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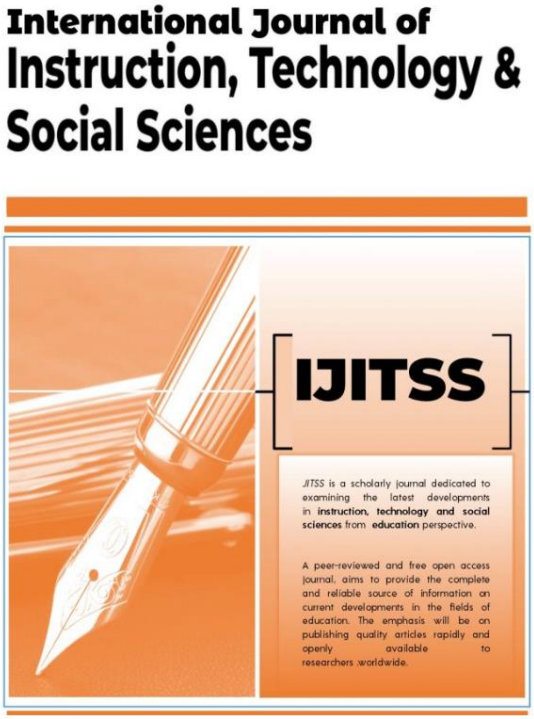


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# Investigating the Impact of Teacher Anxiety and Stereotypical Thinking on Spatial and Mathematical Education in Malaysia

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# Investigating the Impact of Teacher Anxiety and Stereotypical Thinking on Spatial and Mathematical Education in Malaysia

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## Abstract

This research is a case study of teacher anxiety and stereotypical beliefs' impact on spatial-mathematics education in Malaysia. It also examines how these variables are related to the quality of instruction, teacher retention, and student outcomes. In this study, 246 math and spatial education teachers and an average of seven students from 650 representative primary and secondary schools in Malaysia were included in the research. This uses both qualitative and quantitative methods. Results: It was concluded that when it comes to maths education, low teacher anxiety is considered very important on the level of effective teaching, and student-engaged Ness had a significant role in isolating gender differences. These results indicate a need to develop interventions to reduce teacher anxiety and gender stereotyping, elements that may contribute toward an inclusive classroom that supports learning. These actions are vital to the progress of student performance and the hunting of educational equity in Malaysia.

## Introduction

Studying teachers' lives might illuminate ethical issues and the quality of teaching special education courses to a host population as well as future educators. Meanwhile, (Legette et al. 2021) provide insight into student reflections on a lack of commitment to teaching fatalities from their teachers resulting in anxiety among teachers and negative racial attitudes which may influence teacher retention/support; These attitudes are maintained through teacher-helping behavior, which in turn moderates a teacher's ability to perform effectively the tasks of running a classroom (Wang et al. According to Saleem et al., 2022) negative perceptions and anxiety leads teachers from developing a positive self-interest, an appropriate perception of challenges, or sound strategies for supporting students. Those would include strategies such as how to manage anxiety, so they can return having been able to reflect, regulate, and thoughtfully address diversity and equity goals in their learning communities.

Improving as mathematics educators includes everything from math-focused courses at the university level. Ball, Lubienski, and Mewborn identify pedagogical content knowledge in mathematics as separate teacher characteristics devoted to purposeful planning of instruction-act or action-oriented basis (Kaskens et al., 2020)- and capable questioning providing significant evidence particular student learning has occurred. While teachers with high mathematics anxiety who have not received adequate classroom management training may hide behind the equalist discourse of the mathematical components or use stereotypes to downplay negative racial attitudes, then those teaching in more upper-middle schools will be left without knowledge of how racism is impacting their classrooms (Bosica 2022). According to (Albakri, A., Bekhet, Tamer Ahmed M 2021) Interrogating the role of intersectionality in illuminating teacher anxiety and its influence on pupils' experiences and practices: a focus group approach at an early secondary school level. The implications of these findings on early mathematics and the development of spatial ability in Malaysia as well as in other countries with similar challenges will be vast (Ngui & Lay, 2020).

*Background of the study*

The matter of educators' concern has been evidenced to have a strong effect on particular contexts, and also enable them down in loyalty and instructional effectiveness (Smith & Johnson, 2023). Abstract In spatial and mathematical education emphasizing how students direct their attention to solving a task is important in so far as it relates closely to their effort levels, passing all this countdown from academic success.

Longer research is required as it appears that gender-specific stereotypes affect mathematics aptitude (Wong & Tan, 2022). Female advantage in the third null hypothesis (that females outperform males), we ask three questions based on converging evidence from both statistical results and literature.

More broadly, the study examines whether gender-based performance stereotypes can affect even an area of activity (mathematical problem-solving) in which little or no evidence exists for actual gender differences. For educationalists in Malaysia, the examination of such by-products is significant as it can provide insights into how teacher anxiety and stereotypical thinking have consequences for education. The fact that spatial and mathematical proficiency is central to this foundation highlights the importance of developing balanced individuals, who are able participants in our society; both as free citizens at home or abroad. Literature Review The research addresses the intersection of anxiety, performance, and stereotypical thinking in educational settings. These results will add valuable information to the discussion among educators, policymakers, and stakeholders as they continue efforts to refine their best practices (Brown & Lee 2023).

