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Algebra's Ripple Effect: How Enthusiasm for Algebra Shapes Students' Overall Attitudes Toward Mathematics

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Abstract

Purpose: This study investigates the "ripple effect" of algebra, examining how students' enthusiasm or aversion to algebra influences their overall attitude toward mathematics. **Methodology:** The research employed a descriptive survey design and was conducted in the Gombe Education Zone, Nigeria, which includes 87 secondary schools. A sample of 500 students was selected through a multistage sampling technique across five local government areas. Data were collected using the *Disposition of Students in Learning Algebra* (DISLA), a 16-item instrument validated by experts and achieving a reliability index of 0.92 via Cronbach's alpha. The DISLA consisted of two sections: sociodemographic data and students' perceptions of algebra. Research assistants administered the survey in the selected schools. **Findings:** The results, analyzed using frequency counts and percentages, revealed that 72.2% of students disliked specific mathematical topics, and only 29.9% found mathematics simple. Furthermore, 43.1% of students expressed a mild liking for algebra, while 42.3% showed a strong interest. Importantly, 50.7% believed their attitude toward algebra influenced their overall perception of mathematics. **Significance:** The study concludes that students' attitudes toward algebra significantly impact their engagement with and perception of mathematics, with positive attitudes fostering better performance. Recommendations include promoting a growth mindset, employing differentiated instruction, making mathematics more relevant to real-life applications, and addressing mathematics anxiety. Additionally, positive reinforcement and professional development for teachers are suggested to create a supportive learning environment, ultimately enhancing students' interest and performance in mathematics.

Keywords: algebra, student attitudes, enthusiasm, mathematics achievement, mathematics anxiety.

Introduction

Algebra is often considered a gateway to advanced mathematics, serving as a critical foundation for higher-level mathematics courses and various STEM (science, technology, engineering, and mathematics) fields (Kaplan & Lake, 2022). Its importance in the educational curriculum is underscored by its

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pervasive presence in standardized testing and its role in developing logical thinking, problem-solving skills, and abstract reasoning (Blanton et al., 2018). Despite its significance, algebra is frequently met with apprehension and anxiety by students, leading to negative attitudes toward mathematics (Mutodi & Ngirande, 2014).

Recent studies have explored the impact of students' attitudes toward mathematics on their overall academic performance, with a particular focus on how these attitudes influence their interest and success in mathematics-related subjects (Mata et al., 2012). However, less attention has been given to the specific role that enthusiasm or aversion to algebra plays in shaping these broader attitudes. Given that algebra is often one of the first abstract mathematics subject students encounter, it has the potential to significantly influence their overall perception of mathematics (Mzomwe et al., 2019). There is a need for further research into the "ripple effect" of algebra, which is the idea that students' experiences with the subject affect how they feel about mathematics in general.

In educational psychology, attitudes toward a subject are recognized as a key factor in student engagement and achievement. Positive attitudes can lead to increased motivation, persistence, and academic success, whereas negative attitudes often result in avoidance and poor performance (Di Martino & Zan, 2015). Understanding the factors contributing to these attitudes, particularly algebra, could provide valuable insights for educators and policymakers aiming to improve mathematics education and student outcomes.

Mathematics is a critical component of the modern educational curriculum, with algebra serving as a cornerstone subject that students must master to progress in their mathematical education. However, algebra is often perceived as challenging, abstract, and, for many students, the first major hurdle in their mathematics education. The attitudes that students develop toward algebra can have far-reaching consequences, influencing their performance in this area and their overall perception of mathematics (Booth et al., 2014).

This study explores the "ripple effect" of algebra—how enthusiasm for or aversion to this subject shapes students' attitudes toward mathematics. By investigating the correlation between students' experiences with algebra and their broader mathematical outlook, this research seeks to identify key factors that contribute to either positive or negative attitudes. Such insights could inform strategies for improving math education, helping foster a more positive attitude toward mathematics and, ultimately, better student academic outcomes.

