

Mathematics Learning Anxiety Among Senior High School Students: A Qualitative Case Study

Yuzarion¹, Yenti Arsini*², Masyhuril Fajar¹, Yusutria¹
Akhmad Fajar Prasetya¹, Rina Febriana³

¹Universitas Ahmad Dahlan Yogyakarta, Indonesia

²Universitas Islam Negeri Sumatera Utara Medan, Indonesia

³Universitas Cokroaminoto Yogyakarta, Indonesia

yentiarsini@uinsu.ac.id*

<p>Submitted: 2026-01-01</p> <p>Revised: 2026-02-04</p> <p>Published: 2026-03-04</p> <p>Keywords: Mathematics Anxiety, Psychosomatic Symptoms, Psychospiritual Well-being</p> <p>Copyright holder: © Author/s (2026)</p> <p>This article is under:</p>  <p>How to cite: Yuzarion, Y., Arsini, Y., Fajar, M., Yusutria, Y., Prasetya, A. F., & Febriana, R. (2026). Mathematics Learning Anxiety Among Senior High School Students: A Qualitative Case Study. <i>Bulletin of Counseling and Psychotherapy</i>, 8(1). https://doi.org/10.51214/002026081754000</p> <p>Published by: Kuras Institute</p> <p>E-ISSN: 2656-1050</p>	<p>ABSTRACT: Mathematics learning anxiety is a prevalent issue among high school students that can adversely affect academic performance and psychological well-being. Despite extensive quantitative research, little is known about the lived experiences and psychospiritual dimensions of students facing mathematics anxiety, particularly within Islamic educational settings. This qualitative case study explores the determinants of mathematics learning anxiety among students at Senior High School (SMA) Muhammadiyah Yogyakarta, Indonesia. Participants were purposively selected based on active enrollment, observable signs of mathematics anxiety, and willingness to provide informed consent. Data were collected through observation, semi-structured interviews, and document analysis, then analyzed thematically. Findings indicate that students experience psychosomatic symptoms, cognitive difficulties, altered learning behavior, and neurophysiological disturbances. Contributing factors include low self-efficacy, poor concentration, fear of failure, and the perception of mathematics as inherently difficult. Anxiety manifested during lessons and assessments, negatively influencing problem-solving, conceptual understanding, and overall academic achievement. This study highlights the need for holistic support strategies in schools that address both psychological and psychospiritual well-being, integrating educational and Islamic principles to reduce mathematics learning anxiety and enhance student outcomes.</p>
---	---

INTRODUCTION

Education is widely recognized as a moral and intellectual endeavor, shaping not only cognitive development but also character, spirituality, and social responsibility (Irpan & Sain, 2024). In the Islamic worldview, education is a holistic process that nurtures both the intellect ('aql) and the soul (nafs), guiding individuals towards purposeful living and alignment with divine values (Verma, 2024). Within this framework, mathematics plays a pivotal role in fostering logical reasoning and structured thinking. Yet, despite its significance, mathematics is often perceived by students as an abstract, difficult subject, frequently accompanied by fear, anxiety, and emotional distress (Taschereau-Dumouchel et al., 2022). These negative responses are not merely academic struggles, but may reflect deeper psychological and spiritual imbalances, affecting students' motivation, confidence, and engagement.

Mathematics anxiety can manifest through behavioral withdrawal, classroom passivity, and physiological symptoms such as increased heart rate, sweating, and muscular tension. These responses often stem from previous failures, negative self-perceptions, and a lack of internal confidence (Cruz, 2025). From an Islamic lens, such conditions may be likened to a state of *qalbun wajil*, a heart unsettled by excessive worry reflecting diminished *tawakkul* (trust in Allah SWT) and *yaqin* (inner certainty) when facing intellectual challenges.

The multidimensional nature of learning anxiety cognitive, affective, and physiological has been established in psychological literature (Cai et al., 2024). Students experiencing high anxiety often struggle to concentrate, entertain intrusive thoughts of failure, and emotionally disengage from the learning process. These symptoms parallel the concept of *khauf* in Islamic tradition: persistent mental disturbances that disrupt clarity of mind and faith.

Emerging neuroscience research affirms the brain's plasticity and potential for transformation through experience (Singer, 2025). This insight complements the Islamic principle of *tazkiyatun nafs* (self-purification and development), as well as the lifelong pursuit of 'ilm. Foundational educational theories such as Bruner's cognitive theory (Ozdem-Yilmaz & Bilican, 2025) and Krathwohl's affective domain taxonomy support the need to integrate intellectual, emotional, and spiritual dimensions in learning (Nelson et al., 2020).

However, despite the growing body of research on mathematics anxiety, a gap remains. Most existing studies are quantitative, focusing on correlations between anxiety levels and academic performance (Barroso et al., 2021), but they often fail to explore students' lived experiences, the nuanced psychological and spiritual processes underlying anxiety, and how these are shaped within an Islamic educational context (del Carmen Pérez-Fuentes et al., 2020). Furthermore, prior research rarely examines the role of Islamic conceptual frameworks such as the principles of *sabr*, *tawakkul*, and love of knowledge (*mahabatul 'ilm*) in mediating or reframing mathematics anxiety.

Initial interviews conducted with five students from Senior High School (SMA) Muhammadiyah revealed recurring expressions of helplessness, fear of failure, and avoidance of mathematics-related activities. These findings suggest that qualitative exploration can provide deeper insights into how internal (emotional, cognitive, spiritual) and external (educational, social) factors interact to shape anxiety, offering a perspective that quantitative studies alone cannot capture.

Islamic teachings, integrated as a conceptual lens rather than normative justification, provide practical guidance for understanding and addressing anxiety. Surah Al-Baqarah (2:286) and Surah Thaha (20:114) highlight the importance of perseverance, reliance on Allah SWT, and the pursuit of knowledge principles that can inform strategies to transform anxiety into resilience and purposeful learning.

Purpose of the Study

This study seeks to explore the lived experiences of high school students facing mathematics anxiety in an Islamic educational setting. It aims to address the identified gaps by investigating both the internal and external factors contributing to anxiety and by examining how Islamic psychospiritual concepts can inform holistic interventions. By integrating empirical evidence with Islamic principles, this research aspires to enhance understanding of mathematics anxiety and support the development of compassionate, contextually relevant educational practices.