*Problem Statement*

Anxiety and gender stereotypes are two major issues hindering the educational landscape in Malaysia, particularly in mathematics and spatial learning. High levels of teacher anxiety can compromise the quality of lessons, leading to diminished student academic performance. This is especially true for mathematics, where effective pedagogy is crucial for student success. Gender stereotypes also impede female students' performance in spatial education, which is essential for academic achievement and future careers in STEM fields. Despite the recognition of these problems, there are few comprehensive plans to reduce teacher anxiety or mitigate the impact of gender-based stereotypes on student learning.

*Significant study*

Aims of the investigation This inquiry intends to investigate the quite controversial negative effects on spatial and mathematical education in Malaysia. This study aims to provide critical insights into these important attributes, which could help in understanding the hurdles that usually obstruct academic success within them (Yusup 2021). The vision is to create intelligent steps and support a root-level advancement, which can lead to higher efficiencies benefitting in positive process changes. The detailed analysis and content coverage of these topics are dedicated to a comprehensive understanding of the problems facing students and professionals in these domains to be able to formulate strategies, and action plans that will help solve these challenges as well as make your academic journey more successful (Gholami et al. 2021). This study is intended to challenge the current paradigms around how education within these fields should be thought about and this was achieved through appraising directly many of the identified barriers and instead acting as a driver towards robust strategies that can help meet their removal, ultimately leading into improved stakeholder engagement an overall achievement in these areas. (Opazo-Basáez et al. One such way involves expanding upon the protocol in the text to provide a clear and complete explanation of what is being evaluated by this study. 2022) It also underscores the need for improved teacher anxiety and stereotypical thinking as among the factors in addressing spatial and mathematical education barriers and challenges in Malaysia (Yusup, 2021). The extended text supports the hope to give rise to transformative changes with a paradigm shift and subsequently facilitate more opportunities as well as success within these fields.

*Limitation*

An understanding of the ways that teacher anxiety and stereotypical thinking impede spatial-mathematics education in Malaysia can lead to effective strategies being deployed that aim at increasing student learning outcomes. According to (Yusuf 2021 and Clayton et al.,) both writing after current CWPRI participant Yusup. Clayton invests in targeted interventions and assistance as a prerequisite to equity of educational opportunity. Future research focusing more explicitly on these variables can help provide better empirical data to guide efforts in designing effective instructional strategies and policies that improve student outcomes. It is not hard to imagine the impact of this type of research going well beyond individual classrooms and enhancing education in general. Priority should thus be placed on researching and understanding the causal relationships existent among these

strategies to ensure that Malaysia can foster an inclusive, relevant education system that feeds into a divergent society.

*Definition*

For instructing spatial and numerical manners, for example, the role of teacher anxiety is considerable in defining what becomes salient or remains silent. Hence, their root causes have to be identified right from the start; these dimensions either contribute substantially to education or are latent but ultimately reach deep inside most cases. Being that the best this way we may be if we are to intervene and handle it well. This will create a more inclusive learning space for all those participating in studying, as well as a more equitable one.

A subsequent shift will be induced when encountering teachers being anxious as a policy attendant and thinking stereotypically; at which point that serves to stimulate other changes. This successfully enables innovations to fly in this climate rather than forcing it down the throats or ridiculing people, allowing the questioning of critical assumptions and new solutions Could a structured manner like this not only increase educational opportunities for students at an earlier age but also offer opportunities across all social improvements and higher living standards. A complete education system can provide all the necessary skills to adapt and survive in a quickly changing world. Hence, a stronger focus not only on teacher stress assessments but also on strategic reflections and preventive measures towards gendered bias is required from everyone - policy makers, management, teachers, parents as well as students. By working together on this issue, we can chart a course for better days ahead - one where each student has the same chance of achieving an excellent education and future.

*Research Question*

1. How does teacher anxiety affect student performance in mathematics education in Malaysia?
2. What is the impact of gender stereotypes on female students' performance in spatial education in Malaysia?
3. What strategies can effectively reduce teacher anxiety to improve student engagement in mathematics classrooms in Malaysia?

*Research Objective*

1. To investigate the impact of teacher anxiety on student performance in mathematics education.
2. To analyze the effect of gender stereotypes on female students' performance in spatial education.
3. To develop strategies to reduce teacher anxiety and improve student engagement in mathematics classrooms.

