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Analysis of Attitudes and Mathematical Abilities Based on Gender in Muhammadiyah Merauke Junior High School Students

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***Abstract*:**
This study evaluates how the attitudes and mathematical abilities of Muhammadiyah Merauke junior high school students are influenced by gender differences. The research uses a descriptive-comparative quantitative approach involving 28 eighth-grade students (15 males, 13 females). Data were collected through a questionnaire on attitudes toward mathematics and a mathematical ability test. The results show that male students tend to have slightly more positive attitudes compared to females. However, the mathematical abilities of both groups are considered very low. No significant effect of gender on mathematical ability results was found. The findings of this study suggest the need for enjoyable and contextual learning to improve students' mathematical abilities and motivation without gender bias.

Keywords: attitude towards mathematics, mathematical ability, gender, junior high school students

Introduction

Mathematics is one of the subjects that plays an important role in the development of students' critical, logical, and analytical thinking skills. Through mathematics learning, students are trained to think systematically and solve problems in various life contexts (Suardana et al., 2020). However, in reality, many students still perceive mathematics as a difficult, stressful, and even frightening subject (Alifatul Aprilia, 2022). This negative perception impacts the low motivation to learn and the poor mathematics learning outcomes across various educational levels. Students' attitudes toward mathematics become one of the affective factors that influence learning outcomes. Meri Andayani (2019) suggests that a positive attitude toward mathematics can foster interest and self-confidence, while a negative attitude can lower motivation and perseverance in learning. Several studies have also shown a positive relationship between learning attitudes and mathematics achievement (Charli et al., 2019). Therefore, understanding how students perceive mathematics is an important step in improving the quality of teaching. Recent findings by Palobo, Sulaiman, and Rahaju (2025) emphasize that many students face difficulties in

constructing area concepts due to cognitive gaps, especially among aural learners, highlighting the importance of adapting teaching styles to students' cognitive profiles.

In addition to attitudes, mathematical ability is also a crucial indicator for measuring the success of learning. This ability includes concept understanding, logical thinking skills, and the ability to solve mathematical problems (Masitoh & Prabawanto, 2015). However, the results of the Programme for International Student Assessment (PISA) survey show that Indonesian students' mathematical abilities are still relatively low compared to other OECD countries (2022). The low level of this ability can be caused by various factors, such as teaching methods that lack contextual relevance, low student confidence, and limited learning motivation (Utami, 2025). One interesting factor to examine is the gender difference in mathematics learning. According to Athifah & Khusna (2022), male students tend to have higher self-confidence and are more competitive in facing mathematics problems compared to female students. On the other hand, female students often show anxiety and lack confidence in their own abilities (Sembiring & Warnadi, 2021). However, research by Juaini et al. (2024) found that this difference is not always significant, depending on the learning environment and the teaching style of the teacher.

In addition to internal factors, external factors such as parental support and social environment also play an important role in shaping students' attitudes and abilities (Rosyadi, 2024). Parental encouragement can serve as an external motivation that strengthens students' interest in learning mathematics, while a competitive environment can foster a spirit of achievement. However, motivation driven purely by external factors often lacks sustainability compared to intrinsic motivation (Basalamah & Risman, 2025). On the other hand, teachers also have a central role in building positive attitudes toward mathematics. A fun and contextual learning approach can help students understand abstract concepts more easily (Yolanda et al., 2024). For example, the use of interactive learning media or problem-based learning approaches can increase active participation and build confidence in solving problems (Rohman et al., 2024).

Based on the preliminary study at SMP Muhammadiyah Merauke, it was found that most students still show hesitation toward mathematics learning. Some students perceive mathematics as abstract and difficult, while others feel motivated only when they achieve good grades. Additionally, there is a difference in tendencies between male and female students in terms of self-confidence and perseverance in learning. This situation highlights the challenges in building positive attitudes and improving students' mathematical abilities evenly.