METHODS

Design

This study employed a qualitative case study design to explore mathematics learning anxiety among senior high school students (Hays & McKibben, 2021). The case study approach was chosen for its ability to provide an in-depth and holistic understanding of participants' unique experiences, while identifying patterns and variations in learning anxiety (Cleland et al., 2021; Lim, 2025). Six

participants, consisting of two male and four female students from SMA Muhammadiyah, were selected using purposive sampling based on their experiences of mathematics anxiety and willingness to participate. Data were collected through semi-structured interviews, observation, and document analysis, and subsequently analyzed thematically to interpret students' psychospiritual experiences in the context of mathematics learning (Schoch, 2020).

Participants

Participants in this study were high school students from SMA Muhammadiyah Yogyakarta, Indonesia who demonstrated symptoms of mathematics learning anxiety. A purposive sampling strategy was employed to ensure the selection of individuals who possessed direct experience with the phenomenon under investigation (Campbell et al., 2020). As Creswell emphasizes, purposive sampling in qualitative research aims to identify individuals whose experiences are particularly relevant to the research objectives (Ahmad & Wilkins, 2025; Chivanga & Monyai, 2021).

The inclusion criteria were as follows: (1) Actively enrolled as high school students. (2) Exhibiting signs of mathematics learning anxiety, such as fear, declining academic performance, or negative emotional responses toward mathematics. (3) Willingness to participate in the study, as indicated by signing an informed consent form.

A total of six participants two males and four females were selected based on these criteria. Participants were expected to offer rich, detailed accounts of their experiences, allowing for the exploration of cognitive, emotional, behavioral, and possibly spiritual aspects of their learning anxiety.

Research Ethics

In alignment with universal research ethics and Islamic principles that uphold the sanctity and dignity (*karāmat al insān*) of human beings, this study prioritized ethical considerations throughout the research process. Participants were provided with a comprehensive informed consent form, which included details regarding the study's purpose, procedures, duration, and confidentiality measures. They were also informed about their rights, including the right to withdraw at any time without consequence. Consent was obtained voluntarily, with assurances that all data would be anonymized and used solely for research purposes. The researcher ensured that participants were treated with respect, compassion, and care throughout the process. Efforts were made to create a comfortable and trusting environment, allowing participants to share their experiences openly. As a token of appreciation, participants received personalized gifts aligned with their needs and interests, along with verbal expressions of gratitude.

Data Collection

Data were collected through three primary qualitative techniques: observation, semi structured interviews, and document analysis. These methods were chosen to enable triangulation and enhance the depth and validity of the findings (Chand, 2025). Observation was conducted using a passive participation approach, wherein the researcher observed participants in their natural learning environments without active involvement (Aprilianti, 2024). Behavioral cues and contextual interactions were documented using field notes. Semi structured interviews served as the main data source. An interview guide was developed based on Stuart's framework of learning anxiety, covering cognitive, physiological, and emotional dimensions. Interviews were recorded using audio devices, transcribed verbatim, and later coded and analyzed thematically (Dwyer, 2022). Documentation involved the collection of relevant artifacts such as students' mathematics grades, school records, teacher evaluations, and behavioral notes. These documents provided contextual depth and facilitated triangulation of interview and observation data.

Data Analysis

The study employed thematic analysis, a widely used method for identifying, analyzing, and interpreting patterns (themes) within qualitative data (Dwyer, 2022). Thematic analysis offers both flexibility and rigor, making it particularly suitable for exploring complex psychological and emotional phenomena such as learning anxiety (Kiger & Varpio, 2020). The analysis followed a systematic process involving: (1) Familiarization with the data through repeated readings. (2) Generating initial codes that represent meaningful units. (3) Collating codes into potential themes. (4) Reviewing and refining themes in relation to the coded extracts and the entire data set. (5) Defining and naming themes that encapsulate the essence of participants' experiences. (6) Producing a final report with illustrative quotes and analytical commentary. This method enabled the researcher to not only interpret patterns in the data but also remain attentive to the subtle psychospiritual dimensions embedded in the participants' narratives.

Research Trustworthiness

To ensure the trustworthiness of the findings, the study adopted Lincoln and Guba's criteria: credibility, transferability, and confirmability (Enworo, 2023). Credibility refers to confidence in the truth of the findings. This was established through member checks, whereby participants reviewed the interpretations and confirmed the accuracy of their own narratives (Motulsky, 2021). Transferability denotes the extent to which findings can be applied to other contexts. This was addressed by providing rich, thick descriptions of the participants' backgrounds, settings, and experiences, enabling readers to assess contextual similarity.

Confirmability ensures that the findings are shaped by participants' perspectives rather than researcher bias. An audit trail documenting all research steps from design to analysis was maintained to support transparency and accountability.

This commitment to methodological integrity reflects not only scientific rigor but also ethical responsibility, resonating with Islamic scholarly traditions that uphold sincerity (*ikhlas*), honesty (*sidq*), and trustworthiness (*amānah*) in the pursuit of knowledge.

RESULTS AND DISCUSSION

Results

This study involved six Grade 12 students, aged between 17 and 19 years, who consented to participate. The participants comprised four females and two males, all from Grade 12 MIPA 2 Class at SMA Muhammadiyah Yogyakarta. The six participants were identified as being in a vulnerable state with respect to mathematics learning anxiety.

The analysis revealed four principal themes that characterize mathematics learning anxiety among students at SMA Muhammadiyah. These themes are: psychosomatic disorders, decreased quality of thinking skills, behavioral changes in learning, and neurophysiological disorders. The following sections provide a detailed description of each identified theme, based on the interview data.

Psychosomatic Disorders

Psychosomatic disorders refer to health conditions in which psychological factors, such as stress and anxiety, contribute to the onset or exacerbation of observable physical symptoms. The term "psychosomatic" originates from the Greek words *psyche* (mind) and *soma* (body), highlighting the close interconnection between mental states and physical responses. These disorders are often characterized by symptoms that cannot be fully explained by specific medical diagnoses, including pain, fatigue, digestive disturbances, and other physiological reactions, which can significantly impact an individual's quality of life.

Interview results indicated that four participants KAS, NPM, MFAF, and MDS experienced symptoms that can be classified as psychosomatic within the context of mathematics learning. Reported symptoms included abdominal pain, palpitations, nervousness, cold sweats, and fatigue.

Participant KAS reported that anxiety related to mathematics triggered physical reactions such as abdominal pain and increased heart rate, particularly when required to solve problems in front of the class. This is reflected in the following statements:

Participant 1 (KAS):

"...Sometimes I get a stomachache thinking about math because the problems are difficult." "Yes, sometimes I get startled or just nervous when I'm unprepared." "My heart races, and sometimes I even get cold sweats because of panic..."