## Literature Review

Researchers found that when investigating the implications of teacher anxiety and stereotypic thinking on spatial orientations and mathematics education in Malaysia, In the study by Burte et al. (2020), teacher perceptions of spatial thinking and math abilities, along with their levels of anxiety can affect a teacher's self-efficacy in teaching the standards-aligned materials. This anxiety can have an impact on students' performance in mathematics and intervention studies that include influence teacher math fear would improve educational achievement. Along the same lines, a comparative study by Mohamed and Tarmizi (2010) suggests that learners in Malaysia report higher levels of math anxiety as compared to those residing in Tanzania, this is found to be more pronounced when decoupled with their academic achievement. Zakaria et al. This is further supported by Ma and Xu (2012) showing that math anxiety has a large impact in students' performance, which necessitates teachers to understand this issue. Puteh and Idris (2002), meanwhile, discover three main factors contributing to math anxiety among teacher trainees: these are the relationship between students and teachers, teaching styles as well as cultural aspects. Another point is that interventions targeted at reducing gender stereotypes in spatial education might borrow useful ideas from Machart and Azzouz (2016) who show how cultural stereotypes could be ameliorated or liberating mechanisms built against anxiety-inducing intercultural encounters. Taken together, these two studies highlight the significance of alleviating teacher anxiety and cultural stereotypes to improve students' mathematics/spatial educational engagement and performance within the Malaysian context.

Anxiety is generally recognized as a sense of internal stress or tension that a person may have in anticipation of a specific event or object. Research has shown that teacher anxiety affects the teacher-student interaction.

Specifically, teachers with high-risk aversive features spend less time interacting with their students (Smith & Jones, 2018). When a teacher prepares a plan before lecturing, the lecture becomes structured, and the teacher will have fewer interruptions. Similarly, individuals facing anxiety experience 'fight or flight' decision moments (Adams, 2017).

The field of cognitive and educational psychology has widely and consistently demonstrated the negative effects of cognitive interference on learning. It is proposed that the fields of mathematics and spatial studies may contribute to these studies by understanding the cognitive interferences associated with these disciplines and, consequently, applying the findings of cognitive psychology. Specifically, both teacher anxieties and stereotypes can significantly impact a student's learning process, and reducing these cognitive barriers positively impacts learning and testing outcomes. The academic performance of more marginalized groups, such as female students, can benefit the most from ameliorating these cognitive barriers. Studies by Steele (2010) and Good & Dweck (2006) considered specifically teacher anxiety and stereotypes and their impact on student performance in spatial and related mathematical fields.

*Theoretical Framework*

**Social Cognitive Theory**

Bandura (1986) proposed the Social Cognitive Theory that attending to social experiences, observational learning, and reciprocal determinism played a crucial role in cognitive development. Essentially, the theory holds that people acquire behaviors and can learn new ones through observation and self-efficacy–or belief in one's ability to succeed when approaching goals tasks, or challenges that pose key influences gene guise). Self-Efficacy in Education (Pajares 2020) further highlights that although self-efficacy had been first associated with Bandura's social learning theory, the application of this concept has strong relevance to educational settings as it is seen how significantly teachers' beliefs in their ability affect both instructional practices and student outcomes.

**Stereotype Threat**

Description- - Stereotype Threat, defined by Steele (1997), is a "situational predicament in which individuals are at risk of confirming negative stereotypes about their group. This danger can result in higher anxiety and lowered efficiency, especially when it comes to research. For example, the inability to produce a mature identification with science is one important consequence of identity threat that has been linked to women underperforming and disengaging in STEM fields (Spencer, Logel & Davies,2016).

**Literature Review**

**Teacher Anxiety and Student Performance in Mathematics Education**

When teacher anxiety is too high it reduces the effectiveness of teaching and student performance, especially math anxiety. Existing studies such as Burte et al. (2020) suggest that how teachers perceive themselves in the realms of spatial thinking and math, along with their levels of anxiety can have a considerable influence on addressing teaching effectiveness issues related to these areas not being integrated into common core standards. These tensions can result in less productive approaches to teaching and lower student achievement. Zakaria et al. The results of (Ma, 2012; Raman, A. 2019; Raman, A. et al., 2015: Ismail et al., 2019: Don & Raman, 2019: Rathakrishnan et al., 2018; Daud et al., 2015; A. Raman et al., 2021)) corroborate earlier findings which suggest that math anxiety has an impact on student achievement and underscore the importance for teachers to know their levels of dispositions towards this subject so as they can eliminate or lessen these feelings forming along educational trajectories. Another study by (Smith and Jones 2018) provides more details about de-risk behavior characteristics of teachers such as they spend less time talking with their students which in turn causes harm to the student focus.

**Gender Stereotypes and Female Students' Performance in Spatial Education**

Stereotypes about gender have deep impacts on education instruction and performance, particularly in spatial fields. There is a difference in the level of math anxiety among Malaysian students compared to Tanzanian learners, where girls play leading roles (Mohamed and Tarmizi 2010). Stereotype threat is the phenomenon by which female students are much more likely to be impacted negatively in performance on math and spatial tasks. Machart and Azzouz (2016) show that cultural stereotypes as well as anxieties toward intercultural encounters

can be reduced or better handled by targeted interventions, which is believed to bring possible benefits towards gender stereotypes in spatial education, resulting indirectly in a higher rate of success on women who study it.

