study included 384 participants (192 males, 192 females) aged 9-16 years ($M = 12.4$, $SD = 2.1$). Distribution by academic level: Primary 4 (18.2%), Primary 5 (19.5%), Primary 6 (20.8%), JSS 1 (19.0%), JSS 2 (11.7%), JSS 3 (10.8%).

4.2 Mathematical Attitudes by Dimensions

Table 1 presents descriptive statistics for mathematical attitude dimensions:

Table 1: Descriptive Statistics for Mathematical Attitude Dimensions

Dimension	N	Mean	SD	Interpretation
Enjoyment	384	2.31	0.87	Negative
Motivation	384	2.12	0.92	Negative
Confidence	384	2.01	0.94	Negative
Perceived Usefulness	384	2.84	0.78	Neutral
Overall Attitude	384	2.32	0.73	Negative

Note: Scale ranges from 1 (Very Negative) to 5 (Very Positive); 3.0 = Neutral

Results indicate predominantly negative attitudes across all dimensions except perceived usefulness, which approached neutral levels.

4.3 Gender Differences in Mathematical Attitudes

Independent samples t-tests revealed significant gender differences:

Table 2: Gender Differences in Mathematical Attitudes

Dimension	Males (n=192) M (SD)	Females (n=192) M (SD)	t-value	p-value	Cohen's d
Enjoyment	2.45 (0.84)	2.17 (0.88)	3.21	0.001*	0.33
Motivation	2.28 (0.89)	1.96 (0.93)	3.45	0.001*	0.35
Confidence	2.19 (0.91)	1.83 (0.95)	3.82	<0.001*	0.39
Perceived Usefulness	2.91 (0.76)	2.77 (0.79)	1.78	0.076	0.18
Overall Attitude	2.46 (0.71)	2.18 (0.73)	3.87	<0.001*	0.39

*Significant at $p < 0.05$

Male students demonstrated significantly more positive attitudes across most dimensions, with medium effect sizes.

4.4 Academic Level Differences

One-way ANOVA revealed significant differences across academic levels ($F(5,378) = 12.47$, $p < 0.001$). Post-hoc Tukey tests showed attitudes becoming progressively more negative from Primary 4 to JSS 3.

Table 3: Mathematical Attitudes by Academic Level

Academic Level	N	Mean	SD
Basic 4	70	2.84	0.69
Basic 5	75	2.61	0.71
Basic 6	80	2.38	0.68
Basic 7	73	2.19	0.72
Basic 8	45	1.94	0.74
Basic 9	41	1.78	0.76

4.5 Correlation Analysis

Pearson correlations revealed significant relationships:

- Mathematical attitude and academic performance: $r = 0.67$, $p < 0.001$
- Mathematical attitude and parental support: $r = 0.45$, $p < 0.001$
- Mathematical attitude and teaching quality: $r = 0.52$, $p < 0.001$

4.6 Predictors of Mathematical Attitudes

Multiple regression analysis identified significant predictors:

Table 4: Predictors of Mathematical Attitudes

Predictor	β	T	P	95% CI
Gender (Male)	0.23	4.81	<0.001	[0.14, 0.32]
Academic Level	-0.31	-6.92	<0.001	[-0.40, -0.22]
Teaching Quality	0.28	5.94	<0.001	[0.19, 0.37]
Resource Availability	0.19	3.87	<0.001	[0.10, 0.28]
Parental Support	0.16	3.24	0.001	[0.06, 0.25]

$R^2 = 0.58$, $F(5,378) = 104.23$, $p < 0.001$

The model explained 58% of variance in mathematical attitudes.

4.7 Qualitative Findings

Thematic analysis of focus group discussions revealed six major themes:

4.7.1 Teaching Methods and Pedagogy

Students consistently cited traditional teaching methods as contributing to negative attitudes. As one JSS 2 student noted:

"Our teacher just writes on the board and expects us to copy. We don't understand why we need to learn all these formulas."

4.7.2 Resource Constraints

Limited instructional materials and poor infrastructure were frequently mentioned:

"We don't have calculators or textbooks. Sometimes we sit on the floor because there are no chairs." (Basic 6 student)

4.7.3 Cultural Perceptions

Students reported negative community attitudes toward mathematics:

"My father says mathematics is for people who want to become engineers, but we are farmers here." (Basic 7 student)

4.7.4 Teacher Factors

Teacher attitudes and competence significantly influenced student attitudes:

"Our teacher gets angry when we ask questions. She says we should have understood from the first explanation." (Basic 5 student)

4.7.5 Peer Influence

Peer attitudes and collaborative learning opportunities affected individual attitudes:

"When my friends say mathematics is hard, I also start thinking it's hard." (Basic 9 student)

4.7.6 Relevance and Applications

Students struggled to see mathematical relevance to their lives:

"We learn about algebra and geometry, but I don't see how it helps in selling fish in the market." (Basic 8 student)

5. Discussion

5.1 Interpretation of Findings

The predominantly negative attitudes toward mathematics among students in Omoku Community align with broader patterns observed in Nigerian educational contexts (Adebayo & Kolawole, 2023). The mean overall attitude score of 2.32 indicates that most students view mathematics unfavorably, which has significant implications for academic achievement and future STEM participation.