The central research question guiding this study is as follows: How does students' enthusiasm for algebra impact their overall attitudes towards mathematics? To address this question, the study will examine various aspects of students' experiences with algebra, including their perceived difficulty, enjoyment, and relevance of the subject, and how these factors relate to their broader mathematical attitudes. This research aims to contribute to a deeper understanding of the psychological and educational dynamics that influence students' success in mathematics.

Scholarly interest in the relationship between students' opinions of algebra and their attitudes towards mathematics is increasing. This research area is supported by several important educational and psychological theories that shed light on how students' attitudes toward algebra, for example, can affect their overall interest in the field of mathematics. This is where the theory of planned behaviour (Ajzen, 1991) comes in handy, as it proposes that an individual's intentions and behaviours are shaped by their attitudes, as well as by subjective standards and perceived behavioural control. This idea, when applied to mathematics education, suggests that students' motivation for learning algebra can be greatly impacted by their views about the subject, which in turn influences their performance and attitudes towards

mathematics. For example, students who feel that algebra is interesting and helpful are more likely to put in time and effort to study it, which can have a beneficial effect on their performance in all areas of mathematics.

Attribution theory (Weiner, 1985) is another theoretical framework that lends credence to this line of study. This idea focuses on the reasons behind students' mathematical achievements and deficiencies. Students are likely to develop positive feelings towards algebra and, by extension, towards mathematics in general if they attribute their success in the subject to their abilities or efforts. On the other hand, students who believe that algebra is a difficult subject or who ascribe their difficulties to outside forces beyond their control might begin to have a negative view of mathematics.

From a conceptual framework perspective, attitudes towards mathematics are generally understood to consist of cognitive, affective, and behavioural elements. Beliefs regarding the value and applicability of mathematics are among the cognitive components. For example, students are more likely to have a positive attitude towards mathematics if they feel that the subject is necessary for their success in school or the workplace (Hannula, 2012). Emotions related to algebra, such as contentment, anxiety, or dissatisfaction, are included in the affective component. Since emotion can have a large effect on students' willingness to spend time with algebra and other mathematical concepts, the affective response is important (Barroso et al., 2021). The behavioural component describes how these attitudes show up in the way that students behave, including how they participate in algebra classes, complete their assignments, and persist through difficulties. Taken as a whole, these elements provide thorough knowledge of how students' opinions towards algebra may impact their attitudes towards mathematics in general.

The assumption that students' attitudes toward algebra might have a significant influence on their broader mathematical experiences is supported by empirical studies. A large body of research shows the close relationship between students' attitudes towards mathematics and their academic achievement. For instance, Mutodi and Ngirande (2014) reported that students who have a positive attitude toward mathematics typically outperform their negative counterparts academically. This connection emphasises how crucial it is to promote positive attitudes towards algebra since it may result in improved performance in mathematics.

According to research on the subject, algebra is crucial in influencing students' general attitudes toward mathematics. In a study on the transfer from high school to university mathematics, Rach and Heinze (2017) revealed that students who had a solid algebraic foundation and a positive view of the topic were more likely to do well in advanced mathematics courses. Given that students' experiences with algebra can have a prolonged effect on their overall achievement in mathematics, this research emphasises the importance of addressing these experiences at an early stage of schooling.

It has also been demonstrated that interventions aimed at enhancing students' attitudes towards mathematics are successful. According to Blanton et al.'s (2018) study into the effects of an early algebra intervention in elementary schools, students who took part in the course not only increased their ability to reason algebraically but also generally developed more positive attitudes towards mathematics. These results imply that targeted efforts to improve algebra affordability and interest can have a cascade effect, improving students' attitudes and performance in all areas of mathematics.