These statements demonstrate a direct relationship between the psychological pressure experienced and the emergence of physical symptoms.

Similarly, participant NPM reported experiencing psychosomatic reactions, particularly under time constraints and the fear of being asked to answer questions without knowing the formulas:

Participant 2 (NPM):

"...Yes, when time is almost up, it triggers a stomachache." "I also feel nervous. I'm afraid of being asked to solve a problem when I don't know the formula..."

For MFAF, both physical and mental fatigue contributed to psychosomatic symptoms, especially during the last class of the day. The participant also reported nervousness and dizziness when confronted with numbers:

Participant 4 (MFAF):

"...I feel tired too, especially after physics and chemistry in the earlier hours; it's hard to concentrate by the last class." "When I see a lot of numbers, I get nervous and dizzy trying to add them up..."

In contrast, MDS experienced abdominal discomfort not directly triggered by mathematics anxiety, but due to dietary factors. Nevertheless, this physical condition affected concentration and engagement in mathematics learning:

Participant 5 (MDS):

"...Maybe it happened, but not because of math more because I didn't eat lunch or overate at breakfast, so my stomach hurts." "It made me run to the restroom." "I asked the teacher to repeat the explanation several times until I could understand it myself..."

These findings indicate that psychosomatic disorders can originate from multiple factors, both psychological and physical, and ultimately influence the mathematics learning process.

Therefore, addressing psychosomatic disorders requires a holistic approach that considers both psychological and physical aspects. Psychological interventions, such as counseling and Cognitive Behavioral Therapy (CBT), along with stress management and relaxation techniques, can help reduce anxiety and associated physical symptoms. If left unaddressed, long-term psychosomatic disorders may cause trauma and exacerbate excessive anxiety in students within the learning context.

Decline in Quality of Thinking Skills

The decline in students' cognitive functioning encompasses various aspects, including reduced critical thinking, creativity, and problem-solving abilities when facing complex tasks. This condition is influenced by multiple factors, such as rapid technological developments, lifestyle changes, and educational systems that have yet to fully support the cultivation of deep-thinking skills.

Digital technology has transformed the way students access information. The abundance of readily available information encourages reliance on external sources without engaging in critical analysis or reflective thinking. Additionally, modern lifestyles, characterized by multiple demands at school and home, reduce opportunities for reflection and introspection. Education systems that remain focused on rote memorization and mastery of core content, coupled with limited interactive learning experiences, further contribute to the decline in students' cognitive abilities.

The study findings indicate that five participants (NPM, ASI, MFAF, MDS, and SNS) experienced diminished cognitive functioning, reflected in complaints such as lack of focus, difficulty understanding material, inability to memorize formulas, poor concentration, forgetfulness, inconsistent study habits, challenges in decision-making, and drowsiness during mathematics lessons.

Participant NPM reported that difficulties in maintaining focus and recalling formulas directly hindered problem-solving, particularly with two-variable linear equations. NPM also perceived the examination problems as disproportionately difficult relative to the taught material:

Participant 1 (NPM):

*"...Yes, if I really pay attention, sometimes I get it, sometimes not. Depends."
"I don't know the formulas, so I can't solve the problems." "In the exam, suddenly it's so difficult, like the teacher never taught it..."*

Participant ASI indicated that poor concentration was a major barrier to engaging in mathematics lessons, often leading to daydreaming and distraction:

Participant 2 (ASI):

"...My concentration is somewhat disturbed, sometimes I daydream and lose focus..."

Participant MFAF highlighted cognitive challenges such as difficulty memorizing formulas, frequent forgetfulness, poor focus, and inconsistent study habits, exacerbated by classroom conditions and physical discomfort:

Participant 3 (MFAF):

*"...I have trouble remembering formulas, sometimes I forget and lose focus."
"Studying at the last class of the day is difficult, especially if the classroom is hot or I am hungry, so it's hard to concentrate." "Yes, sometimes because my concentration is disturbed or I don't really pay attention." "I'm inconsistent, sometimes diligent, sometimes not..."*

Participant MDS explained that lack of focus and non-conducive classroom conditions impaired understanding of mathematics, prompting requests for repeated explanations:

Participant 4 (MDS):

"...If the material is difficult, I ask the teacher to repeat it because it's hard to process." "It's quite disruptive if the classroom environment is not conducive, so the lessons don't stick..."

Participant SNS reported that drowsiness due to insufficient sleep negatively affected focus, concentration, and formula recall during mathematics tasks:

Participant 5 (SNS):

"...If I don't understand, I ask for it to be repeated." "In the afternoon, I lose focus." "Sleepy, maybe because I didn't sleep enough last night." "Understanding is easy, but during exams, it gets mixed up." "I hope to get good grades, but sometimes I forget the formulas..."

These findings suggest that a decline in cognitive functioning not only impacts students' academic performance but also affects their decision-making abilities and capacity to manage their thinking processes effectively. Efforts to maintain and enhance cognitive skills through more interactive learning, supportive classroom environments, and balanced lifestyle management are essential to promote students' cognitive and mental health.

Behavioral Changes in Learning

Changes in learning behavior refer to various forms of conduct that hinder the learning process, including reduced concentration, procrastination in completing tasks, and low motivation to study. Alongside these learning behavior changes, students also exhibit deviations in social behavior behaviors that do not align with social norms and expectations such as aggression, social withdrawal, and resistance to engaging in learning activities.

These behavioral changes significantly affect not only the students as individuals but also their surrounding social environment, including family, peers, and educational institutions. Deviant academic behaviors can exacerbate learning anxiety, reduce academic achievement, and hinder opportunities for further education. Likewise, deviant social behaviors can trigger interpersonal problems and increase the risk of adolescent delinquency.

The study findings indicate that all six participants experienced changes in both learning behavior and social behavior. These changes manifested as boredom, nervousness, low self-confidence, fear of making mistakes, completing tasks only if familiar with the formulas, reluctance to study at home, anxiety when encountering mathematical variables, careless problem-solving, fear of being called to the front of the class, frustration when unable to answer questions, bad moods, rejection of mathematics lessons, mood swings, laziness, restlessness, and pessimism regarding personal abilities.

