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Research Paper

Factors Affecting Key Stage 3 Students' Attitudes towards Mathematics in Fuvahmulah City, Maldives

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Abstract: Mathematics can foster students' capacity in reasoning and nurturing their critical thinking abilities. In turn, attitude emerges as a pivotal factor influencing students' mathematical performance. The National Assessment of Learning Outcomes (NALO) has revealed a concerning decline in mathematics proficiency among Grade 7 students within this atoll over successive years. Scholarly investigations have underscored the significance of a positive attitude towards the subject in augmenting learning outcomes. Guided by the ABC model of attitude, this study sought to discern the factors shaping students' perspectives towards mathematics, the specific challenges hindering them from realising their full potential, and the proposed reforms in pedagogical and environmental dimensions to enhance mathematical proficiency. Employing purposive sampling, a qualitative case-study approach, and semi-structured interviews, data was collected from eight students in Key Stage 3. The findings indicate that students' outlook on the subject is influenced by a confluence of positive and negative emotions. Factors such as teachers' attitude, pedagogical methodologies, insufficient parental support, and deficiencies in foundational mathematical understanding during primary schooling emerged as prominent impediments to students' mathematical achievement. Additionally, students expressed a desire for a conducive and differentiated learning milieu to bolster their grasp of mathematical concepts.

Keywords: Mathematics education, attitude, qualitative research, Key Stage 3, ABC model

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Introduction

A baseline study conducted by United Nations Children's Fund (UNICEF) and National Institute of Education (NIE) in 2012 examined the efficacy of Maldives' National Curriculum, uncovering a notable deficiency in Maldivian students' capacity to engage with high-order skills and conceptual questions in mathematics (Naseer, 2016). Analysis of documents revealed a concerning trend: the average mathematics score of the current Grade 8 students had declined by 45% compared to their Grade 7 results, while those of Grade 7 students had dropped by 48% compared to their performance in Grade 6 (Subject Analysis Sheet, 2018, 2019). The implementation of the current mathematics syllabus aims to equip students with the knowledge, skills, values, and attitudes necessary for success across various domains of life (Ministry of Education, 2015; National Institute of Education, 2023). Consequently, the attainment of all syllabus outcomes is paramount to fostering numeracy skills and facilitating the moral education of students through the development of cognitive and critical thinking abilities.

While a positive attitude towards mathematics is known to be correlated with performance, it is not the sole determinant of success as various other factors must also be considered (Libradilla et al., 2023). Prendergast and Hongning (2016), in a comparative study on pupils' attitudes towards mathematics, delineated beliefs, emotions, and actions as the three components comprising attitude. Students' attitudes play a pivotal role in their mathematics learning and achievement (Kundu & Ghose, 2016). In contrast to the behavioral approach, a constructivist perspective on attitude formation posits the coexistence of old attitudes with newly formed ones, resulting in dual (or multiple) attitude representations for the same object (Ajzen & Fishbein, 2000). However, the evaluation of these attitudes in the mind is ultimately influenced by individual interest and motivation, shaping subsequent behaviour or attitude.

Yet, despite the significance of understanding students' perspectives, no research on this matter has been published for teachers in the Maldives since the inception of the current curriculum. Consequently, educators rely solely on assumptions regarding student performance. Thus, this research endeavours to explore the factors influencing Key Stage 3 students' attitudes towards mathematics in a selected school in Fuvahmulah City, Maldives. Furthermore, this study aims to provide recommendations to support teachers in addressing the challenges students face in learning mathematics.

The research focuses on these specific questions:

1. What are the primary factors influencing the attitudes of Key Stage 3 students towards mathematics in the selected school in Fuvahmulah City, Maldives?

2. How do teachers' attitudes and pedagogical strategies impact the attitudes of Key Stage 3 students towards mathematics?
3. What challenges do Key Stage 3 students face in learning mathematics, and how do these challenges affect their attitudes towards the subject?

The significance of this study lies in its potential to shed light on the factors influencing Key Stage 3 students' attitudes towards mathematics in a specific context, namely Fuvahmulah City, Maldives. Understanding these factors is crucial for educators and policymakers to devise targeted interventions aimed at improving mathematics education outcomes. By identifying the challenges students face and the role of teachers' attitudes and pedagogical strategies, this study can inform the development of effective teaching practices and educational policies tailored to enhance students' attitudes and performance in mathematics. Additionally, the recommendations generated from this research can serve as valuable insights for teachers, school administrators, and educational authorities in fostering a positive learning environment conducive to students' mathematical learning and overall academic success. Ultimately, the findings of this study have the potential to contribute to the enhancement of mathematics education quality and the promotion of students' lifelong learning skills in the Maldivian educational context.

Literature Review

Theoretical Framework and Conceptual Framework

Attitude development occurs within individuals through several components. Many attitude researchers argue that evaluation constitutes the primary component of attitude definition. From the moment of birth, attitudes and behaviours begin to develop, with the environment serving as the primary influence through which we experience these processes (Shuyang, 2021).

The theoretical framework guiding this study is the ABC model, widely recognised as the most cited model of attitude (Jain, 2014). Illustrated in Figure 1, the ABC model posits that attitudes comprise three fundamental constituents: Affect, Behaviour, and Cognition (Walker et al., 2020). Affect relates to the emotional responses exhibited by individuals toward an attitude object. Behaviour encompasses the behavioural inclinations or predispositions of individuals regarding an attitude object. Cognitive delineates the cognitive constructs, including beliefs and perceptions, held by individuals concerning an attitude object. Each of these components can be individually positive or negative (Jain, 2014). This combination is referred to as triad, with each reflecting a different state of mind.