Gender is an important variable to study because the biological and social differences between males and females can affect their thinking styles, learning strategies, and emotional responses to mathematics lessons. Some studies indicate that male students tend to excel in spatial abilities and risk-taking, while female students are stronger in accuracy and perseverance (Athifah & Khusna, 2022; Sembiring &

Warnadi, 2021). Understanding these differences is important so that teachers can develop non-gender-biased teaching strategies, promote self-confidence, and provide equal opportunities for all students to achieve optimal performance.

Therefore, this research is crucial to analyze the attitudes and mathematical abilities of students at SMP Muhammadiyah Merauke from a gender perspective. The results of this study are expected to provide an empirical overview of students' affective and cognitive conditions in mathematics learning, as well as serve as a foundation for teachers to develop adaptive, inclusive, and responsive teaching strategies based on gender differences in learning needs.

Research Methods

This approach was chosen because it aligns with the research objective, which is to describe and compare students' attitudes and mathematical abilities based on gender. The research subjects consist of eighth-grade students from SMP Muhammadiyah Merauke, totaling 28 students, with 15 male students and 13 female students. The research instruments include two types: a questionnaire on attitudes toward mathematics, consisting of 9 Likert scale statements, and a mathematical ability test in the form of short-answer questions. The data obtained were analyzed using descriptive statistics to describe general trends, and a difference test (t-test or non-parametric alternatives) was used to analyze differences between groups based on gender. All analysis processes were conducted with the help of statistical software to ensure the accuracy and objectivity of the results.

This study involves 28 eighth-grade students from SMP Muhammadiyah Merauke as subjects, consisting of 15 male students and 13 female students, aged 13 to 15 years. The sample selection was purposively conducted, considering the homogeneity of age and academic levels, to ensure that the research results represent the general condition of junior high school students. SMP Muhammadiyah Merauke was chosen because of its diversity of student characteristics and its active application of competency-based learning.

The instruments used in this study consist of two main types: a questionnaire on attitudes toward mathematics and a test of students' mathematical abilities.

1. Attitude Questionnaire Toward Mathematics

The questionnaire was designed to measure students' attitudes toward mathematics learning from an affective perspective. The questionnaire consists of 9 statements with a 5-point Likert scale: Strongly Agree (5), Agree (4), Neutral (3), Disagree (2), and Strongly Disagree (1). The statements cover the following dimensions:

a) Interest and engagement in mathematics
b) Anxiety and self-confidence
c) Intrinsic and extrinsic motivation
d) Perception of difficulty and success in learning mathematics

The content validity of the questionnaire was tested through expert judgment by two lecturers specializing in mathematics education and was deemed valid in terms of substance.

2. *Mathematical Ability Test*

This test aims to measure students' cognitive abilities in solving mathematics problems, covering three indicators:

a) Concept understanding
b) Use of mathematical procedures
c) Solving contextual problems

The test consists of short-answer questions tailored to the eighth-grade curriculum and has been reviewed by subject teachers and field lecturers to ensure alignment with the curriculum and appropriate difficulty level.

Scoring and Category Assessment:

Tabel 1. Scoring and Category Assessment

90–100	Very High
80–89	High
70–79	Enough
60–69	Low
< 60	Very low

The content validity of the test items was assessed through a review by two subject matter experts and mathematics teaching practitioners, and the results were deemed valid.

Results and Discussions

This study was conducted at a junior high school (SMP) in Merauke Regency, specifically SMP Muhammadiyah Merauke, focusing on eighth-grade students (ages 13 to 15). The ratings ranged from 1 - excellent to 5 - unsatisfactory.