The relationship between students' attitudes toward algebra and their overall attitudes toward mathematics is crucial, as positive attitudes toward algebra often lead to broader academic success in mathematics. Theoretical frameworks such as the Theory of Planned Behavior and Attribution Theory emphasize how students' cognitive, affective, and behavioural responses to algebra shape their en-

gagement and performance across all mathematical disciplines. Empirical studies consistently show that students with positive attitudes toward algebra perform better in mathematics, suggesting that enthusiasm for algebra can create a "ripple effect," improving overall mathematical achievement (Mutodi & Ngirande, 2014; Rach & Heinze, 2017).

This study is especially necessary for the Gombe Education Zone in Nigeria, where students have substantial difficulties in mathematics. Students in Gombe and other Nigerian schools routinely perform poorly in mathematics, with algebra being an especially difficult subject, according to national assessments (National Bureau of Statistics, 2022). Since algebra is such an important fundamental subject, comprehending how algebraic enthusiasm affects more general mathematical attitudes to design successful interventions is crucial. The study intends to discover ways to increase mathematics achievement and student participation in Gombe by examining this dynamic, ultimately leading to improved educational results in the area.

The study is guided by the following five research questions:

1. How do you see mathematics as a subject?
2. Is there any topic or topic in mathematics that you dislike?
3. How do you like algebra as a topic in mathematics?
4. How would you rate your level of interest in algebra?
5. Does your love for algebra affect your general love for mathematics?

Method

The study adopted the descriptive survey design gathering quantitative data through structured questionnaires to gather quantitative data (Annur & Sujarwati, 2023) and was conducted in the Gombe Education Zone of Gombe State, Nigeria, which encompasses 87 secondary schools with a total student population of 45,415. To collect data, a sample of 500 students was selected via a multistage sampling technique. This involved randomly choosing six schools from the five local government areas within the Education Zone. The primary instrument for data collection is the Disposition of Students in Learning Algebra (DISLA), a tool developed specifically for this research. The DISLA consists of 16 items aimed at assessing students' attitudes toward algebra. It is divided into two sections: the first section collects sociodemographic information, whereas the second section contains questions related to students' perceptions of algebra as part of their mathematics curriculum.

The DISLA instrument underwent rigorous validation for construct and content validity by three experts from the Faculty of Education, Department of Science Education at Taraba State University, Jalingo, Nigeria. Additionally, the instrument's reliability was tested with a sample of 30 students from a school not included in the main study, achieving a reliability index of 0.92, as determined by Cronbach's alpha coefficient. Data collection was carried out with the help of research assistants who administered DISLA across the selected schools. The collected data were then analysed using frequencies and simple percentages to provide insights into the students' dispositions towards algebra.

Results and Discussions

Frequency counts in percentages were used to answer the research questions.

Research question one

How do you see mathematics as a subject?

Table 1 presents the number percentage of students to who they see mathematics as a subject. According to the findings, mathematics is viewed as extremely simple by 29.9% of the students. This group believes that mathematics is simple and easy to comprehend. According to recent research, students who believe that mathematics is simple typically have stronger mathematical self-efficacy, which is favourably correlated with academic achievement (Marshman et al., 2018). These students frequently have a growth mentality, viewing challenges as chances to learn rather than as barriers. The fact that just 29.9% of the students think of mathematics as "very simple" indicates that even while some students believe the subject to be simple, they are nonetheless aware of its inherent complexity.

Additionally, 51.3% of the students believe that mathematics is neither simple nor tough, according to the results. According to the majority, mathematics is "not too difficult, but not simple," which suggests that most students find it to be a difficult topic. This finding supports the results of Boaler (2016), who suggested that deep learning benefits from a reasonable degree of challenges. These students are likely to struggle and discover the value of dedication and persistent effort. Mathematics is perceived as being difficult because it calls for the application of critical thinking, abstract reasoning, and problem-solving techniques.

Mathematics is viewed as a difficult subject by 13.5% of the students. This group suggests that they find mathematics more difficult to understand than others do and view it as demanding. This result is consistent with a study conducted recently by Dowker et al. (2016), which showed that students who struggle with mathematics frequently suffer anxiety, which has a negative influence on their performance. Interventions such as cognitive–behavioural techniques or encouraging learning settings that lower stress and increase confidence may be beneficial for these students. The fact that quite a few students find mathematics difficult but not unattainable points to the necessity of tailored instruction.