Participant KAS reported that feelings of boredom, nervousness, and low self-confidence often arose during mathematics lessons, especially when unable to find solutions. This led the participant to complete assignments only when familiar with the formulas and to avoid studying at home:

Participant 1 (KAS):

"...The reason is that I couldn't find the answer, and then the class lasted a long time, so it became boring." "Yes, nervous, shaking too." "Not confident, sir." "Sometimes I do it, sometimes not. If I know the formula, I do it; if not, I'm too lazy and it's confusing..."

Participant NPM stated that anxiety emerged when facing mathematical symbols and variables, particularly when asked to go to the front of the class. The participant also admitted to solving problems carelessly and lacking confidence due to insufficient study:

Participant 2 (NPM):

"...Like X, F, those kinds of things. I can't do it. Especially if asked to go forward, I get anxious." "Sometimes bored because of the teacher's method." "Sometimes I answer randomly." "Not confident because I didn't study..."

Participant ASI experienced changes such as low self-confidence, frustration at being unable to answer questions, bad mood, and anxiety, which led to reluctance to participate fully in mathematics lessons:

Participant 3 (ASI):

"...Sometimes I understand, but if the numbers are different, I'm not sure, scared." "It feels a bit difficult, doesn't stick in my mind, makes me frustrated." "Sometimes I don't feel like doing anything, just want to leave the class." "When anxious, it's because I'm afraid I won't be able to do it..."

Participant MFAF reported anxiety and nervousness mainly when viewing difficult mathematics problems, although not always accompanied by severe physical symptoms:

Participant 4 (MFAF):

"...Anxiety only appears when I see the problem." "Like nervous, jittery..."

Participant MDS showed behavior changes influenced by mood, laziness, and restlessness when facing mathematical numbers. The participant also reported fear of being unable to answer questions and concern about grades:

Participant 5 (MDS):

"...Sometimes yes, sometimes no, depends on my mood." "Sometimes I lose to my own laziness." "Restless when seeing difficult numbers." "Afraid I can't answer, afraid of my grades too..."

Participant SNS reported feelings of fear, nervousness, and pessimism toward mathematics, particularly due to frequent forgetfulness of formulas and concern over low grades or failing:

Participant 6 (SNS):

"...Afraid, nervous if I don't memorize the formulas." "Sometimes I forget the formulas during the exam." "Surely worried about not passing." "I hope for good grades, but I often forget the formulas..."

These findings indicate that changes in learning behavior are closely associated with students' emotional and psychological conditions. Therefore, developing students' personality and socio-emotional competencies is crucial to help them manage anxiety, foster empathy, self-regulation, and positive social skills. Timely, evidence-based interventions, supported by safe, structured, and supportive home and school environments, play an essential role in preventing deviant behaviors and guiding students back to healthy learning patterns.

Neurophysiological Disorders

Neurophysiological disturbances refer to conditions affecting the nervous system, including the brain, spinal cord, and peripheral nerves. The nervous system plays a critical role in regulating various bodily functions, ranging from motor activities and sensory perception to cognitive and emotional processes. In the context of mathematics learning, neurophysiological disturbances can impair students' abilities to comprehend material, retain information, and manage emotional responses.

Interview findings indicate that all six participants in this study exhibited symptoms indicative of neurophysiological disturbances. These symptoms included dizziness when unable to find solutions to mathematics problems, confusion, poor memory, perceptions of mathematics as difficult, mental blanking, numbness, slow processing of teacher explanations, feelings of being haunted, sleep disturbances, and tendencies toward overthinking.

Participant KAS reported that inability to solve mathematics problems triggered dizziness and confusion, as reflected in the following statements:

Participant 1 (KAS):

"...Dizzy, and then just stayed dizzy because I couldn't find the answer." "Just confused, because mathematics requires thinking in circles." "Yes, sometimes confused, it's hard to express..."

Participant NPM similarly reported experiencing confusion, difficulty recalling formulas, and perceiving certain mathematics topics as difficult:

Participant 2 (NPM):

"...Confused, sir, because I keep forgetting. Math requires memorizing formulas..."

"...When I try to study, I'm confused about what to study because I didn't pay attention to the board." "I think arithmetic, linear variables, and trigonometry are difficult..."

Participant ASI described experiences of dizziness, mental blanking, and numbness when engaging with numbers during mathematics learning:

Participant 3 (ASI):

"...Sometimes I just get dizzy looking at the numbers, then suddenly go blank..."

"...When studying, I understand, but when the problem comes out, I go blank..."

"...Sometimes dizzy and then feel numb..."

Participant MFAF reported that statistics, particularly median-related topics, were challenging and often led to confusion and mental blanking. The participant also experienced slow comprehension of teacher explanations:

Participant 4 (MFAF):

"The difficult material is statistics, the median parts." "Sometimes I go blank." "Once confused about where it came from, I had to ask for it to be repeated to understand."

Participant MDS similarly reported challenges with statistics, requiring repetition of explanations from the teacher:

Participant 5 (MDS):

"...If the material is difficult, I ask for it to be repeated because it's hard to absorb..."

"...The difficult material is statistics..."

Participant SNS reported more complex neurophysiological disturbances, including mental blanking during exams, feelings of being haunted, sleep disturbances, and overthinking, which affected memory and problem-solving abilities in mathematics:

Participant 6 (SNS):

"...Went blank, like I didn't know how to answer the next question." "Feels like being haunted." "I have trouble sleeping, earliest at two o'clock..."

"...Overthinking constantly, even without using my phone I still can't sleep..."

"...During exams it gets mixed up, forget the procedure..."

These findings indicate that neurophysiological disturbances experienced by the participants can significantly impede the learning process, particularly affecting concentration, memory, and comprehension. Symptoms such as sleep disturbances, mental blanking, and cognitive difficulties may be associated with conditions like sleep deprivation and mild cognitive dysfunction, which negatively impact academic performance and psychological well-being.

Therefore, appropriate interventions through a multidisciplinary approach are essential, involving medical, psychological, and educational support. Timely and effective intervention can provide students with opportunities to improve their neurophysiological condition, enhance quality of life, and maintain autonomy and efficiency in the learning process.

Factors Affecting Mathematics Learning Disorder in Students of SMA Muhammadiyah

Several factors were identified as contributing to the students' mathematics learning difficulties, including the following:

Unease and Imbalance of Physical and Mental Resources

Unease during the learning process, along with imbalances in physical and mental energy, can significantly hinder students' academic performance. High levels of stress, coupled with poor time management, can affect concentration and overall well-being (Marais et al., 2020). Additionally, inadequate nutrition or an unbalanced diet may lead to energy depletion, exacerbating anxiety and impairing cognitive function (Mukherjee et al., 2024).