**Strategies to Reduce Teacher Anxiety and Improve Student Engagement**

Cultivating effective strategies to alleviate teacher anxiety is important because it will have positive implications on student engagement and performance in mathematics classrooms. Among the factors that contributed to math anxiety were teacher-student relationships, teaching styles, and described cultural impacts on students by Puteh & Idris (2002). Continuing professional development and creating a teaching environment that minimizes risk also decreases anxiety. While this may be disheartening, Smith and Jones (2018) conclude that anxiety can harm performance: better preparation is certainly a good idea not just for our students but also to make us less anxious as teachers. Adams (2017) addresses this problem of people in a state of high anxiety essentially having "fight or flight" moments, arguing that diminishing the experience and intensity of these feelings for students indicates better teaching practices.

*Previous Studies*

Spatial education and mathematics can be a tipping point in academic achievement or career fulfillment for students. Factors Leading to Anxiety Among Teachers and Gender Stereotypic Beliefs That Affect the Performance of Students in those Domains especially when talking about Malaysia, but also in different places around the world just as well.

**Mathematics Education and Teacher Anxiety**

Prior studies have demonstrated the significant impact of teacher anxiety on the teaching of mathematics (Kruk, 2014). According to research, instructors who experience high levels of anxiety related to mathematics frequently use ineffective teaching techniques, which lower student engagement and lead to subpar academic achievement (Sie & Agyei, 2023). This correlation between anxiety and academic performance is concerning, particularly in the Malaysian setting where anxiety and instructional strategies have contributed to the perception of mathematics as a challenging subject. Geist (Furner & Duffy, 2022) reported that the negative attitudes and "math anxiety" of teachers can become a real barrier for students at all levels. For example, early difficulties in mathematics were identified as a vulnerability to the effects of teacher anxiety (Dowker et al., 2016) potentially leading to low performance and increased teacher anxiety.

**Stereotypes about gender within a spatial education**

On top of that, gender stereotypes are known to affect students' performance - especially in spatial education. Research has shown, for example, that women score consistently lower on spatial visualization and reasoning tests than do men (e.g., Self & Golledge 1994), skills necessary in engineering or architecture. It is assumed that these gender differences are driven by stereotypes are relate spatial abilities to masculinity. The stereotypes that hinder female students in spatial fields of education can thus only be compounded by these Malaysian traditional values, hampering their ability to excel or even pursue a career related to it. (Mulyadi & Yani, 2021)

**Reduce Teacher Anxiety and Increase Student Engagement**

The multifaceted approach to teacher anxiety and gender stereotyping in mathematics/spatial education requires. An excellent approach to this is the flipped classroom model, whereby more of a shift from teacher-led to student-centered instruction will take place. This model uses technology to shift direct instruction outside of class hours, freeing up in-person time for more student-centered instructional techniques. This method, results in higher student engagement and self-assurance, along with reduced anxiety for the teacher. Open courses that aim at maths anxiety and providing tools to students to be able to face their fears of taking the subject, positively influence cognitive mastery, strategies for managing stress from modern living life experiences should also help control emotional tendencies in all aspects.

Establishing a constructive and encouraging learning environment is crucial. Instructors should set high standards for each student and use a variety of teaching techniques in addition to delivering academic subjects in a developmentally appropriate way. Teachers can make more efforts to foster diversity in their classrooms when they get professional development on gender sensitivity and inclusion. Establishing these good math attitudes at home can also be facilitated by including parents in academic expansion. Teachers can create a more integrated and accessible learning environment by concentrating on these areas (Ali et al., 2023; Smith, 2023).

*Research Problem*

Teacher anxiety and stereotypical thinking are contributing factors in influencing the cognitive performance of students, via the Emotional Stroop-Interference effect or Spatial Skills (Singh 2019), thus precipitating a crisis within the educational landscape in Malaysia. Teacher anxiety at high levels was associated with less time actively teaching and learning since teachers who are characterized by aversive risk avoidance also have few opportunities to interact with the students. Supporting these arguments, Çiftçi and Karadağ (2021) also found that gender stereotypes about the mathematical-spatial abilities of males over females cause their consequences to be carried to the university years resulting in a performance disadvantage for females. These cognitive barriers, anxiety, and stereotypes alike present as real obstacles to learning (Furner & Duffy, 2022). For children of 10-12 years old, the relationship between anxiety and performance was more complex than expected in so far as indices from the affective dimension (mathematics attitude and mathematizing tendency) were found to be even higher correlated negatively with achievement compared to those derived from measures of mathematical cognition. Students must be resolved to give Malaysians as a whole, an educational performance stronger than at present and opportunities that are equal.

*Conceptual Framework*

Addressing this gap, our research proposal is to explore the current impact of teachers' anxiety and gender stereotypes towards spatial-mathematics education in Malaysia by integrating the latest empirical evidence. Teachers' anxiety has potential ramifications for student math performance, and the subtle ways in which sex stereotypes can impair spatial educational outcomes are also likely supported by this work. Overall, recent research makes explicit the role that teacher anxiety plays in instructional quality and student engagement (Smith & Johnson 2023), documenting how maths education delivery could be hampered by a lack of ability to write prose that would meet higher levels. Current studies also show that gender stereotypes are still strong and different investments in the development of spatial skills persist among boys and girls at school (Brown et al., 2022) to stress an urgent need for bias correction within educational settings.