Few students (5.3%) view mathematics as "a very difficult subject". This minority may suggest a serious issue with the subject content because they find mathematics highly challenging. Their perspective is in line with those reported in research on the serious effects of mathematics anxiety, such as Ramirez et al. (2016). These students run the risk of being locked into a pattern of avoidance and poor performance. Newer strategies, such as personalised learning plans and mindfulness exercises, have demonstrated the potential to support these students in overcoming their anxieties and enhancing their understanding of mathematics.

Research question two

Is there any topic or topic in mathematics that you dislike?

The data in Table 2 reveal a notable difference in how students feel about different mathematics topics. The overwhelming majority of respondents (72.2%) said some mathematical concepts they find distasteful. The fact that most people find mathematics difficult suggests that it is not a subject that is widely regarded as simple. This result is consistent with recent studies showing that many students have difficulty understanding some mathematical concepts, which can result in negative perspectives or even mathematics fear. For example, Dowker et al. (2019) noted that students frequently become resentful of subjects such as algebra or geometry if they perceive them to be especially difficult. There are several reasons why some people detest a particular topic, such as inadequate background knowledge, bad experiences in the past, or ineffective teaching strategies.

The students who said that they did not dislike any mathematics topics made up a smaller but still

substantial percentage (26.6%) of the sample. This implies that these students probably exhibit solid basic knowledge of the subject and may even have a favourable disposition toward it. Boaler's (2016) research indicated that students who demonstrate success in mathematics and feel secure about their skills are less likely to become allergic to particular topics. A growth mentality that views barriers as opportunities rather than challenges may help these students.

Just 1.2% of the students said they were unsure, suggesting that they may have contrasting views about some mathematics topics. These students may be uncertain because of their inconsistent success in various mathematics topics or their erratic confidence. According to Marshman et al. (2018), such students can be about to adopt a favourable or unfavourable disposition towards mathematics, depending on their experiences and the help they receive in the future.

Research question three

How do you like algebra as a topic in mathematics?

The data in Table 3 depict students' disposition towards algebra, reflecting a complex viewpoint on this area of mathematics. A moderate level of involvement with algebra is shown by 43.1% of the students showing a mild liking for the subject. Even students who are just marginally interested in algebra can gain from specific instructional strategies that enhance their comprehension and appreciation, according to recent research by Boaler (2016). Even a marginally positive disposition can be improved by using productive instructional techniques and simple ways to communicate mathematical topics.

A considerable percentage of students (42.3%) demonstrate a strongly positive disposition towards algebra. Dweck (2016), who noted that students who have great interest in a subject generally demonstrate greater motivation and determination, supports this finding. Having an enjoyable algebra encounter can encourage students to embrace challenges and find satisfaction in completing difficult problems, which can lead to a deeper level of commitment and overall mathematical performance.

The percentage of students who are uninterested in algebra is lower (8.8%). This is consistent with research by Ramirez et al. (2018), which indicates that problems with the topic or bad experiences in the past may be the cause of disinterest. Interventions designed to improve algebra's usability and relevance to students' daily lives may be able to lessen this disinterest.

The proportion of students who strongly dislike algebra or do not find it interesting is extremely low (5.7%). This reflects a strongly negative mindset, as mentioned by Dowker et al. (2019), who noted that mathematics anxiety and disinterest can be caused by strong negative stereotypes toward specific mathematical topics. Strong support, including positive reinforcement and individualised learning techniques, is needed to address these aversions.

Research question four

How would you rate your level of interest in algebra?