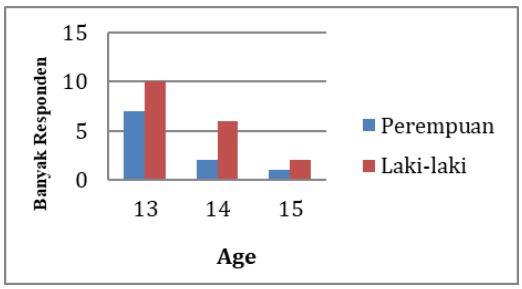

Figure 1. Age Description by Gender

Based on the bar chart of the Respondent Age Distribution by Gender, it is evident that the majority of respondents were 13 years old, consisting of 7 female students and 10 male students. At the age of 14, the number of respondents decreased to 2 female students and 6 male students. Meanwhile, at the age of 15, there were 1 female student and 2 male students. Overall, the data indicates that the majority of

respondents were 13 years old, with a higher number of male students compared to female students in each age group.

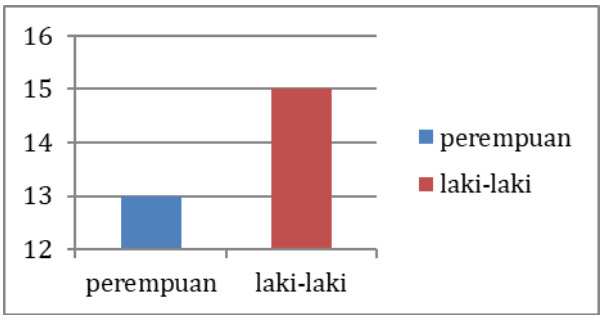

Figure 2. Description of Student Gender

Based on the bar chart above, it can be seen that the number of male respondents exceeds that of female respondents. A total of 15 male students and 13 female students participated in this study. This difference in numbers indicates that the proportion of male students is slightly higher than female students, but overall, both genders are represented in relatively balanced numbers. This condition provides an indication that the data obtained encompasses a proportional representation of both genders, which supports the analysis of mathematical attitudes and abilities between male and female students.

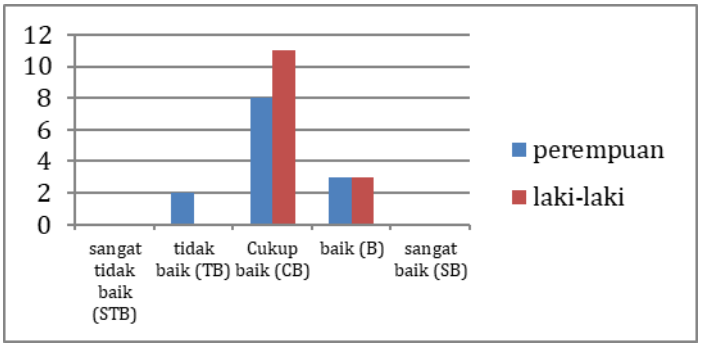

Figure 3. Description of Student Attitudes Towards Mathematics

Based on the diagram above, it can be observed that most students, both male and female, have an attitude towards mathematics in the "fairly good" (CB) category, with 11 male students and 8 female students. In the "good" (B) category, there are 3 students from both groups, while the "poor" (TB) category is filled by 2 female students, and no students fall into the "very good" (SB) or "very poor" (STB) categories. These results suggest that, in general, students have a positive attitude towards mathematics, although not yet optimal. Male students tend to show a slightly more positive attitude compared to female students, which may be related to higher self-confidence and competitiveness. This finding is consistent with the research by Athifah & Khusna (2022), which states that male students have higher self-confidence and are more daring to face mathematical challenges, compared to female students, who tend to be more cautious and experience learning anxiety. This condition

indicates the need for a learning strategy that can foster self-confidence and interest in learning evenly among both gender groups to create a more equitable and inclusive learning environment.