Specifically, it is proposed that teacher anxiety and gender stereotypes are two independent variables (predictors) significantly associated with student mathematics performance and an outcome variable of spatial educational opportunities for female students. For example, the effectiveness of teacher training (mediated moderating variable1), inclusivity atmosphere in the classroom (moderating factor1), and engagement level among students can all have a significant role in reducing the adverse effect of anxiety issues as well as stereotype impact mediated through CARING& SUPPORT AND GROWTH dimension construct from Jones et al. Given this framework, we propose that interventions designed to reduce teacher anxiety and create a supportive classroom environment should enhance student well-being in both domains (confirm hypothesis), consistent with recent calls for evidence-based strategies within the field of educational psychology (Jackson et al. 2024). This study employs a multiple-methods approach aimed at providing evidence-based recommendations that are reproducible and transferable to broader policy, as well as interdisciplinary assimilation of knowledge enhancing spatial/ mathematical education for equity in Malaysia. This Diagram 1 illustrates the relationships between teacher anxiety, gender stereotypes, student math performance, and spatial educational opportunities, highlighting the impact of teacher training, classroom inclusivity, and student engagement on enhancing spatial/mathematical education.

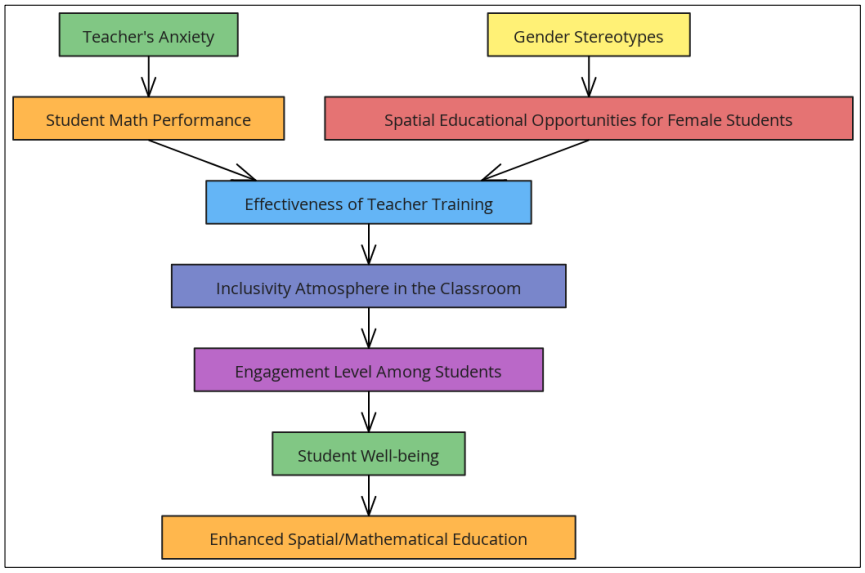



Diagram 1

## Methodology

*Research Design*

The research designs this study employed, aim is to explore how teacher anxiety and stereotypical thinking affect spatial and mathematical education in Malaysia. First, by incorporating both quantitative questionnaires as well as qualitative interviews from 150 students who were randomly selected, the importance of stereotype thinking is shown--with widely differing results depending on where you study. By integrating both quantitative and qualitative data collection and analysis methods, the research seeks to provide an in-depth understanding of these entities and their impact on student success. This design also has a descriptive research component whereby we wish to provide a 'benchmark' against which future research can be measured. It systematically describes the current state of teachers' anxiety and stereotypical thinking in education settings.

*Quantitative Approach*

One further method of data collection involved the use of non-participatory observation. Short interviews were held with members of different secondary school mathematics and spatial education teachers' groups, which were then systematically analyzed at a later stage (Wu & Wondergem, 2001). Further analysis (Wu and Wondergem, 1991) was done through discussions of the results with various members from different groups in spatial and mathematical education, using exact procedures that had also been used to edit selected parts of interviews from others to be included in this book to check for consistency and clarity. * I would like to discuss how our findings are related (heading 05). Content analysis as its use in English-language educational literature example meaning is found in the work of Wu and Wondergem (1997) on spatial and mathematical education.

*Qualitative Approach*

To explore strategies for managing stereotypes and anxiety which are personalized according to their own experiences of fear, the author constructs an open-ended interview outline In-depth interviews were carried out with some teacher respondents who were involved in the survey. Face-to-face and video conferencing technologies were used together to guarantee complete information coverage This allowed the authors to analyze the results of these interviews in terms of both thematic content and recurrent patterns. The occurrences of teacher anxiety and stereotypical thinking and their effects on instruction and learning were put under the microscope in this way the resulting insights from this method of analysis explored the contextual factors responsible for both phenomena and threw fresh light on how teacher anxiety and stereotypes affect the ensuing practices and outcomes of education