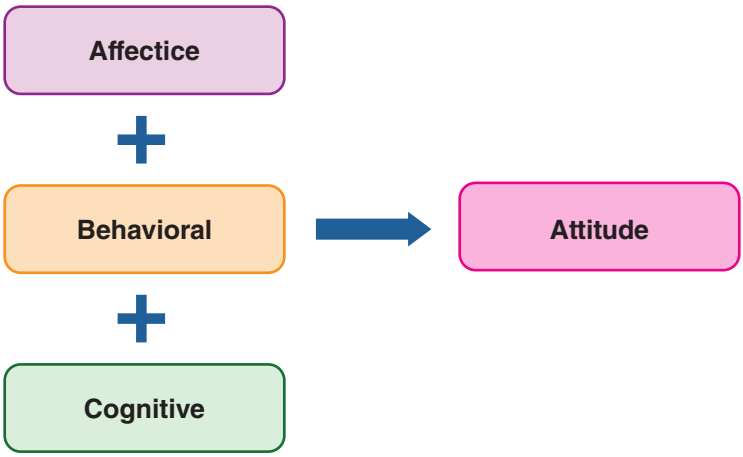

Figure 1. The ABC model of attitude

Numerous research studies utilised the ABC model to investigate various aspects of attitudes (Boote & Boote, 2018; Gül & Özyürek, 2024; Mazana et al., 2019). The ABC model, rooted in cognitive behavioural therapy (CBT), serves as a foundational technique and conceptual framework, positing that individual beliefs concerning specific events influence their corresponding reactions (Pietrangelo, 2019).

After a comprehensive analysis of various attitude models, it becomes evident that numerous theories integrate one or more elements of the ABC model (Bentler & Speckart, 1979; León-Mantero et al., 2020). Consequently, it can be inferred that when studying attitudes, these three components necessitate examination. In this regard, this study aims to explore the factors influencing students' attitudes towards mathematics, wherein the identified factors align with components of the ABC model.

The ABC model of maths attitudes encompasses three distinct factors: affective, behavioural, and cognitive (Drew, 2023; León-Mantero et al., 2020). The affective component pertains to emotional responses towards maths, such as preferences for or aversions to mathematical activities. The behavioural component encompasses academic behaviours associated with mathematics, such as diligent exam preparation or persistence in understanding course materials. The cognitive component delineates beliefs regarding one's aptitude for learning mathematics.

Thus, when investigating factors influencing students' attitudes towards mathematics, the ABC model proves instrumental due to its comprehensive

coverage of factors affecting each component, facilitating comprehensive conclusions regarding student attitudes.

The components of the ABC model correspond closely with the features of the social cognitive theory by Bandura, as well as Abraham Maslow's Hierarchy of Needs theory, among other learning theories. The social cognitive theory posits that human behaviour is influenced by environmental stimuli (Bandura, 1999), while Maslow's theory underscores the hierarchical progression of human needs towards self-actualisation (Lee & Sims, 2023; Takyi Mensah, 2023).

The affective component of attitude models refers to emotional reactions towards objects, individuals, issues, or situations (Mcleod, 2023). Research in this area underscores the significance of affective components in attitudes, which is interconnected with the concept of self-efficacy in the social cognitive theory (SCT). Emotions play a crucial role in persuasion, social influence, and attitude change (Shuyang, 2021). Moreover, within the hierarchy of needs theory, positive emotions are emphasised for healthy personal development (Fredrickson, 2001), aligning with the humanistic approach advocating for the holistic development of individuals (Al-Khalidi, 2015).

The cognitive domain encompasses opinions formed based on knowledge and beliefs about an object. Beliefs, according to Fishbein and Ajzen (1975), constitute information linking an object to specific attributes. This component reflects individuals' organisational processes of information regarding their capabilities in learning mathematics. The cognitive component resonates with the behavioural capacity aspect of SCT, emphasising individuals' abilities to perform behaviours through acquired knowledge and skills (Zolait, 2014). Moreover, from a humanistic perspective, metacognitive strategies facilitate self-directed learning, thereby influencing behaviours and attitudes (Karataş & Arpacı, 2021; Şentürk & Zeybek, 2019).

The behavioural domain manifests as observable actions resulting from cognitive and affective domains, quantifiable through behaviours and verbal expressions (Spekle, 2024). Academic behavioural tendencies related to mathematics, such as diligent exam preparation or persistent studying, constitute examples of this component. Thus, the behavioural aspect underscores the importance of integrating affective and cognitive domains to foster constructive attitudes.

In conclusion, attitudes are shaped by the interplay of the cognitive, affective, and behavioural domains, which can be influenced by various factors. Notably, these components can individually exhibit positive or negative attributes. This study utilised the conceptual framework depicted in Figure 2 to elucidate factors impacting students' attitudes towards mathematics.