The finding that perceived usefulness scored highest among attitude dimensions suggests that while students may not enjoy or feel confident in mathematics, they recognize its practical importance. This paradox reflects a disconnect, between theoretical learning and practical application, highlighting the need for more contextualized mathematics instruction (Chen et al., 2024).

5.2 Gender Differences

The significant gender differences favoring males align with some international research but contrast with recent Nigerian studies suggesting narrowing gender gaps (Martinez et al., 2023). The medium effect sizes observed suggest these differences are practically meaningful and may reflect cultural factors specific to the Niger Delta region. Traditional gender roles and expectations may contribute to differential mathematical socialization experiences for boys and girls in Omoku Community.

5.3 Academic Level Trends

The progressive decline in mathematical attitudes from primary to junior secondary levels reflects the increasing complexity of mathematical content and the persistence of negative learning experiences. This trend is concerning as it suggests that the current educational approach fails to maintain student engagement and may actively contribute to negative attitude formation over time.

5.4 Predictive Factors

The regression model's ability to explain 58% of variance in mathematical attitudes indicates that the identified factors (gender, academic level, teaching quality, resource availability, and parental support) are crucial determinants of student attitudes. Teaching quality emerged as a particularly strong predictor, emphasizing the central role of pedagogical practices in shaping student attitudes.

5.5 Implications for Practice

The findings suggest several practical implications:

1. **Pedagogical Reform:** There is an urgent need to shift from traditional teacher-centered methods to student-centered, interactive approaches that emphasize understanding over memorization.
2. **Resource Investment:** Adequate provision of instructional materials, technology, and infrastructure is essential for creating positive learning environments.
3. **Teacher Development:** Comprehensive professional development programs should focus on both content knowledge and pedagogical skills, with emphasis on fostering positive classroom climates.
4. **Community Engagement:** Addressing negative cultural perceptions requires community-wide initiatives to highlight the relevance and importance of mathematical literacy.

5. **Gender-Sensitive Approaches:** Targeted interventions should address gender disparities while avoiding reinforcement of stereotypes.

5.6 Theoretical Contributions

This study contributes to the theoretical understanding of mathematical attitudes by providing empirical evidence from a previously understudied context. The findings support the applicability of social cognitive theory in explaining attitude formation while highlighting the importance of contextual factors in rural African communities.

6. Conclusion and Recommendations

6.1 Conclusion

This study provides compelling evidence of predominantly negative attitudes toward mathematical science among basic education students in Omoku Community, Rivers State. The findings reveal significant gender and academic level differences, with multiple factors including teaching quality, resource availability, and parental support significantly predicting student attitudes. The research confirms that mathematical attitudes are multifaceted constructs influenced by complex interactions between individual, pedagogical, and socio-cultural factors. The progressive deterioration of attitudes from primary to secondary levels suggests that current educational practices may inadvertently contribute to negative attitude formation.

6.2 Recommendations

Based on the findings, the following recommendations for the various stakeholders are proposed:

6.2.1 For Educational Policymakers

1. **Curriculum Reform:** Integrate practical, culturally relevant mathematical applications that connect to students' lived experiences and future aspirations.
2. **Resource Allocation:** Prioritize funding for instructional materials, technology, and infrastructure improvements in rural schools.
3. **Teacher Education:** Mandate pre-service and in-service training on student-centered pedagogical approaches and attitude development.

6.2.2 For School Administrators

1. **Professional Development:** Organize regular workshops on innovative mathematics teaching methods and classroom management.
2. **Learning Environment:** Create supportive, resource-rich environments that encourage mathematical exploration and discovery.
3. **Assessment Reform:** Implement formative assessment practices that provide constructive feedback rather than punitive evaluation.

6.2.3 For Teachers

1. **Pedagogical Approaches:** Adopt interactive, collaborative teaching methods that emphasize problem-solving and critical thinking.
2. **Cultural Sensitivity:** Incorporate local contexts, languages, and examples to make mathematics more relevant and accessible.
3. **Attitude Awareness:** Regularly monitor and address student attitudes through surveys, discussions, and individualized support.

6.2.4 For Parents and Community

1. **Mathematical Literacy:** Participate in community programs to improve adult mathematical literacy and positive attitudes.
2. **Home Support:** Create supportive home environments that encourage mathematical learning and exploration.
3. **Career Awareness:** Expose students to diverse career paths that utilize mathematical skills beyond traditional professions.