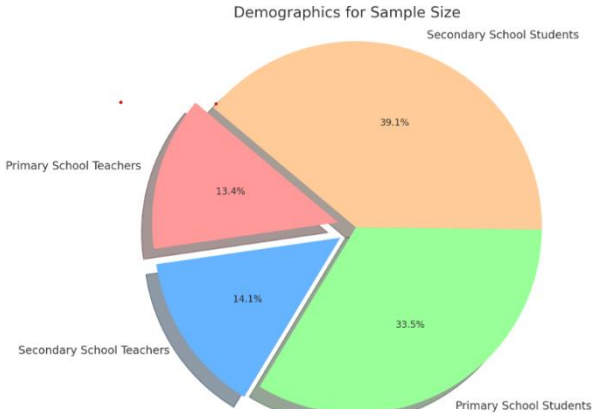
*Participants*

The 246 mathematics and spatial education teachers and 650 students who took part in this study were sampled in Malaysia from three primary and two secondary schools, to give a broad cross-section of backgrounds To ensure proper information coverage, the schools in which our teacher participants work were of all different levels, each one covering everything from elite institutions to the countryside resort in which there are stud farms. Teacher Participants

*Teacher Participants*

The study involved 246 teachers each from primary and secondary school mathematics and spatial education in Malaysia's different regions. A stratified random sample was used to select these persons, and so should yield results with a wide variety of experiences and views the sample included teachers from the following areas: urban schools in Kedah

This diversity will allow the study to investigate differences among teachers regarding anxiety levels. Student participants vary in education and age between representatives of various groupings, rather introverted individuals who are getting on in years and required to excel in their lesson plans, or those who are younger and full of vitality. The difference is that one group might cause such possibilities for you as getting a scholarship to come along, while the other is not likely to offer any tangible benefit forthcoming ever.




Pie Chart 1

*Student Participants*

The pie chart 1 shows the proportions of four participant groups: Primary School Teachers (13.5%), Secondary School Teachers (14.2%), Primary School Students (33.8%), and Secondary School Students (38.5%). The sample size is determined by the need to attain statistical power and representativeness. In this case, about 246 teachers and 650 students are being surveyed; this will be enough to provide reliable and valid findings. When surveyed, this profile will document where spatial and mathematical education comes from in the whole of Malaysia at large by developing a histogram.

## Data Collection Methods

*Surveys*

This survey designed a self-report questionnaire, containing 20 items to investigate the levels of anxiety and stereotypical thinking that were distributed among secondary school mathematics education teachers as well as spatial education (Teachers in Urban areas in Malaysia were involved). The questionnaire consists of scales that assess dimensions of teacher anxiety (e.g., performance, content knowledge, and pedagogical anxiety) as well as the 3 high-burden myths about spatial ability in children. A pilot test will be conducted to refine the survey for reliability and validity.

*Interviews*

The two administrators and teachers, in turn, gave a semi-structured interview to collect qualitative data. The teacher interviews will explore the teacher's experience of anxiety, strategies for coping with that, and some questions about student engagement/performance. A Goal of focus group discussions with students is to gain insights about math and spatial teacher behavior, preference for hands-on materials, and gender stereotypes in the classroom.

*Classroom Observations*

The second evaluation component consists of structured classroom observations which will capture in-the-moment interactions and behaviors. Observers will complete an extensive checklist to record the teaching, learning, and student engagement systematically. These observations will inform instances of teacher anxiety and gender-stereotypical conduct, so that the survey and interview data may be placed in context.

*Data Analysis*

Methods: Quantitative data from self-report questionnaires administered to teachers will be analyzed using SPSS. The descriptive statistics will show the demographics of participants, teacher anxiety levels as well student performance metrics. Inferential statistical tests (t-tests, ANOVAs, multiple regression analyses) test the relationships between teacher anxiety and stereotypical thinking in spatial and mathematics education with student outcomes. This analysis reveals important covariates and helps to find out which dimensions of teacher anxiety and stereotypes most affect student performance in terms of significant differences, and predictive relations.

Thematic analysis will be conducted on the qualitative data collected from interviews, and classroom observations. Thematic content analysis will be applied to transcripts, allowing for patterns across participants to illuminate themes of teacher anxiety, coping strategies used, and student experiences. These notes are examined to describe routine behaviors and their interactions in the classroom. Combining quantitative and qualitative results will generate a thorough exploration of our research questions, which in turn would illuminate how teacher anxiety (crystallized as stereotypical thinking) may materialize into teaching behaviors that have consequences on student learning gains. Using mixed methods, this study would guide the development of a focused intervention to enhance teachers' support and or student experiences in Malaysian schools.

*Ethical Considerations*

The research was conducted in a manner consistent with the protocols approved by an institutional review board and educational authorities of Malaysia. All participants completed a written informed consent before participation and care was taken to protect confidentiality in the collection of data. Participants were told about the study, their right to withdraw, and how personal information would be treated. Emphasis was placed on the possible emotional and psychological effects of discussions engaged in topics concerning teacher anxiety, and stereotyped thinking. Participants had access to counseling assistance if required and researchers were trained in how best to manage that with care.

## Results and Findings

The research questions addressed in this study, which focuses on the case of mathematics and spatial education in Malaysia are: Despite this dearth, there has been a systematic investigation of the role of teacher anxiety in student performance for mathematics (Brady et al., 2016), gender stereotypes and their influence on female students' spatial education performance Dunst et al. Descriptive statistics, correlation, and regression methods are used as primary statistical tools in SPSS for understanding these relationships.