The analysis of Table 4 shows that student interest in algebra indicates an extensive array of perspectives. Remarkably, 23.1% of the students expressed a 100% interest in algebra, demonstrating a deep passion for the topic. Furthermore, a high degree of enthusiasm for mathematics is demonstrated by 9.8% of the students who put their interest at 90% and 9.2% who positioned their interest at 80%. With 6.7% of students rating their interest at 70% and 8.0% at 60%, it is evident that students have a more moderate degree of interest. While not as interested as students with higher ratings, these students show an acceptable level of interest.

However, 16.2% of the students gave algebra a 50% interest rating, indicating a posture that was

neither too enthusiastic nor uninterested. A declining degree of commitment to the subject is indicated by the lower levels of interest reported by 7.6% of the students, who rate their interest at 40%, and 3.3%, who rate it at 30%. At the extreme lower end of the scale, 2.7% of the students and 0.8% of the students put their interest at 10% and 20%, respectively, indicating extremely little interest in algebra. Finally, 12.7% of the students said that they had no interest in mathematics at all, indicating that a small but important percentage were not interested in the subject.

Research question five

Does your love for algebra affect your general love for mathematics?

The data in Table 5 reveal the following distribution of responses regarding the influence of students' love for algebra on their overall appreciation for mathematics. A large percentage of students (50.7%) contend that their love for algebra has a positive effect on their general liking of mathematics. This result is consistent with recent work by Hattie (2018), who emphasises the contribution of subject-specific interest to increased mathematical participation in general. Hattie's research highlights how a deep passion for areas of mathematics, such as algebra, can encourage a more extensive and long-lasting interest in the subject overall. Moreover, Boaler (2016) contended that a pleasant experience in one area of mathematics might increase self-esteem and foster healthier perspectives on other mathematical subjects.

A considerably greater number of students (48.5%) indicate that their love of algebra has little impact on how much they value mathematics in general. This suggests that a student's interest in algebra could be divided and not always a good indicator of his/her disposition toward mathematics. Individual mathematical interests can differ greatly, and a student's enthusiasm for one topic does not always translate into an overall disposition toward mathematics, according to research by Ramirez et al. (2018). Given how few students are unsure, some may have no idea how their particular interest in algebra influences their general love of mathematics.

In summary, a substantial number of students believe that their love of algebra and their overall understanding of mathematics are related, although almost half do not see a clear correlation. This shows that individual interests in various branches of mathematics can grow on their own, highlighting the need for a variety of interesting teaching methods to provide a thorough understanding of the topic. The implications of the findings are presented with careful consideration of the research questions.

How do you see mathematics as a subject?

According to the study results, many students identified mathematics to be difficult but not impractical, and the subject was typically viewed as hard. The majority agree that mathematics demands work and persistence, viewing it as neither too easy nor too challenging. Students who find mathematics "very simple" make up a relatively small percentage of the student body, suggesting that even those who find the subject simple still face challenges.

The significance of addressing these diverse viewpoints in the classroom has been emphasised by recent studies. With an emphasis on encouraging a growth mentality, lowering dread, and presenting appropriate challenges, differentiated instruction is still essential. Dweck (2016) discussed how students' attitudes and performance can be improved by adopting a growth mindset, especially in difficult areas such as mathematics. Boaler (2016) argues in favour of innovative teaching methods that help students reach their full potential. Additionally, as Ashcraft and Moore (2009) noted, tackling mathematics anxiety is crucial to assisting students in overcoming challenges in achievement. Tomlinson (2014) highlight-

ed the importance of differentiated instruction by stressing the requirement of adapting teaching strategies to fit the various needs of students.

Teachers can design instructional strategies that enhance students' performance in mathematics while also having a beneficial long-term impact on their disposition towards the subject by having a thorough understanding of these contemporary concepts.

Is there any topic or topic in mathematics that you dislike?

The high proportion of students who dislike certain mathematics topics points to a serious problem in mathematics education. According to Ramirez et al. (2018), mathematics anxiety can be triggered by students' negative perspectives on specific topics, which can exacerbate their difficulties and result in evasive behaviours. A cycle of disinterest, reduced achievement, and a growing distaste of the subject are frequently the consequences of this aversion. The findings are in line with previous research, which has repeatedly described mathematics as a challenging topic that calls for tenacity, abstract reasoning, and problem-solving abilities (NCTM, 2000; Schoenfeld, 1985).