Four participants reported physical symptoms such as palpitations and rapid heartbeat when called upon to solve problems in front of the class. The physical strain, combined with mental anxiety, was especially pronounced during late day math lessons, leading to fatigue and discomfort. Additionally, some participants noted that poor dietary habits exacerbated their physical unease.

Difficulty Concentrating

Several participants struggled with concentration, particularly during math lessons. This difficulty in maintaining focus can be attributed to high levels of anxiety, excessive stress, and poor sleep quality, all of which impede cognitive functioning (Szűcs, 2020). Five participants reported forgetfulness and difficulty recalling mathematical formulas, further contributing to their learning challenges.

Fear of Mathematics

Fear of mathematics was a common theme among all participants. This fear stemmed from their lack of mastery over the material, leading to anxiety about making mistakes or receiving poor grades. Participants also reported a lack of confidence, nervousness, and trembling during math lessons, which significantly affected their engagement with the subject.

Perception of Mathematics as a Difficult Subject

All six participants perceived mathematics as a difficult subject, primarily due to the complexity of the material and the need to memorize numerous formulas. Frustration, confusion, and sleep disturbances were common symptoms following unsuccessful attempts to solve math problems. These difficulties led to negative attitudes toward the subject, further reinforcing their math anxiety. The following is, figure 1 as a chart or explanation scheme of the findings of this study related to math learning anxiety in Muhammadiyah high school students:

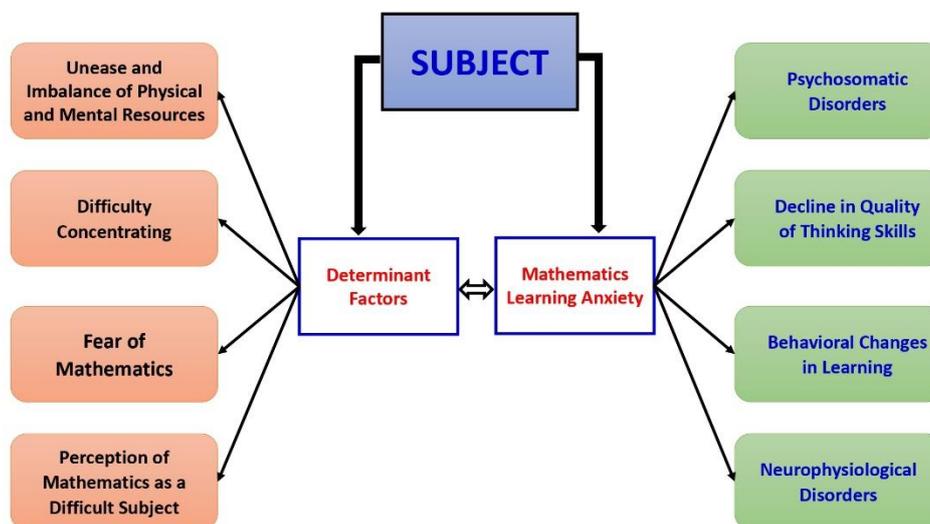


Figure 1: A Diagram Summarizing the Key Findings of The Study, Illustrating the Interrelationships Between Psychosomatic Disorders, Cognitive Decline, Behavioral Changes, And Neurophysiological Disorders in The Context of Mathematics Learning Anxiety in Students of SMA Muhammadiyah.

Discussion

Math Learning Anxiety in Muhammadiyah Yogyakarta High School Students

This study explored the dynamics of math learning anxiety among students at SMA Muhammadiyah, revealing several key factors and symptoms that contribute to students' challenges in math learning. The research identified four primary themes: psychosomatic disorders, decreased quality of thinking ability, behavioral changes in learning, and neurophysiological disorders. These themes are interconnected and represent how students' mental and physical health can significantly impact their math learning experience.

Psychosomatic Disorders

The study highlighted how students experience psychosomatic symptoms due to the stress and anxiety associated with math learning. These symptoms, including fatigue, stomach aches, and dizziness, significantly hinder the students' ability to concentrate and learn effectively. Poor physical preparation such as skipping breakfast or ignoring overall health can exacerbate these symptoms, further hindering academic performance (Peprah et al., 2024). Managing these psychosomatic symptoms requires an integrated approach that addresses both mental and physical health.

Decreased Quality of Thinking Ability

One of the primary issues identified in this study is the decline in students' thinking abilities, which is often exacerbated by anxiety and a lack of motivation. The subjects in this study often had trouble concentrating, poor recall of formulas, and general mental fatigue, all of which are indicators of reduced cognitive function. This finding resonates with Ruggiero's definition of thinking as a problem solving activity, emphasizing the importance of honing thinking skills, especially in math, which requires logical reasoning and creativity (Upadhyay, 2024). The students' reliance on external sources, such as online formulas, rather than engaging deeply with the material, further contributes to their cognitive decline.

Behavioral Changes in Learning

Changes in learning behavior, such as lack of motivation, fear of making mistakes, and social withdrawal, were pervasive among the students in this study. These behaviors, often linked to anxiety, can lead to a cycle of disengagement and academic decline. Angelyca noted that such behavior is a response to academic pressure and low self-confidence. The subjects in this study

exhibited nervousness, a reluctance to participate, and mood swings, all of which created barriers to effective learning (Geetha, 2023). These behavioral shifts not only affected their academic performance but also their social interactions, highlighting the broader impact of math learning anxiety.

Neurophysiological Disorders

The study also identified neurophysiological symptoms, such as confusion, dizziness, and forgetfulness, which are linked to the stress induced by math anxiety. Neurophysiological disorders, such as the cognitive slowing and difficulty processing information observed in the students, align with neurological conditions that can impair mental functioning. While the study did not diagnose these students with specific disorders like epilepsy or Parkinson's, the symptoms suggest a level of stress induced cognitive disruption (Kanner et al., 2020). These disruptions further contribute to students' difficulties in learning and performing math.

Factors Contributing to Math Learning Anxiety

Uneasy Studying and Imbalanced Body Ammunition

The findings underscore how students' physical states, such as lack of proper nutrition and poor health habits, contribute to their anxiety and stress. The research suggests that an imbalance in "body ammunition" (energy levels) can have a direct impact on students' mental focus and ability to cope with academic pressure. This was observed in the students' reports of stomachaches, rapid heartbeats, and dizziness when faced with math challenges. Proper nutrition, exercise, and rest are crucial in maintaining students' energy levels and preparing them to engage in the learning process (Tafuri et al., 2024).