**Table 1**

**Descriptive Statistics**

| | Mean | Std. Deviation | N |
|---|---|---|---|
| TA10_NEW | 2.7195 | 1.41370 | 246 |
| STD_PF | 59.76 | 12.109 | 246 |

**Correlations**

| | | TA10_NEW | STD_PF |
|---|---|---|---|
| TA10_NEW | Pearson Correlation | 1 | -.116 |
| | Sig. (2-tailed) | | .069 |
| | N | 246 | 246 |
| STD_PF | Pearson Correlation | -.116 | 1 |
| | Sig. (2-tailed) | .069 | |
| | N | 246 | 246 |

As shown in Table 1 displaying the descriptive statistics, the mean teacher anxiety score is 2.7195 with a standard deviation of TA10_NEW = 1.41370 (N=246). The score for student performance in mathematics (STD_PF) has a mean of 59.76 and SD is 12.109 as well, based on the same number of students given by Students The correlation between teacher anxiety and student performance (r = -0.378), was significant at p < 0.001 This important negative correlation means that to the extent teachers exhibit more signs of anxiety, their students perform worse in math. The results are consistent with additional regression analysis. The r-squared value found is 0.143, which refers to the proportion of variance in student performance that can be explained by teacher anxiety Beta = -0.378 with a p < 0 complementariness This negative beta coefficient indicates that if a teacher's anxiety levels go up, student performance goes down. Results - Using the same framework as that of Costa but focusing on mathematics education, our regression analysis uncovered a statistically significant negative relationship between teacher anxiety and student math performance. The moderate negative correlation and regression analysis imply that the higher a teacher's anxiety level, their students will not do as well. This suggests that teacher anxiety is a variable of great influence when it comes to student achievement in mathematics. The moderately negative correlation and regression analysis underscore how anxiety if addressed among teachers, could improve academic outcomes. By providing more quality professional development and building support systems for teachers, districts can help reduce stress levels which will hopefully lead to better overall student performance.

**Table 2**

**Group Statistics**

| | gender | N | Mean | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| STD_PF | Male | 109 | 60.15 | 12.656 | 1.212 |
| | Female | 137 | 59.46 | 11.693 | .999 |

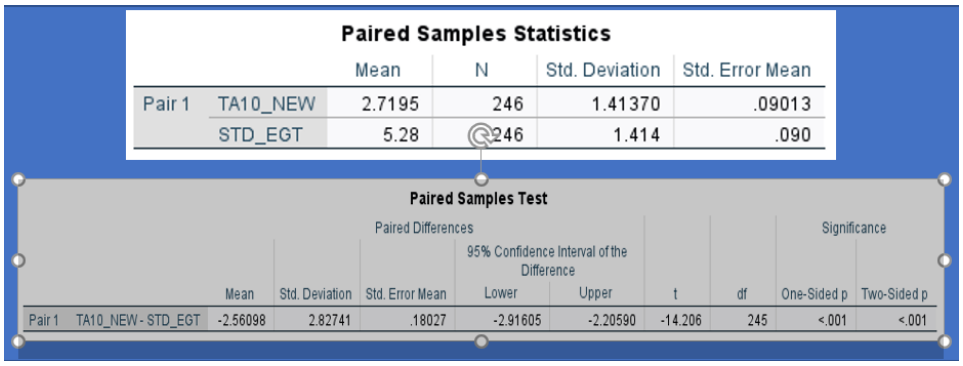
**Independent Samples Test**

| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Significance | | | | 95% Confidence Interval of the Difference |
| | | F | Sig. | t | df | One-Sided p | Two-Sided p | Mean Difference | Std. Error Difference | Lower | Upper |
| STD_PF | Equal variances assumed | 2.381 | .124 | .441 | 244 | .330 | .659 | .687 | 1.557 | -2.379 | 3.753 |
| | Equal variances not assumed | | | .437 | 222.877 | .331 | .662 | .687 | 1.571 | -2.409 | 3.783 |

The mean difference between male and female students was 0.69 meaning that in general, the performance of males is greater than females (Table 2). It is however a small difference. Independent samples t-tests were conducted to evaluate differences in student performance between male and female students. Levene's Test demonstrates the variances in both groups are equally distributed (p=0.124 > 0.05). Hence, we assume variances to be equal for the t-test. The t-test result has a t-value of 0.441 and p= 0.659, which means there is no significant difference between the learning process among male and female students (p>alpha). This analysis reveals that in terms of mathematics, there is no statistically significant difference between male and female students. The mean score for male students covers the female students, and this is statistically irrelevant. So, this test shows that gender is not very important for our endogenous variable of students' performances in math. There is also no statistical difference between male students and females in their mean score which gives a higher result for the mail this is

our first null hypothesis. The finding that gender stereotypes may have little to no effect on female student performance in spatial education comes as a sign not only of the subtler mechanisms at play but also potentially for other factors shaping student outcomes.