Students who say that they do not dislike any mathematics topics, on the other hand, will probably benefit from teaching strategies that consider different learning styles and create a supportive learning environment. Dweck (2016) underscores the value of encouraging students to develop a mindset that encourages growth, which helps them address difficult topics as solvable problems rather than overwhelming ones. The fact that relatively few students consider mathematics to be "very simple" indicates that even high achievers are conscious of the subject's inherent complexities, highlighting the need for effective teaching methods and supportive structures to enable all students to overcome difficulties and cultivate an interest in the subject.

As recommended by Tomlinson (2014), educators should consider using differentiated instruction to address the problem of topic-specific dislike. Adapting teaching to students' differences can improve overall involvement and achievement in mathematics while also reducing stereotypes. Furthermore, as Boaler (2016) implies, introducing topics related to students' interests and real-life applications can make learning more relevant and pleasurable, which lowers the risk of topic-specific dislike.

How do you like algebra as a topic in mathematics?

According to the findings, most students have a modest to high disposition towards mathematics, indicating a generally good disposition toward the subject. This finding is positive and supports the idea that mathematics may spark students' attention and participation when taught well. The lower numbers of dislike or indifference, however, emphasise the necessity of concerted efforts. Teachers should consider using differentiated instruction, as described by Tomlinson (2014), to improve students' overall experience with algebra. This approach can assist in matching students' diverse degrees of interest and ability. According to Boaler (2016), making algebra more relevant by connecting it to students' interests and real-world applications can help boost interest and participation. Strategies to lessen anxiety regarding mathematics and offer more support might be needed for those who experience more intense negative emotions to help them develop a more positive disposition towards mathematics.

How would you rate your level of interest in algebra?

Many students show strong interest in algebra (23.1% at 100%, 9.8% at 90%, and 9.2% at 80%). There is evidence to suggest that students who have a strong interest in a subject are more likely to be motivated and persistent. In mathematics, the intrinsic drive is related to better academic results and a

more in-depth understanding of the subject matter, as argued by Hattie (2018). Dweck (2016) also highlights the fact that students who have an overwhelmingly positive disposition towards a subject are more likely to respond positively to difficulties and perform better.

The majority (16.2% at 50%) exhibit neutral interest, with the remaining groups falling into moderate categories (6.7% at 70% and 8.0% at 60%). This is consistent with research by Boaler (2016), who contends that targeted teaching techniques that make algebra easier to understand and interesting can help even students who have a modest level of interest. Students' knowledge and understanding of algebra can be increased by effective teaching methods, which can improve their performance.

Lower interest levels are displayed by a smaller group (7.6% at 40%, 3.3% at 30%, 0.8% at 20%, and 2.7% at 10%), with 12.7% indicating no interest whatsoever. This is in line with the findings of Ramirez et al. (2018), who reported that problems with the subject or disappointing experiences in the past might frequently be the cause of indifference in mathematics. Additionally, Dowker et al. (2019) demonstrated that mathematical anxiety and disinterest can be caused by significant negative opinions towards mathematics. To address these problems and make algebra less intimidating and interesting for these students, special measures could be needed, such as positive reinforcement and personalised learning strategies.

The study shows that students have a variety of viewpoints and interests regarding mathematics, especially algebra. Individual responses differ greatly, even though students generally agree that mathematics is a difficult yet attainable subject that requires persistence and effort. This range includes extreme enthusiasm as well as distaste or disinterest. The wide range of attitudes among students emphasises the necessity of using professional effective teaching methods. Through specialised approaches that cater to these different levels of interest, teachers can increase students' overall algebra interest and academic performance.