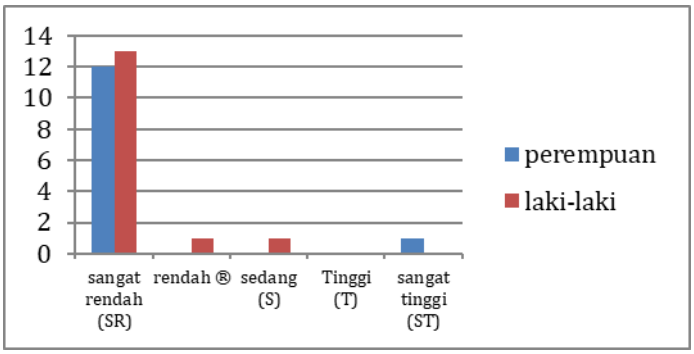

Figure 4. Description of Students' Mathematical Knowledge and Abilities

Based on the diagram above, it can be seen that the majority of students, both male and female, have mathematical abilities in the "very low" (SR) category, with 13 male students and 12 female students. Only a few students reached the "low" (R) and "medium" (S) categories, with one male student each, while the "high" (T) category has no respondents. Interestingly, only one female student reached the "very high" (ST) category. These results indicate that, overall, students' mathematical abilities are still considered low in both gender groups. Although there are slightly more male students in the "very low" category, the difference is not significant. This condition aligns with the research by Juaini et al. (2024), which states that gender differences do not always significantly affect academic abilities, including mathematics, as learning outcomes are more influenced by learning environment factors, teaching strategies, and student motivation. Therefore, a more contextual and participatory learning approach is needed to improve students' mathematical abilities evenly, without gender differentiation.

The following outlines the results for each statement item on the attitude questionnaire.

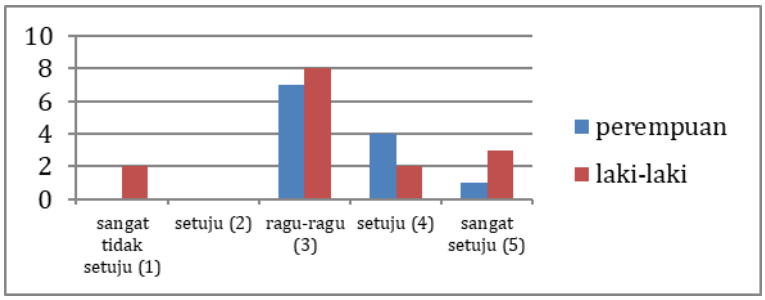

Figure 5. Results for Statement 1: "I often feel successful in learning mathematics"

Based on the diagram above, it is seen that most students, both male and female, responded neutrally (3) to the statement "I often feel successful in learning mathematics," with 7 female students and 8 male students. A small number of students chose "agree" (4), with 4 female students and 2 male students, while only 1 female student and 3 male students strongly agreed (5). There were 2 male students who strongly disagreed (1), and no one selected "disagree" (2). These results suggest that most students are not fully confident about their success in learning mathematics and tend to remain neutral. This indicates a lack of self-confidence in evaluating their abilities, especially among female students who show a higher level of doubt. This is consistent with the findings of Sembiring & Warnadi (2021), who state that female students tend to have higher levels of learning anxiety compared to male students, making them less confident about their ability to solve mathematical problems.

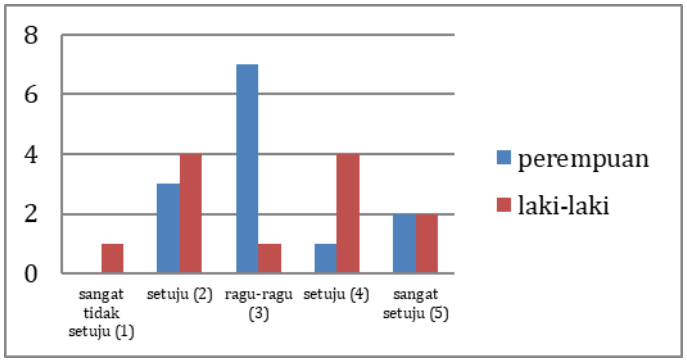

Figure 6. Results for Statement 2: "Mathematics is too abstract for me"