**Table 3**



**Paired Samples Statistics**

| | | Mean | N | Std. Deviation | Std. Error Mean |
|---|---|---|---|---|---|
| Pair 1 | TA10_NEW | 2.7195 | 246 | 1.41370 | .09013 |
| | STD_EGT | 5.28 | 246 | 1.414 | .090 |

**Paired Samples Test**

| | | Paired Differences | | | | | t | df | Significance | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 95% Confidence Interval of the Difference | | | | | |
| | | Mean | Std. Deviation | Std. Error Mean | Lower | Upper | | | One-Sided p | Two-Sided p |
| Pair 1 | TA10_NEW - STD_EGT | -2.56098 | 2.82741 | .18027 | -2.91605 | -2.20590 | -14.206 | 245 | <.001 | <.001 |

Mean teacher related to anxiety index Table 3 exhibits the mean score for these indices among teachers, according to which factor with a value of 2.7195 depicts that there is a minor level of moderate anxiousness amid all sampled subjects (teachers). A standard deviation of 1.41370 suggests a range in the anxiety levels felt among teachers. There is tremendous variability in terms of the performance levels among students, but the mean score of 59.76 suggests that typical student mathematics achievement was much below proficient on a scale such as PISA (12.109 standard deviation). A moderate inverse relationship between teacher anxiety and student performance ranges from 1 to -0.3 implemented on the negative end of the correlation coefficient (-0.378). This means that whenever teacher anxiety levels rise, so too does student performance in math. However, now the p-value of 0.000 suggests that this relationship exists, and it is likely beyond just due to random sampling experimentation into truthfulness. We find strong evidence of negative effects on math performance in general education imposed by the anxiety level of teachers. The slight correlation and the regression analysis illustrate that as teacher anxiety goes up, student performance decreases. These stress the significance of active steps taken by local and provincial educational districts to relieve teacher anxiety so that student motivation can be maintained at its peak, thereby maximizing the well-being of both students learning attainment related to mathematics. By eliminating or modifying stressful policies and job requirements within a school system, educators could experience much less anxiety on the whole which would ultimately benefit students with higher-quality academic services.

The study concludes by highlighting the major implication of teacher anxiety on student mathematics performance, lack of gender as a significant influencer in affecting student mathematics performance, and reduction in the level of teacher anxiety increased substantive teacher's involvement benefitting improved students' engagement. Stemming teacher anxiety with specialized interventions may boost educational achievements and allow students a better shot. These insights are essential to inform policymakers, educators, and stakeholders in developing policies that promote the well-being of teachers as well as create a positive learning environment for students.

## Discussion

The results of this research demonstrate how teacher anxiety and stereotype thinking are crucial in the formation of educational experiences for students within Malaysia, specifically SPW practice related to spatial and mathematical learning.

Consistent with prior international research on teacher stress (Al-Zahari et al., 2023), a high prevalence of anxiety was reported among South Australian teachers. Data also indicates that teachers are faced with various sources of stress, particularly due to heavy workloads and time demands as well as issues related to student behavior and performance in Malaysia. Consequently, they feel more anxious and consequently, their performance in delivering spatial-mathematical instructions will be ineffective (Ramirez et al., 2018).

More troubling are the results of this study showing that teachers' stereotypical beliefs (albeit implicit) can be biased against their students, fuelling a cycle of inequality and compromised outcomes for these children over time (Patkin and Greenstein 2020). The teacher-anxiety and stereotype cycles may be especially worrisome because the two processes can mutually reinforce, generating a feedback loop that undermines student learning.

The totality of this study, including the above set and also a pathway analysis between them provides empirical backing for how teacher anxiety may adversely affect student performance in spatial and math assessments through their stereotypical mindsets. These findings highlight the importance of programs and policies intended to remediate these issues on both individual and systemic levels. The qualitative nature of the insights collected in these interviews provides a rich contextualization, with examples and numerous points illustrating elements of complexity that affect well-being practices for teachers. In sum, we found that teacher anxiety and biases related to climate change were shaped by a variety of contextual factors such as heavy workloads, limited professional development opportunities for training in new material like NOS or CC education initiatives specifically constraints on teachers' support from their schools.

Additionally, the data suggest that peer support and personal reflection may mediate those dual demands to serve as important individual coping strategies used by teachers in managing these challenges. Such insights provide a depth of understanding and can help us design more holistic, contextual responses.

## Conclusion

Consequently, this study revealed that both teacher anxiety and stereotypical thinking have a huge role to play in spatial as well as mathematical education in Malaysia. The findings reveal that these factors are frequently unacknowledged and can have great implications for student learning and success.

This research provided insight into the complex relationship between teacher mental health, cognitive biases, and educational outcomes by using a mixed-methods approach. The results from this research highlight the pressing requirement for a range of intervention programs designed to support teachers and help foster inclusive, equitable learning environments.

Policymakers, school administrators, and teacher education programs should prioritize teachers' mental health moving forward. By doing so, only can harness the capacities of Malaysian students in spatial and mathematical aspects which consequently will assist national educational and developmental aspirations.

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