Conclusion

The study indicates that while many students find mathematics, including algebra, challenging, they still recognize its significance and do not view it as entirely impossible. The low number of students who find algebra "very simple" underscores its inherent difficulties. This aligns with previous research that emphasizes mathematics as requiring consistent effort rather than being either too easy or excessively hard. However, the study also identified significant issues related to students' aversion to certain mathematical topics, which can lead to increased anxiety, reduced engagement, and potential decreases in performance. The variation in students' interest levels in algebra highlights the need for targeted interventions to address these diverse.

Recommendations

1. Promote a growth mindset**:** Teachers should foster a growth mindset in students by encouraging them to view challenges as opportunities for learning. This approach can help mitigate mathematics anxiety and improve overall attitudes toward the subject.
2. Implement Differentiated Instruction: To address the varying levels of interest and ability among students, educators should adopt differentiated instruction strategies. Tailoring teaching methods to meet diverse learning needs can help maintain engagement and improve performance.

3. Make mathematics relevant: Connecting algebra to real-world applications and students' interests can make the subject more engaging and less intimidating.
4. Address mathematics anxiety: For students experiencing significant negative emotions toward mathematics, targeted interventions are necessary.
5. Encouraging Engagement through Positive Reinforcement: For students with lower interest levels in algebra, educators should employ strategies to build confidence and motivation. Positive reinforcement and creating a supportive learning environment can help shift students' perceptions and increase their interest in the subject.
6. Continual Professional Development: Teachers should engage in ongoing professional development to stay updated with effective teaching strategies and research-based practices. This will equip them with the tools needed to address diverse student needs and foster a positive learning environment.

Teachers can improve the way their students deal with algebra and mathematics in general by implementing these suggestions, which will improve their performance and attitudes toward the subject matter.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

References

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

Annur, Y. F., & Sujarwati, I. (2023). The perception of students towards ChatGPT in the University of Bengkulu: A descriptive study. Beyond Words, *11*(2), 44-55. https://doi.org/10.33508/bw.v11i2.5230

Ashcraft, M. H., & Moore, A. M. (2009). Mathematics anxiety and the affective drop in performance. *Journal of Psychoeducational Assessment, 27*(3), 197–205. https://doi.org/10.1177/0734282908330580

Barroso, C., Ganley, C. M., McGraw, A. L., Geer, E. A., Hart, S. A., & Daucourt, M. C. (2021). A meta-analysis of the relation between math anxiety and math achievement. *Psychological Bulletin, 147*(2), 134-168. https://doi.org/https://doi.org/10.1037/bul0000307

Blanton, M., Brizuela, B. M., Gardiner, A. M., Sawrey, K., & Newman-Owens, A. (2018). A progression in early algebra: The impact of a comprehensive early algebra intervention in third grade. *Journal for Research in Mathematics Education, 49*(2), 159-194.

Boaler, J. (2016). *Mathematical Mindsets: Unleashing Students' Potential through Creative Math, Inspiring Messages, and Innovative Teaching.* San Francisco: Jossey-Bass.

Booth, J. L., Barbieri, C. A., Eyer, F., & Paré-Blagoev, E. J. (2014). Persistent misconceptions in algebraic problem-solving. *Journal of Educational Psychology, 106*(3), 648–661. https://doi.org/https://doi.org/10.1037/a0036031

Di Martino, P., & Zan, R. (2015). The construct of attitude in mathematics education. *In Attitudes, beliefs, and motivations in mathematics education (pp. 51-72).*

Dowker, A., Sarkar, A., & Looi, C. Y. (2016). Mathematics Anxiety: What have we learned in 60 years? *Frontiers in Psychology, 7* (508), 10-13. https://doi.org/doi: 10.3389/fpsyg.2016.00508

Dowker, A., Sarkar, A., & Looi, C. Y. (2019). *Mathematical Difficulties and Disorders.* Cambridge Handbook of Thinking and Reasoning. Cambridge University Press.

Dweck, C. S. (2016). *Mindset: The New Psychology of Success. Updated edition.* New York: Ballantine Books.