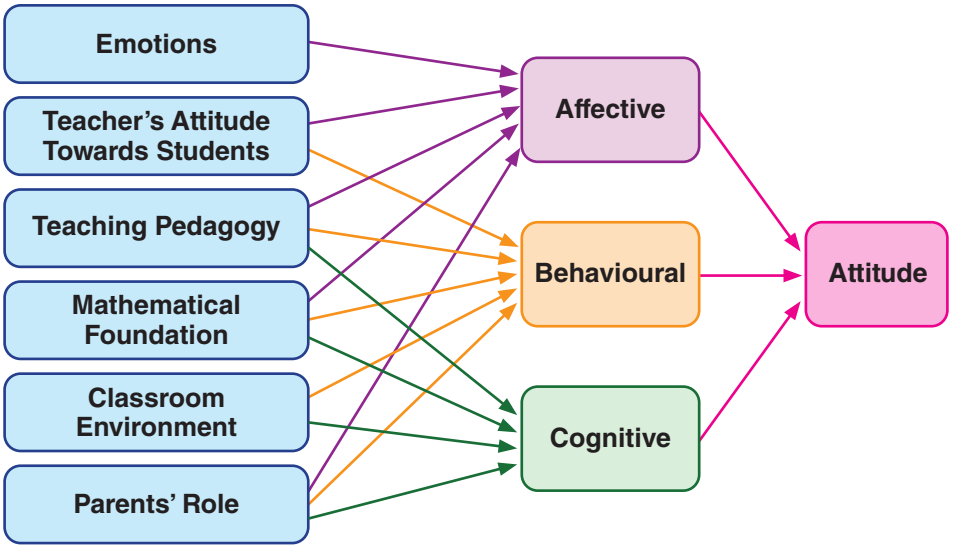

Figure 2. Conceptual framework for factors influencing students' attitudes towards mathematics

Methodology

Research Design

This research utilised the qualitative case study method to investigate the factors influencing students' attitudes towards mathematics. Qualitative research designs enable the acquisition of in-depth understanding into human behaviour, perspectives, feelings, emotions, attitudes, and experiences, delving into the core of their lives (Mohajan, 2018).

Given the research's objective to explore factors impacting students' attitudes towards mathematics from the students' perspective, a qualitative research design emerged as the most appropriate approach. Qualitative research allows for the documentation of people's attitudes, feelings, and behaviours, providing an in-depth yet typically indicative depiction of why people behave in certain ways (Coryn, 2018).

Case studies constitute intensive investigations, defined as in-depth examinations of a few units with multiple variables (Krusenvik, 2016). They offer the advantage of studying a phenomenon in detail and within context, especially in situations where there are numerous variables of interest relative to observations. Additionally, case studies hold the potential to make research more accessible to a broader readership compared to some other designs, aiding academics and practitioners in keeping pace with a rapidly evolving field (Rose et al., 2014).

Settings and Study Sample

The research focused on Key Stage 3 students of the selected school. The school has a total of 110 students in this level, with 56 in Grade 7 and 54 in Grade 8. Each grade has six periods for mathematics, each lasting 35 minutes (Subject Unit Plan, 2019). Purposive sampling was used, and eight students from this key stage were selected for the study. Unlike quantitative research, where larger samples are used to represent populations, qualitative research employs smaller samples to gather information useful for understanding the complexity, depth, variation, or context surrounding a phenomenon (Gentles at al., 2015).

Purposive sampling enables researchers to extract a wealth of information from the data they have collected. When selecting participants, the mathematics results of all Key Stage Three students were analysed with the assistance of math teachers, and four bottom-performing and four top-performing students were selected. Student categorisation was based on their mathematics performance from last semester. Therefore, the study employed purposive heterogeneous or maximum variation sampling to collect data. This technique facilitates the examination of a diverse range of cases relevant to a particular phenomenon or event, allowing researchers to gain insights from multiple perspectives (Mohajan, 2018). The students who participated in the study are listed in Table 1.

Table 1. Participant demographics

Student	Grade	Top and lowest performers in 2019 First Semester Mathematics (n=60)
A	7	58
B	7	54
C	7	8
D	7	11
E	8	54
F	8	52
G	8	5
H	8	10

Data Collection and Data Analysis

Prior to commencing the study, ethical clearance was sought and granted by the Ethics Committee of Zikura International College, Maldives. Subsequently, formal permissions to conduct the study were obtained sequentially from the Ministry of Education and the selected school. Furthermore, explicit consent from parents and informed assent from participants were secured. Participants who voluntarily

consented to partake in the research were engaged through semi-structured interview inquiries and open-ended questions for data collection purposes. The utilisation of semi-structured interviews is particularly advantageous in exploratory research contexts, where participant responses can illuminate novel insights and inform subsequent inquiry trajectories (George, 2022). Probing queries were also incorporated to elicit nuanced responses from participants. All interviews were meticulously recorded using digital recording equipment.

The collected interview transcripts underwent initial transcription to facilitate subsequent analysis. Employing an inductive approach, content analysis was utilised to examine participants' responses to the primary interview inquiries. Content analysis, as outlined by Cole (1988), is a methodological framework employed to scrutinise written, verbal, or visual communication messages. The transcripts were subjected to multiple readings to augment the researcher's comprehension, following which they were categorised into thematic clusters. Subsequently, the written material underwent further scrutiny, with relevant headings delineated in the margins to encapsulate all facets of the content, aligning with Burnard's (1996) methodology. This iterative process enabled a comprehensive interpretation of the data from diverse perspectives. Within the ambit of content analysis, the researcher approached the text with an impartial stance, endeavouring to discern significant themes pertinent to the research inquiry, as proposed by Bengtsson (2016). Moreover, the thematic analysis was guided by considerations of the multi-component model of attitude, thereby substantiating the appropriateness of this analytical approach within the context of the study.

Research Findings and Discussion

The general finding of this research indicates that students' perspective towards mathematics is influenced by both positive and negative emotions, and factors such as negative teacher attitude, the use of teacher-centred pedagogy, lack of thorough mathematical foundation, and lack of parental support were the main problems students experienced in performing mathematics up to their potential (Fuller et al., 2016). Moreover, the findings also show that students expect to have a conducive, differentiated learning environment in the classroom to support their mathematical education.