Difficulty Concentrating

Several students in the study reported difficulty concentrating, which is directly linked to their anxiety and lack of preparation. When students are anxious about math, their ability to focus deteriorates, leading to problems with memory recall and problem solving. Additionally, poor sleep habits, such as staying up late to study or stressing about upcoming lessons, only exacerbate this issue. Concentration is critical for learning, and any disruption in this ability can significantly affect academic outcomes (Giusti et al., 2021).

Fear of Taking Math Lessons

Fear and anxiety around math were prevalent among all six subjects, with students expressing concerns about making mistakes, forgetting formulas, and receiving low scores. This fear often led to avoidance behaviors, where students would become disengaged from the lesson or refuse to participate. The fear of failure, compounded by a lack of confidence in their math skills, reinforced the anxiety cycle and further diminished students' academic performance.

Thinking Math is a Difficult Lesson

All six subjects agreed that math was a particularly challenging subject. They expressed frustration with the perceived complexity of math, difficulty remembering formulas, and feelings of confusion when unable to solve problems. This perception of math as an inherently difficult subject contributed to their anxiety and lack of motivation to engage with the material. The subjects' difficulty with memory and processing also played a role in reinforcing the idea that math was beyond their ability, creating a negative feedback loop that further decreased their confidence.

Implications for Intervention and Support

Given the comprehensive impact of math learning anxiety on students' academic performance and mental health, this study underscores the need for targeted interventions. Addressing the psychological and physical aspects of anxiety, as well as providing academic support, is crucial for helping students manage their anxiety and improve their learning outcomes. Possible interventions include: (1) Cognitive Behavioral Therapy (CBT) and stress management techniques to help students develop coping mechanisms and reduce the physiological effects of anxiety. (2) Improved study habits that focus on self-regulation, time management, and active learning, rather than relying solely on external resources. (3) Increased teacher and parental support to build students' self-confidence and provide emotional encouragement, especially in high stress subjects like math. (4) Holistic health approaches, including ensuring students have balanced nutrition, adequate sleep, and physical activity, to maintain their mental and physical well-being.

Ultimately, fostering a supportive environment both at home and in school, with an emphasis on emotional well-being and academic guidance, will be essential for helping students navigate math learning anxiety and build resilience in their academic journeys.

Factors that Influence Math Learning Anxiety in Students of SMA Muhammadiyah

The factors influencing math learning anxiety in students at SMA Muhammadiyah are multifaceted and interconnected, involving psychological, environmental, and academic elements that collectively contribute to the anxiety students face. One prominent factor is the lack of calmness and an unbalanced physical condition. Anxiety in math learning often manifests physically, with symptoms such as heart palpitations, sweating, and stomach aches, which are exacerbated when students are unprepared for class or are physically unwell (McNickle & Olympia, 2021). Poor physical condition, such as skipping meals or consuming unhealthy foods before math lessons, can lead to mental unpreparedness, further increasing stress and affecting concentration (Chew & Cerbin, 2021).

Another significant factor is difficulty in concentrating. Students who struggle with concentration often experience mental distractions, such as irrelevant thoughts or worries, that hinder their ability to focus on the lesson. This lack of concentration is further aggravated by late night study habits or anxiety about the material (Yao & Chen, 2023). Additionally, low interest in the subject, coupled with external pressures like parental expectations, can hinder students' ability to retain information, amplifying their anxiety (Iqbal et al., 2024). The fear of making mistakes, especially after prior humiliations, can significantly disrupt students' focus and engagement with math (Merg, 2022).

Fear of taking math lessons is another key factor contributing to math anxiety. Many students have developed negative attitudes towards math due to previous experiences of failure or lack of understanding, which exacerbate their anxiety and fear of the subject (Hussein & Csíkos, 2023). Furthermore, the fear of failing math, whether due to low grades or an inability to solve problems, often leads students to avoid the subject altogether, or to develop heightened anxiety, reducing their motivation and participation (Walden, 2022).

The perception of math as a difficult subject also plays a crucial role in shaping students' anxiety. Many students view math as inherently complex due to the nature of the formulas and the cumulative structure of the subject, which reinforces their reluctance to engage with it (Yermaganbetova et al., 2024). Memory challenges, such as difficulty in memorizing formulas or understanding concepts, further contribute to feelings of inadequacy, leading to frustration and increased stress when students face math problems (Bøe & Viefers, 2023). Additionally, low self-esteem, often resulting from negative comparisons with peers who excel in math, worsens students' anxiety and sense of failure (Adefisayo, 2024).

Despite the comprehensive nature of this research, there were several limitations. One major challenge was the difficulty in recruiting participants. The study coincided with school exams and year end events, which made it difficult to find students who fit the specific criteria for math learning anxiety. Additionally, the busy schedules of the students, compounded by preparations for exams and school activities, limited the time available for conducting in depth interviews with the participants.

CONCLUSION

This study reveals that mathematics anxiety among students at SMA Muhammadiyah emerges from a complex interplay of psychosomatic symptoms, cognitive distortions, behavioral avoidance, and neurophysiological disturbances. These challenges are influenced by poor concentration, negative perceptions of mathematics, low self-efficacy, and a lack of emotional regulation. The findings underscore the need for a comprehensive, psychospiritual approach that incorporates mental health awareness, student resilience, and a supportive academic environment. The novelty of this study lies in its integration of Islamic psychological principles within the discourse of mathematics education, offering a culturally relevant perspective to an often-overlooked issue. Encouraging students' interest in mathematics through meaningful engagement, parental motivation, and teacher empathy can foster a more positive emotional response to learning. Future research should explore innovative, faith-informed strategies to reduce anxiety, particularly among specific learner groups, to deepen our understanding of how spiritual, emotional, and cognitive domains intersect in the learning process.

ACKNOWLEDGMENTS

The authors and team would like to express their gratitude to the Rector of UAD through the Head of the Research and Community Service Institute (LPPM) for supporting the internal UAD research for 2023-2024. The Dean of the Faculty of Psychology and the Head of the Master's Program in Psychology provided recommendations for the research in 2024-2025. We also extend our thanks to the research team members and the participating students for their collaboration.