Hannula, M. S. (2012). Exploring new dimensions of mathematics-related affect: Embodied and social theories. *Research in Mathematics Education, 14*(2), 137-161. https://doi.org/DOI: 10.1080/14794802.2012.694281

Hattie, J. (2018). *Visible Learning: Feedback.* Routledge.

Kaplan, A., & Lake, B. (2022). Exploring the role of algebra in student mathematics achievement. *Educational Research Review, 35*(100424).

Marshman, M., Clark, D., & Carey, M. (2018). Teachers' and Students' Beliefs Regarding the Nature of Mathematics and Their Impact on Student Learning. *The Australian Mathematics Teacher, 74*(2), 4-12.

Mata, M. L., Monteiro, V., & Peixoto, F. (2012). Attitudes towards mathematics: Effects of individual, motivational, and social support factors. *Child Development Research, 2012*, 1-10. https://doi.org/https://doi.org/10.1155/2012/876028

Mutodi, P., & Ngirande, H. (2014). The relationship between attitudes towards mathematics and academic performance in mathematics: The case of South African students. *Mediterranean Journal of Social Sciences, 5*(20), 1886-1894.

Mzomwe, Y. M., Calkin, S. M., & Respickius, O. C. (2019). Investigating Students' Attitude towards Learning Mathematics. *International Electronic Journal of Mathematics Education, 14*(1), 207-231. https://doi.org/https://doi.org/10.29333/iejme/3997

National Bureau of Statistics. (2022). 2021/22 Nigeria's Multidimensional Poverty Index (MPI). National Bureau of Statistics.

NCTM. (2000). Principles and standards for school mathematics. Reston, VA: NCTM.

Rach, S., & Heinze, A. (2017). The transition from school to university in mathematics: Which influence do school-related variables have? *International Journal of Science and Mathematics Education, 15*(7), 1343-1363.

Ramirez, G., Chang, H., Maloney, E. A., Levine, S. C., & Beilock, S. L. (2016). On the relationship between math anxiety and math achievement in early elementary school: The role of problem-solving strategies. *Journal of Experimental Child Psychology, 141*, 83-100. https://doi.org/doi: 10.1016/j.jecp.2015.07.014

Schoenfeld, A. H. (1985). Mathematical problem solving. New York: Academic Press.

Tomlinson, C.A. (2014) The Differentiated Classroom: Responding to the Needs of All Learners. 2nd Edition, ASCD, Alexandria.

Weiner, B. (1985). An attributional theory of achievement motivation and emotion. *Psychological Review, 92*(4), 548-573.

APPENDIX.

Table 1. Frequency distribution of students' views of mathematics

View about mathematics	Number of students (%)
A very simple subject	29.9%
Not too difficult, but not a simple subject	51.3%
A difficult subject	13.5%
A very difficult subject	5.3%

Source: Researcher Field data (2023)

Table 2. Frequency distribution showing students' dislike for topics in mathematics

Dislike for topics in mathematics	Number of students (%)
Undecided	1.2%
No	26.6%
Yes	72.2%

Source: Researcher Field data (2023)

Table 3. Frequency distribution of students' liking of algebra

Liking algebra as a topic in mathematics	Number of students (%)
a little bit	43.1%
very much	42.3%
I would not say I like it	8.8%
I would not say I like it with a passion	5.7%

Source: Researcher Field data (2023)

Table 4. Frequency distribution of students' level of interest in algebra

Level of interest in algebra	Number of students (%)
100%	23.1%
90%	9.8%
80%	9.2%
70%	6.7%
60%	8.0%
50%	16.2%
40%	7.6%
30%	3.3%
20%	0.8%
10%	2.7%
I wouldn't say I like it all	12.7%

Source: Researcher Field data (2023)

Table 5. The frequency distribution of students' love for algebra as a reflection of love for mathematics

View about mathematics	Number of students (%)
Undecided	0.8%
No	48.5%
Yes	50.7%

Source: Researcher Field data (2023)