Emotions Toward Mathematics

The purpose of these questions was to identify factors that influence students' perceptions towards the subject. All four of the bottom participants expressed negative emotions or feelings, stating that it is "hard", "stressful", or "boring". In contrast, the majority of the top participants stated positive expressions like

"favourite", "enjoyable", or responded related to the concept of mathematics, such as "calculations" or "problem-solving".

It's hard but enjoyable. – Student B
It's boring and I don't feel like studying it. – Student H

From the responses given by the students, we can conclude that all four students who were at the bottom associate mathematics with negative emotions, hence it is engraved as a "difficult" or "less enjoyable" subject (Bozkurt & Tezer, 2015). Also, we could imply that the "negative" emotions they associate with the subject make it even harder for them to understand even the easy concepts. As stated in the literature, mathematics anxiety is defined as "feelings of tension surrounding different aspects of mathematical thought" (Deshler et al., 2019). When students experience anxiety, the instructions become unclear, the simple becomes complicated, and students fail to comprehend the concepts. If this feeling and state continuously heightens, it imprints a sentiment in students that they cannot be successful at mathematics, and they are about to fail (Bozkurt & Tezer, 2015).

According to the multi-component model or the ABC model of attitude, emotions and feelings play a huge role in determining attitude. This factor affects the "affective" domain of the ABC model. When students have positive emotions, they tend to perform better than when they have negative emotions because, as stated in the classical conditioning approach, when students associate positive emotions, it will help to develop a higher sense of self-efficacy, and their behaviour towards the subject becomes positive. Moreover, SCT of learning states that people's beliefs affect their self-efficacy, and the most effective way of creating a strong sense of efficacy is through mastery experiences.

On the other hand, a similar study conducted at Northern University of Malaysia also demonstrated that there is a significant positive relationship between students' attitude and mathematics anxiety. Moreover, a substantial positive effect of students' attitude and mathematics anxiety on students' achievement was also noted (Sahri at al., 2017). Therefore, having negative emotions towards the subject is one factor that affects their perception towards the subject. On the other hand, students who perform better in the subject associate positive emotions with mathematics. Therefore, both negative and positive emotions affect students' perspectives towards mathematics.

Teacher's Attitude towards Students

One of the most enlightening factors noted from the interview was how the teacher's attitude towards the students has a significant impact on their attitude formation towards the subject (Uluga et al., 2011). Participants were asked to articulate their

perceptions of their mathematics teacher and how teachers respond when students repeatedly pose questions. The purpose of these inquiries was to ascertain any potential correlation between the teacher's attitude and the students' disposition towards the subject. All participants concurred that they are observant of the teacher's verbal and non-verbal cues. The majority of participants, particularly those at the lower end, shared that while teachers generally offer assistance, repeated questioning often leads to a negative reaction from teachers, consequently causing students to hesitate to seek further clarification. Conversely, students identified as high achievers exhibited a favourable opinion towards their teacher and the instructional process.

Student B remarked, "*She is awesome, and her teaching is really good,*" while Student H expressed frustration, stating, "*She seems like she is teaching to a particular student. And it's just sometimes very frustrating when I call her, she wouldn't even reply,*" and Student D acknowledged the teacher's helpfulness but also noted, "*She is really nice, and she really helps us to achieve our goals, but she reacts like 'Oh my god, this girl,' and I don't want to disturb her that much.*"

From the responses gathered, it became apparent that the manner in which teachers respond to students' needs significantly influences the students' overall perception of the teacher and, consequently, their attitude towards the subject as studies show that learning is influenced by motivation, social and affective factors, values, attitudes, and students' expectations (Choong & Tan, 2023; Uluga et al., 2011). A positive attitude exhibited by the teacher impacts various aspects of the students' academic life including motivation, attitude towards school and academic tasks, self-confidence, and ultimately, personality development (Uluga et al., 2011).

As highlighted in prior research, teachers serve as role models for students, shaping their behaviour and attitude towards academic pursuits (Uluga et al., 2011). Positive teacher attitudes are associated with academic success, while negative attitudes are linked to academic underachievement (Uluga et al., 2011). Additionally, a study examining the effects of teachers' attitudes on students' personality revealed that a positive teacher attitude was perceived by 91.2% of students to enhance their academic performance and attitude (Uluga et al., 2011). According to Maslow's hierarchy of needs theory, the satisfaction of students' psychological needs, such as love, respect, and recognition, promotes motivation and receptiveness to learning (Abdulrahman & Hui, 2018). Consequently, fostering positive teacher-student relationships and attitudes towards the subject contributes to students' positive affective and behavioural domains, thereby enhancing academic performance (Abdulrahman & Hui, 2018).

Teaching Pedagogy

During the interviews, students were queried regarding the instructional methodologies employed by their mathematics instructors. The aim was to discern

whether educators utilised diverse pedagogical strategies to elucidate mathematical concepts and whether students were encouraged to engage with the subject meaningfully and purposefully. The prevailing sentiment among participants was that teachers predominantly relied on procedural explanations via chalkboard demonstrations, lacking variety in instructional approaches. Moreover, a significant portion of students expressed a disconnection between mathematical concepts and their real-world applications. Conversely, a minority of high-achieving students reported exposure to instructional materials such as diagrams and charts, fostering a better understanding of the practical utility of mathematics.

Quotes from participants underscore this dichotomy: "*She uses examples, diagrams, charts, books*"; "*When we go abroad and the money exchange*" (Student B). "*She explains it with example, I don't know why I don't understand* "; "*We don't really need most of it. I think. Maybe we if we need addition, subtraction, and division those things would be good to go on with life*" (Student G).