AUTHOR CONTRIBUTIONS STATEMENT

Yuzarion and Yenti Arsini conceptualized the research, developed the research design and methodology, and supervised the overall project. Yusutria contributed to the development of the conceptual framework, data collection procedures, and qualitative analysis. Masyhuril Fajar supported the data collection, coding, and thematic interpretation processes. Akhmad Fajar Prasetya and Rina Febriana provided important input in data analysis, validation, and manuscript improvement. All authors contributed to the drafting, reviewing, and editing of the manuscript, approved the final version for publication, and are accountable for all aspects of this work.

REFERENCES

- Adefisayo, A. J. (2024). Perceived Influence Of Gender, Increased Responsibility, Fear Of Failure And Social Comparison As Predictor For After-School Achievement Anxiety Among Fuoye Undergraduates. *Increased Responsibility, Fear Of Failure And Social Comparison As Predictor For After-School Achievement Anxiety Among Fuoye Undergraduates (July 20, 2024)*. <https://doi.org/https://dx.doi.org/10.2139/ssrn.5023215>
- Ahmad, M., & Wilkins, S. (2025). Purposive Sampling In Qualitative Research: A Framework For The Entire Journey. *Quality & Quantity*, 59(2), 1461–1479. <https://doi.org/https://doi.org/10.1007/s11135-024-02022-5>
- Aprilianti, E. (2024). Integrating Islamic Psychological Principles In Enhancing Students' Academic Resilience. *Nusantara Journal of Behavioral and Social Science*, 3(2), 63–72.

<https://doi.org/https://doi.org/10.47679/202446>

- Barroso, C., Ganley, C. M., McGraw, A. L., Geer, E. A., Hart, S. A., & Daucourt, M. C. (2021). A Meta-Analysis Of The Relation Between Math Anxiety And Math Achievement. *Psychological Bulletin*, 147(2), 134. <https://doi.org/https://psycnet.apa.org/doi/10.1037/bul0000307>
- Bøe, M. V., & Viefers, S. (2023). Secondary and University Students' Descriptions Of Quantum Uncertainty And The Wave Nature Of Quantum Particles. *Science & Education*, 32(2), 297–326. <https://doi.org/https://doi.org/10.1007/s11191-021-00297-w>
- Cai, S., Jin, Y., Lan, X., & Liu, Y. (2024). The Cognitive Psychology Of Learning Anxiety: Effects On Academic Performance. In *Addressing Global Challenges-Exploring Socio-Cultural Dynamics and Sustainable Solutions in a Changing World* (pp. 929–935). Routledge.
- Campbell, S., Greenwood, M., Prior, S., Shearer, T., Walkem, K., Young, S., Bywaters, D., & Walker, K. (2020). Purposive Sampling: Complex or Simple? Research Case Examples. *Journal of Research in Nursing*, 25(8), 652–661. <https://doi.org/https://doi.org/10.1177/1744987120927206>
- Chand, S. P. (2025). Methods of Data Collection In Qualitative Research: Interviews, Focus Groups, Observations, And Document Analysis. *Advances in Educational Research and Evaluation*, 6(1), 303–317. <https://doi.org/https://doi.org/10.25082/AERE.2025.01.001>
- Chew, S. L., & Cerbin, W. J. (2021). The Cognitive Challenges Of Effective Teaching. *The Journal of Economic Education*, 52(1), 17–40. <https://doi.org/https://doi.org/10.1080/00220485.2020.1845266>
- Chivanga, S. Y., & Monyai, P. B. (2021). Back to Basics: Qualitative Research Methodology for Beginners. *Journal of Critical Reviews*, 8(2), 11–17.
- Cleland, J., MacLeod, A., & Ellaway, R. H. (2021). The Curious Case of Case Study Research. *Medical Education*, 55(10), 1131–1141. <https://doi.org/https://doi.org/10.1111/medu.14544>
- Cruz, C. R. P. (2025). Influence of Students' Self-Perception of Success or Failure on Their Response to Positive and Negative Feedback During Spanish Learning Activities on Kahoot. *Pakistan Journal of Humanities and Social Sciences*, 13(1), 158–169. <https://doi.org/https://doi.org/10.52131/pjhss.2025.v13i1.2672>
- del Carmen Pérez-Fuentes, M., Núñez, A., del Mar Molero, M., Gázquez, J. J., Rosário, P., & Núñez, J. C. (2020). The Role Of Anxiety In The Relationship Between Self-Efficacy And Math Achievement. *Educational Psychology*, 26(2), 137–143. <https://doi.org/https://doi.org/10.5093/psed2020a7>
- Dwyer, K. E. (2022). *Teachers' Perceptions of How Anxiety Influences Students' Academic Performance: A Qualitative Study*. American College of Education. <https://doi.org/https://doi.org/10.4337/jqart.2023.0006>
- Enworo, O. C. (2023). Application of Guba and Lincoln's Parallel Criteria To Assess Trustworthiness Of Qualitative Research On Indigenous Social Protection Systems. *Qualitative Research Journal*, 23(4), 372–384. <https://doi.org/https://doi.org/10.1108/QRJ-08-2022-0116>
- Geetha, K. (2023). *Achievement in Economics of Higher Secondary Students in Relation to Academic stress, Classroom climate and Self-Confidence: Education Psychology*. Shashwat Publication.
- Giusti, L., Mammarella, S., Salza, A., Del Vecchio, S., Ussorio, D., Casacchia, M., & Roncone, R. (2021). Predictors Of Academic Performance During The Covid-19 Outbreak: Impact Of Distance Education On Mental Health, Social Cognition And Memory Abilities In An Italian University Student Sample. *BMC Psychology*, 9(1), 142. <https://doi.org/https://doi.org/10.1186/s40359-021-00649-9>
- Hays, D. G., & McKibben, W. B. (2021). Promoting Rigorous Research: Generalizability and Qualitative Research. *Journal of Counseling & Development*, 99(2), 178–188. <https://doi.org/https://doi.org/10.1002/jcad.12365>
- Hussein, Y., & Csikos, C. (2023). The effect of teaching conceptual knowledge on students'