References

Adebayo, O. F., & Kolawole, E. B. (2023). Mathematics anxiety and attitude among secondary school students in Lagos State, Nigeria. *Journal of Mathematical Education Research*, 15(3), 45-62. https://doi.org/10.1080/jmer.2023.145623

Ahmed, S. A., & Hassan, M. K. (2024). Gender stereotypes and mathematics achievement in African contexts: A systematic review. *International Journal of Educational Development*, 89, 102-115. https://doi.org/10.1016/j.ijedudev.2024.102715

Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Decision Processes*, 50(2), 179-211. https://doi.org/10.1016/0749-5978(91)90020-T

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Prentice-Hall.

Chen, L., Wang, X., & Liu, Y. (2024). The relationship between mathematical attitudes and STEM career aspirations: A meta-analysis. *Educational Psychology Review*, 36(2), 287-315. https://doi.org/10.1007/s10648-024-09823-4

Creswell, J. W., & Plano Clark, V. L. (2023). *Designing and conducting mixed methods research* (4th ed.). Sage Publications.

Di Martino, P., & Zan, R. (2022). Attitude towards mathematics: A bridge between beliefs and emotions. *Mathematics Education Research Journal*, 34(4), 821-842. https://doi.org/10.1007/s13394-021-00392-3

Federal Ministry of Education. (2023). *Annual report on basic education performance in Nigeria*. Government Printing Press.

Grootenboer, P., Marshman, M., & Edwards-Groves, C. (2023). Mathematics education and affect: Developing positive attitudes through pedagogical innovation. *Mathematics Teacher Education and Development*, 25(1), 5-22.

Hannula, M. S. (2022). Affect in mathematics education: Fresh perspectives on motivation, emotions, and attitudes. *Educational Studies in Mathematics*, 109(3), 515-532. https://doi.org/10.1007/s10649-021-10128-6

Johnson, K. R., Smith, D. L., & Brown, A. M. (2023). School environment and mathematical attitudes: A multilevel analysis. *School Effectiveness and School Improvement*, 34(2), 178-195. https://doi.org/10.1080/09243453.2023.2187654

Krejcie, R. V., & Morgan, D. W. (1970). Determining sample size for research activities. *Educational and Psychological Measurement*, 30(3), 607-610. https://doi.org/10.1177/001316447003000308

Martinez, C., Rodriguez, P., & Garcia, L. (2023). Closing the gender gap in mathematics: Recent trends and cultural factors. *Gender and Education*, 35(4), 412-428. https://doi.org/10.1080/09540253.2023.2201456

Mbugua, Z. K., Kibet, K., Muthaa, G. M., & Nkonke, G. R. (2023). Factors contributing to students' poor performance in mathematics in public secondary schools in Kenya. *African Journal of Educational Studies in Mathematics and Sciences*, 19(1), 33-44.

Okafor, N. J., & Anaduaka, U. S. (2023). Challenges of mathematics education in Nigerian secondary schools: Teachers' perspectives. *International Journal of Educational Research*, 118, 101-112. https://doi.org/10.1016/j.ijer.2023.101987

Ramirez, G., Shaw, S. T., & Maloney, E. A. (2023). Math anxiety: Past research, promising interventions, and a new interpretation framework. *Educational Psychologist*, 58(3), 145-164. https://doi.org/10.1080/00461520.2023.2199451

Sullivan, P., Askew, M., Cheeseman, J., Clarke, D., Mornane, A., Roche, A., & Walker, N. (2024). Supporting teachers in structuring mathematics lessons involving challenging tasks. *Journal of Mathematics Teacher Education*, 27(2), 243-267. https://doi.org/10.1007/s10857-023-09578-1

Tapia, M., & Marsh, G. E. (2004). An instrument to measure mathematics attitudes. *Academic Exchange Quarterly*, 8(2), 16-21.

Thompson, R. J., & Davis, M. L. (2024). Rural mathematics education: Challenges and opportunities in resource-limited contexts. *Rural Educator*, 45(1), 12-25. https://doi.org/10.35608/ruraled.v45i1.1234

Ugwu, C. O., Okeke, S. O., & Asogwa, U. D. (2024). Mathematics anxiety among primary school pupils in Enugu State: Prevalence and correlates. *Nigerian Journal of Educational Psychology*, 22(1), 78-92.

Weli, V. E., & Nwankwoala, H. O. (2022). Socio-economic factors affecting educational development in Niger Delta communities. *Journal of Educational and Social Research*, 12(3), 156-167. https://doi.org/10.36941/jesr-2022-0067

Williams, A. S., & Brown, T. M. (2024). Mathematical confidence and gender: A longitudinal study of attitude development. *Journal of Educational Psychology*, 116(4), 789-804. https://doi.org/10.1037/edu0000823

Wokoma, D. L., & Oko, J. U. (2023). Environmental challenges and educational outcomes in Rivers State: A case study of mathematics performance. *Environmental Education Research*, 29(8), 1145-1162. https://doi.org/10.1080/13504622.2023.2234567

Zhang, H., & Li, M. (2023). Technology integration and mathematical attitudes: A systematic review of recent research. *Computers & Education*, 195, 104-118. https://doi.org/10.1016/j.compedu.2023.104712