The cultivation of real-world, pertinent, and purpose-driven learning experiences in mathematics correlates strongly with three forms of student engagement: cognitive, operative, and affective. Thus, facilitating cognitive, operative, and affective engagement enhances students' overall learning experience, as highlighted by Giardini (2016). Particularly challenging is fostering affective engagement, which fosters positive emotions toward the subject and is contingent upon purposeful learning experiences. Sparrow and Hurst (2010) argued that students are more likely to develop a positive attitude towards mathematics when they perceive its relevance in both academic and practical contexts. This positive disposition towards mathematics is integral to academic achievement, fostering increased motivation and willingness to learn (Mata et al., 2022; Peixoto et al., 2017). Grounded in the intrinsic motivation theory, the enjoyment and satisfaction derived from meaningful mathematical engagement serve as primary drivers for learning (Ryan & Deci, 2000).

Furthermore, student-centred pedagogical approaches align with constructivist learning principles, wherein knowledge is co-constructed by both teacher and students (Garrett, 2008). In such environments, students actively participate in the learning process, thereby deepening their understanding and motivation to learn mathematics. However, the efficacy of pedagogical approaches may vary across cultural contexts. While studies in China have shown success with "passive transmission" and "rote drilling" methodologies (Lai & Murray, 2012; Zhao et al., 2014), it is essential to acknowledge that teaching practices must be tailored to specific cultural and educational contexts (Zhao et al., 2014). In the context under examination, a teacher-centred approach proves suboptimal, negatively impacting cognitive, operative, and affective domains of learning, thus fostering a deleterious attitude towards mathematics.

Basic Mathematical Foundation

This part of the interview reflected students' previous year's performance in mathematics, and they were asked if it has any connection with their current performance in mathematics. The purpose of this question was to identify if the basics of mathematics affected students' attitude towards the subject. The majority of the participants stated that previous math performance is important because it covers essentially the same topics they are studying now, but with increasing complexity each year. They also noted that understanding the basics would facilitate a better comprehension of mathematics at present.

Student A remarked, "*My previous grade math results were also very good and it helped me to do maths better even now*." Student G added, "*Because if I understood the basics it might be easier to do the advanced stuff*."

Students who reported good performance in previous grades were observed to perform better even now. In mathematics, conceptual understanding and applied knowledge greatly build upon each other (Wriston, 2015). According to Brown and Quinn (2007), "students who fail to master the foundational conceptual understanding of fractions, such as operations with fractions, are often unable to conceptualise algebraic functions and commonly exhibit error patterns when learning algebra" (p. 1). However, most of the time when students advance to higher grades, teachers attempt to cover the syllabus within a limited time frame, often neglecting to assess students' cognitive readiness. Consequently, this neglect affects their cognitive domain. When students cannot perform as well as their peers, they develop negative emotions, affecting their affective domain, and subsequently reflecting on their behaviour as a negative attitude towards the subject. Students must be met where they are cognitively within the subject of mathematics and not simply taught according to their current grade level (Wriston, 2015). In other words, even though a student is in the eighth grade, if they have not met the seventh-grade math standards, they should not be given eighth-grade materials.

According to Piaget's cognitive model of learning, children learn by modifying, adding, or changing existing schemas or knowledge as new information or experiences occur (Belyh, 2019). Therefore, it is important for them to have a strong mathematical foundation to comprehend complicated maths. Moreover, as stated in SCT, if students fail to keep up with the grade level, they would feel less confident, and their self-efficacy would decrease, affecting their cognitive, affective, and behavioural domains, and subsequently, developing a negative attitude towards mathematics.

Classroom Environment

Students were asked about their classroom environment during maths periods. The purpose of this question was to identify if the classroom environment in which the

students studied has any effect on their attitude towards mathematics. The majority of participants stated that the classrooms were not as quiet as they preferred, making it difficult for them to concentrate and focus on the explanations.

Student B remarked, "*It's pretty quiet but not all do the works.*" Student H added, "*It's very noisy. Children are like every where, they don't even listen to the teacher. The teacher doesn't know how to control the students.*" Student D expressed, "*I want it to be peaceful and understandable. Like easy to concentrate.*"

From these statements, we can conclude that a distracting classroom makes it difficult for students to learn mathematics, and students expect their classrooms to be peaceful and cooperative to help them focus and learn. Both bottom and top students prefer and expect a quiet classroom to understand mathematics lessons. The term environment is broad; it covers layout, furniture, and decoration, but also the emotional climate that is created. Children who feel comfortable, yet stimulated in the environment are able to settle in and enjoy learning (Singh, 2014).

A child's development is directly linked to its ability to interact with its environment. As stated in SCT, a major component of learning is observational learning, where Bandura claimed that people observe and imitate models they encounter in their environment, enabling them to acquire information much more quickly (Cynthia Venney, 2019). Hence, it is of utmost importance for teachers to create a conducive, inclusive environment where all students actively take part in the lessons. If students see that some of their peers are not doing any work or are standing around, as stated in SCT, it makes interested learners also lose their academic focus.

It is also important to note that students' perception of the friendliness of the environment may or may not be accurate. However, research on change has indicated that the person to be asked to change must be involved in the process. Therefore, students need to be consulted about how to rectify the environment (Singh, 2014). When students were consulted about how their environment might be modified, active and empathetic listening on the part of the parent or teacher was deemed crucial (Francis, 2005). A distracting classroom affects the cognitive and behavioural aspects of the ABC model and hence, encourages a negative attitude towards the subject.

Parental Role and Their Expectations

Students were asked if they received any support from home to do their mathematics work. The purpose of this question was to identify whether or not parents play a role in affecting student attitudes towards mathematics. The top students stated that they have support at home to do mathematics, while one student at the bottom stated that they do not have any support at home for mathematics, which causes them problems. From these statements, we could conclude that students prefer some kind

of support at home to do maths, and when parents perceive mathematics as fun and enjoyable, it encourages students to learn more.