- achievement, anxiety about, and attitude toward mathematics. *Eurasia Journal of Mathematics Science and Technology Education*, 19(2). <https://doi.org/https://doi.org/10.29333/ejmste/12938>
- Iqbal, S., Hamdani, A. R., Mazhar, S., Munawar, A., Tanvir, M., Dogar, S. F., & Hassan, A. (2024). Exploring The Role Of Parental Expectations And Pressures On Students' Academic Performance And Mental Health. *Migration Letters*, 21(S9), 1232–1242.
- Irpan, I., & Sain, Z. H. (2024). The Crucial Role of Islamic Religious Education in Shaping Children's Character: Psychological and Spiritual Review. *QALAMUNA: Jurnal Pendidikan, Sosial, Dan Agama*, 16(1), 383–392. <https://doi.org/https://doi.org/10.37680/qalamuna.v16i1.4902>
- Kanner, A. M., Helmstaedter, C., Sadat-Hossieny, Z., & Meador, K. (2020). Cognitive Disorders In Epilepsy I: Clinical Experience, Real-World Evidence And Recommendations. *Seizure*, 83, 216–222. <https://doi.org/https://doi.org/10.1016/j.seizure.2020.10.009>
- Kiger, M. E., & Varpio, L. (2020). Thematic Analysis of Qualitative Data: AMEE Guide No. 131. *Medical Teacher*, 42(8), 846–854. <https://doi.org/https://doi.org/10.1080/0142159X.2020.1755030>
- Lim, W. M. (2025). What is Qualitative Research? An Overview and Guidelines. *Australasian Marketing Journal*, 33(2), 199–229. <https://doi.org/https://doi.org/10.1177/14413582241264619>
- Marais, G. A. B., Lantheaume, S., Fiault, R., & Shankland, R. (2020). Mindfulness-Based Programs Improve Psychological Flexibility, Mental Health, Well-Being, And Time Management In Academics. *European Journal of Investigation in Health, Psychology and Education*, 10(4), 1035–1050. <https://doi.org/https://doi.org/10.3390/ejihpe10040073>
- McNickle, L., & Olympia, R. P. (2021). School Nurses on the Front Lines of Healthcare: Serious Infections in Students and Their Common Presenting Complaints. *NASN School Nurse*, 36(1), 39–44. <https://doi.org/https://doi.org/10.1177/1942602X20933680>
- Merg, A. (2022). *Mindset, Stereotype Threat, and the Fear of Failure: Why Female Students Leave a Secondary High Honors Mathematics Pathway*. University of South Carolina. <https://doi.org/https://doi.org/10.26803/ijlter.21.6.15>
- Motulsky, S. L. (2021). Is Member Checking The Gold Standard Of Quality In Qualitative Research? *Qualitative Psychology*, 8(3), 389. <https://doi.org/https://psycnet.apa.org/doi/10.1037/qap0000215>
- Mukherjee, U., Sehar, U., Brownell, M., & Reddy, P. H. (2024). Mechanisms, Consequences And Role Of Interventions For Sleep Deprivation: Focus On Mild Cognitive Impairment And Alzheimer's Disease In Elderly. *Ageing Research Reviews*, 100, 102457. <https://doi.org/https://doi.org/10.1016/j.arr.2024.102457>
- Nelson, J. S., Pender, D. A., Myers, C. E., & Sheperis, D. (2020). The effect of affect: Krathwohl and Bloom's affective domains underutilized in counselor education. *Journal of Counselor Preparation and Supervision*, 13(1), 1. <https://doi.org/http://dx.doi.org/10.7729/131.1279>
- Ozdem-Yilmaz, Y., & Bilican, K. (2025). Discovery Learning Jerome Bruner. In *Science education in theory and practice: An introductory guide to learning theory* (pp. 173–187). Springer.
- Peprah, P., Oduro, M. S., Boakye, P. A., & Morgan, A. K. (2024). Association Between Breakfast Skipping And Psychosomatic Symptoms Among Canadian Adolescents. *European Journal of Pediatrics*, 183(4), 1607–1617. <https://doi.org/https://doi.org/10.1007/s00431-023-05392-4>
- Schoch, K. (2020). Case Study Research. *Research Design and Methods: An Applied Guide for the Scholar-Practitioner*, 31(1), 245–258.
- Singer, T. (2025). A Neuroscience Perspective On The Plasticity Of The Social And Relational Brain. *Annals of the New York Academy of Sciences*, 1547(1), 52–74. <https://doi.org/https://doi.org/10.1111/nyas.15319>
- Tafuri, F., Martinez-Roig, R., Susanto, N., Setyawan, H., & Latino, F. (2024). Physically Active Lifestyles within the School context: Morpho-Physiological and Functional Aspects. *Universitat*

Yuzarion, Y., Arsini, Y., Fajar, M., Yusutria, Y., Prasetya, A. F., & Febriana, R. (2026). Mathematics Learning Anxiety...

d'Alacant / Universidad de Alicante.

<https://doi.org/https://doi.org/10.47197/retos.v58.106154>

Taschereau-Dumouchel, V., Michel, M., Lau, H., Hofmann, S. G., & LeDoux, J. E. (2022). Putting The “Mental” Back In “Mental Disorders”: A Perspective From Research On Fear And Anxiety. *Molecular Psychiatry*, 27(3), 1322–1330. <https://doi.org/https://doi.org/10.1038/s41380-021-01395-5>

Upadhyay, A. S. S. S. (2024). Exploring the Interplay between Mathematical Creativity and Parallel Thinking: Insights from Edward de Bono’s Theories. *Bulletin of Nexus: Journal of Multidisciplinary International Research Studies*, 1(1), 6–10. <https://doi.org/10.5281/zenodo.14538622>

Verma, S. (2024). Role Of Education In Moral Values. *HUMAN DEVELOPMENT & SOCIAL DYNAMICS*, 02(01), 155. <https://doi.org/https://doi.org/10.35896/jjee.v2i1.778>

Walden, P. R. (2022). Student Motivation, Anxiety And Pass/Fail Grading: A SoTL Project. *Teaching and Learning in Communication Sciences & Disorders*, 6(1), 13. <https://doi.org/https://doi.org/10.30707/TLCSD6.1.1649037808.651639>

Yao, H., & Chen, S. (2023). Associations of Time Spent on Study and Sleep with Anxiety and Depressive Symptoms in Junior High School Students: Report from the Large-Scale Monitoring of Basic Education Data in China. *International Journal of Mental Health Promotion*, 25(9). <https://doi.org/http://dx.doi.org/10.32604/ijmh.2023.028844>

Yermaganbetova, S. K., Abylkasymova, A. E., & Baishagirov, K. Z. (2024). The Content And Methodological Features Of Professionally Oriented Training Of Engineering Students In Higher Mathematics. *Higher Education for the Future*, 11(1), 47–59. <https://doi.org/https://doi.org/10.1177/23476311231207681>