Student A stated, "*I ask my mother and she thinks it's fun, easy, and enjoyable.*" Student C expressed, "*I feel like I need help with maths and there is nobody in my house to help me with it so I could not carry on with maths so I just study other subjects.*"

Home-based involvement encompasses assisting with homework, responding to children's academic performance, and talking with children about happenings at school (Dogruer, 2014). From the findings of this study, students who were performing better stated that their "mother" helped them with math problems. A similar study showed that specifically, mothers who practised a strong behavioural and cognitive involvement moulded children who felt more competent in school and were more in control of school outcomes than those whose mothers were less involved (Grolnick & Slowiaczek, 1994).

Baumrind (1991) suggested that authoritative parents "monitor and impart clear standards for their children's conduct." This then affects the behavioural domain of the students and hence, their attitude. This is explained by the expectancy-value theory of motivation, where behaviour is the result of a conscious choice between alternatives to minimise loss and maximise gain (Barron & Hulleman, 2015). When students receive support from parents and are aware of their parents' expectations, it motivates them to put more effort into the subject, orienting their behaviour in a way that improves their performance and hence, influence their attitude towards mathematics.

Conclusion and Recommendations for Future Study

The findings of this research underscore the intricate interplay between students' emotional responses and their perspectives on mathematics. Both positive and negative emotions emerge as significant determinants shaping students' attitudes towards the subject. Negative teacher attitudes, the prevalent use of teacher-centred instructional approaches, deficient foundational numeracy skills, and a dearth of parental involvement emerged as primary hurdles impeding students from realising their mathematical potential. Furthermore, students expressed a strong preference for a conducive, differentiated learning milieu in the classroom, one that nurtures their conceptual understanding of mathematical principles.

This study has afforded insights into the multifaceted factors influencing students' perceptions of mathematics, the attendant impediments constraining their proficiency in the subject, and their envisioned requisites for an optimal learning environment. Consequently, the following recommendations are proffered to educators to alleviate students' struggles in mastering mathematics:

1. Educators should scaffold students' learning experiences and provide reinforcing feedback to instil positive affective responses towards the subject. Successful

engagement with mathematical concepts bolsters students' confidence and self-efficacy.

2. Pedagogical patience and the cultivation of a supportive, affirming demeanour are imperative for educators in fostering conducive learning environments. Both verbal and non-verbal communication channels should consistently convey encouragement and support.
3. In lieu of conventional teacher-centred pedagogy, educators should embrace a student-centred, constructivist instructional paradigm. Such an approach empowers students to actively construct their understanding of mathematical concepts.
4. The adoption of problem-based instructional methodologies is advocated to engender deeper conceptual comprehension among students. By contextualising mathematical principles within real-world scenarios, students are better equipped to internalise abstract concepts.
5. Remedial interventions targeting foundational numeracy skills are essential for students struggling to meet grade-level standards. A systematic approach focusing on remediation ensures a solid foundation for subsequent mathematical learning.
6. A well-managed, inclusive classroom environment is indispensable for nurturing a sense of belonging and academic engagement among all students. Educators should strive to create an atmosphere where every student feels valued and supported.
7. Enhanced parental engagement and awareness campaigns are pivotal in underscoring the critical role parents play in shaping their children's attitudes towards mathematics. Collaboration between educators and parents can fortify students' academic trajectories and foster a positive disposition towards the subject.

The above recommendations serve as pragmatic strategies aimed at cultivating an enriching and empowering learning milieu conducive to students' mathematical proficiency and holistic development.

Given the intricate relationship between students' emotional responses and their perspectives on mathematics, further research should explore the long-term effects of various pedagogical approaches on students' attitudes and achievements in mathematics. Studies could investigate the efficacy of student-centred and problem-based instructional methodologies over extended periods and across diverse student populations. Additionally, research should examine the impact of early interventions in foundational numeracy skills on subsequent mathematical performance. The role of parental involvement warrants deeper investigation, particularly in understanding how different forms of parental support can enhance students' mathematical confidence and outcomes. Finally, longitudinal studies could provide insights into how sustained pedagogical patience and supportive educator behaviours influence

students' long-term engagement and success in mathematics. By addressing these areas, future research can contribute to developing effective strategies that holistically support students' mathematical learning and emotional well-being.

References

Abdulrahman, A. S., & Hui, X. (2018). Implication of motivation theories on teachers' performance in the context of education system in Tanzania. *International Journal of Secondary Education, 6*(3), 46–53.

Ajzen, I., & Fishbein, M. (1975). A Bayesian analysis of attribution processes. *Psychological Bulletin, 82*(2), 261–277.

Ajzen, I., & Fishbein, M. (2000). Attitudes and the attitude-behavior relation: Reasoned and automatic processes. *European Review of Social Psychology, 11*(1), 1–33.

Al-Khalidi, S. Q. (2015). The significance of WiMax on resource sharing among Saudi universities: A study of King Khalid University, Kingdom of Saudi Arabia. *International Journal of Information and Education Technology, 5*(12), 961–964.

Bandura, A. (1999). Social cognitive theory of personality. *Handbook of Personality, 2*(1), 154–196.

Barron, K. E., & Hulleman, C. S. (2015). Expectancy-value-cost model of motivation. *Psychology, 84*, 261–271.

Baumrind, D. (1991). The influence of parenting style on adolescent competence and substance use. *The Journal of Early Adolescence, 11*(1), 56–95.

Belyh, A. (2019, Sept 24). Piaget's theory of cognitive development. *Cleverism*. https://www.cleverism.com/piagets-theory/

Bengtsson, M. (2016). How to plan and perform a qualitative study using content analysis. *NursingPlus Open, 2*, 8–14. https://doi.org/10.1016/j.npls.2016.01.001

Bentler, P. M., & Speckart, G. (1979). Models of attitude–behavior relations. *Psychological Review, 86*(5), 452–464. https://doi.org/10.1037/0033-295X.86.5.452

Boote, S. K., & Boote, D. N. (2018). ABC problem in elementary mathematics education: Arithmetic before comprehension. *Journal of Mathematics Teacher Education, 21*, 99–122.

Bozkurt, A. S. & Tezer, M. (2015). Determining attitudes and anxiety levels of students in need of protection towards Mathematics course. *Procedia-Social and Behavioral Sciences, 186*, 269–273. https://doi.org/10.1016/j.sbspro.2015.04.197

Brown, G., & Quinn, R. J. (2007). Fraction proficiency and success in algebra: What does research say? *Australian Mathematics Teacher, 63*(3), 23–30.

Burnard, P. (1996). Teaching the analysis of textual data: An experiential approach. *Nurse Education Today, 16*(4), 278–281. https://doi.org/10.1016/S0260-6917(96)80115-8

Choong, Y. C., & Tan, S. Y. (2023). Exploring ESL students' language learning strategies at an independent Chinese secondary school in Malaysia. *Asia-Pacific Journal of Futures in Education and Society, 2*(2), 101–121. https://doi.org/10.58946/apjfes-2.2.P6

Cole, F. (1988). Content analysis: Process and application. *Clinical Nurse Specialist, 2*(1), 53–57.

Coryn, B. (2018, March). *Semi-structured Interviews*. https://know.fife.scot/knowfife/wp-content/uploads/sites/44/2018/05/KnowHow-Semistructured-interviews.pdf

Deshler, J., Fuller, E., & Darrah, M. (2019). Affective states of university developmental mathematics students and their impact on self-efficacy, belonging, career identity, success and persistence. *International Journal of Research in Undergraduate Mathematics Education, 5*, 337–358. https://doi.org/10.1007/s40753-019-00096-3

Dogruer, S. S. (2014). Effects of parental roles in students' mathematical learning: How does the education level of parents affect their involvement? *The Eurasia Proceedings of Educational & Social Sciences, 8*, 84–89.

Drew, C. (2023, August 18). The 3 components of attitude (ABC / tripartite model). *HelpfulProfessor.com.* https://helpfulprofessor.com/abc-attitude-model/

Fredrickson, B. L. (2001). The role of positive emotions in positive psychology: The broaden-and-build theory of positive emotions. *American Psychologist, 56*(3), 218–226.

Fuller, E., Deshler, J., Darrah, M., Trujillo, M., & Wu, X. (2016, March). *Anxiety and personality factors influencing the completion rates of developmental mathematics students* [Conference presentation]. First Conference of International Network for Didactic Research in University Mathematics, Montpellier, France.

Garrett, T. (2008). Student-centered and teacher-centered classroom management: A case study of three elementary teachers. *Journal of Classroom Interaction, 43*(1), 34–47.

Gentles, S. J., Charles, C., Ploeg, J., & McKibbon, K. A. (2015). Sampling in qualitative research: Insights from an overview of the methods literature. *The Qualitative Report, 20*(11), 1772–1789.

George, T. (2022, January 27). Semi-structured interview | Definition, guide & examples. *Scribbr*. https://www.scribbr.com/methodology/semi-structured-interview/

Giardini, E. (2016). Mathematical learning with a purpose. *Journal of Student Engagement: Education Matters, 6*(1), 13–18.

Grolnick, W. S., & Slowiaczek, M. L. (1994). Parents' involvement in children's schooling: A multidimensional conceptualization and motivational model. *Child Development, 65*(1), 237–252.

Gül, G., & Özyürek, P. (2024). Evaluation of final-year nursing students' attitudes towards preventing medical device-related pressure ulcers using a ABC model of affect, behavior and cognitive dimensions. *Journal of Tissue Viability, 33*(3), 472–480.

Jain, V. (2014). 3D model of attitude. *International Journal of Advanced Research in Management and Social Sciences, 3*(3), 1–12.

Karataş, K., & Arpacı, İ. (2021). The role of self-directed learning, metacognition, and 21st century skills predicting the readiness for online learning. *Contemporary Educational Technology, 13*(3), ep300.

Krusenvik, L. (2016). *Using case studies as a scientific method: Advantages and disadvantages* [Unpublished undergraduate thesis]. Halmstad University, Sweden

Kundu, A., & Ghose, A. (2016). The relationship between attitude and self-efficacy in mathematics among higher secondary students. *Journal of Humanities and Social Science, 21*(4), 25–31.

Lai, M. Y., & Murray, S. (2012). Teaching with procedural variation: A Chinese way of promoting deep understanding of mathematics. *International Journal for Mathematics Teaching and Learning*, 1–25.

Lee, B. T. F., & Sims, J. P. (2023). Maslow's hierarchy of needs: A framework for understanding China's soes, smes and decentralisation. *China Report, 59*(4), 402–421.

León-Mantero, C., Casas-Rosal, J. C., Pedrosa-Jesús, C., & Maz-Machado, A. (2020). Measuring attitude towards mathematics using Likert scale surveys: The weighted average. *Plos One, 15*(10). https://doi.org/10.1371/journal.pone.0239626

Libradilla, A. A., Morales, D. R. B., Piamonte-Bacatan, R. J., & Misoles, P. A. (2023). Examining the association between attitude towards mathematics and student achievement. *International Journal of Research Publication and Reviews, 4*(7), 1040–1046.

Mata, L., Monteiro, V., Peixoto, F., Santos, N. N., Sanches, C., & Gomes, M. (2022). Emotional profiles regarding maths among primary school children–A two-year longitudinal study. *European Journal of Psychology of Education, 37*(2), 391–415.

Mazana, Y. M., Suero Montero, C., & Olifage, C. R. (2019). Investigating students' attitude towards learning mathematics. *International Electronic Journal of Mathematics Education, 14*(1), 207–231. https://doi.org/10.29333/iejme/3997

McLeod, S. (2023, June 13). Components of attitude: ABC model. *Simply Psychology*. https://www.simplypsychology.org/attitudes.html

Ministry of Education. (2015). *Mathematics: Key Stage 2 syllabus*. https://www.moe.gov.mv/assets/upload/Mathematics_Key_Stage_2_Syllabus.pdf

Mohajan, H. K. (2018). Qualitative research methodology in social sciences and related subjects. *Journal of Economic Development, Environment and People, 7*(1), 23–48.

Naseer, M. S. (2016). *Algebraic content and pedagogical knowledge of sixth grade mathematics teachers* [Doctoral dissertation]. ProQuest Dissertations & Theses Global. (UMI Number: 10133404)

National Institute of Education. (2023). *Key Stage 1 Grade 3 revised syllabus: Mathematics*. https://nie.edu.mv/wp-content/uploads/2023/11/KS1-GRADE3-Revised-Syllabus-2023-Math.pdf

Peixoto, F., Sanches, C., Mata, L., & Monteiro, V. (2017). "How do you feel about math?": Relationships between competence and value appraisals, achievement emotions and academic achievement. *European Journal of Psychology of Education, 32*, 385–405.

Pietrangelo, A. (2019, December 15). What is the ABC model in cognitive behavioral therapy? *Healthline*. https://www.healthline.com/health/abc-model

Prendergast, M., & Hongning, Z. (2016). A comparative study of students attitudes towards mathematics in two different school systems. *International Journal for Mathematics Teaching and Learning, 17*(2), 1–24.

Rahman, S. & Lee, Y. L. (2022). Students' challenges and teaching strategies for virtual science learning in primary years during the COVID-19 pandemic. *Asia-Pacific Journal of Futures in Education and Society, 1*(2), 49–67.

Rose, S., Spinks, N., & Canhoto, A. I. (2014). *Management research: Applying the principles.* Routledge.

Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology, 25*(1), 54–67.

Sahri, N. A., Wan Kamaruzaman, W. N. F., Jamil, J. M., & Shaharanee, I. N. M. (2017, November). Exploring mathematics anxiety and attitude: Mathematics students' experiences. *AIP Conference Proceedings, 1905*(1), 050039. doi:10.1063/1.5012258. AIP Publishing.

Şentürk, C., & Zeybek, G. (2019). Overview of learning from past to present and self-directed learning. In F. G. Giuseffi (Ed), *Self-directed learning strategies in adult educational contexts* (pp. 138–182). IGI Global.

Shuyang, Z. (2021, June). The influence of affects on attitude formation and change and its implications on teaching and learning. In *2021 2nd International Conference on Mental Health and Humanities Education (ICMHHE 2021)* (pp. 593–597). Atlantis Press.

Singh, A. (2014). Conducive classroom environment in schools. *International Journal of Science and Research, 3*(12), 1–6.

Sparrow, L., & Hurst, C. (2010). Effecting affect: Developing a positive attitude to primary mathematics learning. *Australian Primary Mathematics Classroom, 15*(1), 18–24.

Spekle, A. L. (2024). *Observing emotional intelligence: An exploratory investigation into its (non) verbal behaviours* [Unpublished master's thesis]. University of Twente, The Netherlands.

Subject Analysis Sheet. (2018). Mathematics [Unpublished manuscript]. Hafiz Ahmed School.

Subject Analysis Sheet. (2019). Mathematics [Unpublished manuscript]. Hafiz Ahmed School.

Subject Unit Plan. (2019). Mathematics [Unpublished manuscript]. Hafiz Ahmed School.

Takyi Mensah, E., Chen, M., Ntim, S. Y., & Gabrah, A. (2023). Analysing Dewey's vocational aspects of education and Maslow's theory of motivation in support of vocational education and training. *Discover Education, 2*(1), 18.

Uluga, M., Ozden, M. S., & Eryilmaz, A. (2011). The effects of teachers' attitudes on students' personality and performance. *Procedia Social and Behavioral Sciences, 15*, 738–745. https://doi.org/10.1016/j.sbspro.2011.10.144

Walker, S. H., Walker, D., & Widaman, K. (2020). The ABCs of math attitudes: Reliability and validity of the threefactor model. *Journal of Studies in Education, 10*(1), 1–17. https://doi.org/10.5296/jse.v10i1.15792

Wriston, J. M. (2015). The importance of a strong mathematical foundation. *Williams Honors College, Honors Research Projects. 177*. https://ideaexchange.uakron.edu/honors_research_projects/177

Zhao, N., Valcke, M., Desoete, A., Sang, G., & Zhu, C. (2014). Does teacher-centered teaching contribute to students' performance in primary school? A video analysis in Mainland China. *International Journal of Research Studies in Education, 3*(3), 21–34.

Zolait, A. H. S. (2014). The nature and components of perceived behavioural control as an element of theory of planned behaviour. *Behaviour & Information Technology, 33*(1), 65–85.