Based on the diagram above, it can be seen that most students, especially females, responded neutrally (3) to the statement "Mathematics is too abstract for me," with 7 female students and only 1 male student. Meanwhile, a number of male students tended to agree (4) with the statement, totaling 4 students, indicating that they find mathematics quite abstract. Additionally, 3 female students and 4 male students selected "disagree" (2), and 2 female students and 2 male students strongly agreed (5). Only 1 male student strongly disagreed (1). These results suggest that the majority of students still perceive mathematics as an abstract and difficult subject, especially female students who show higher doubts about the abstractness of mathematical concepts. This finding is consistent with the research by Yolanda et al. (2024), which states that students' difficulty in understanding mathematical concepts is caused by their abstract nature, so a contextual learning approach is needed to help students relate mathematical concepts to real-life situations. Similar patterns were observed in a case study by Palobo et al. (2025), where even students with strong verbal reasoning struggled to internalize geometric formulas due to lack of representational understanding, reinforcing that gender is not the main factor—conceptual clarity is.

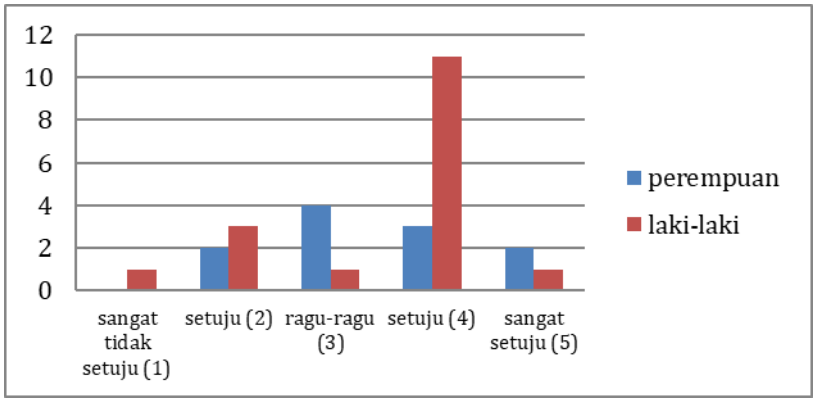

Figure 7. Results for Statement 3: "I find mathematics interesting"

Based on the diagram above, it can be seen that male and female respondents have different tendencies in providing responses. The majority of male respondents selected "agree" (4), with a total of 11 students, showing a high level of agreement with the statement. Meanwhile, female respondents were more varied, with the highest number falling under the "neutral" (3) category, with 4 students. This indicates that females tend to be more cautious or not entirely convinced by the statement, while males show stronger confidence. This result aligns with the findings of Yu & Deng (2022) in their article *A Meta-Analysis of Gender Differences in e-Learners' Self-Efficacy, Satisfaction, Motivation, Attitude, and Performance Across the World*, which explains that males tend to show higher levels of agreement with certain statements compared to females. Thus, this diagram reinforces the view that there are differences in attitude and confidence levels between males and females in responding to statements.

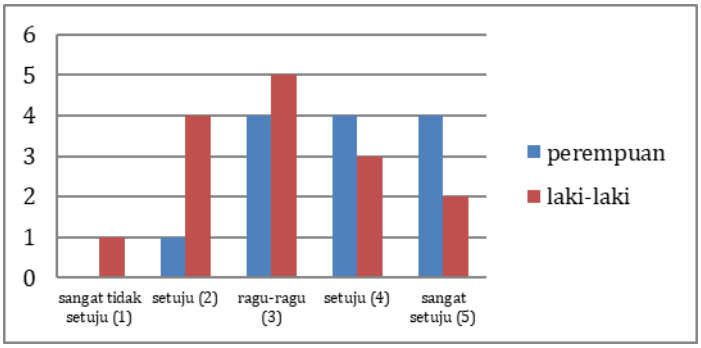

Figure 8. Results for Statement 4: "Only good grades make learning mathematics enjoyable for me"

Based on the diagram above, it can be seen that both male and female respondents had almost balanced responses, but with differences in their level of confidence. Male respondents tended to select "neutral" (3) more often, with 5 students, while female respondents were evenly distributed across the "neutral" (3),

"agree" (4), and "strongly agree" (5) categories, with 4 students each. This suggests that females are more consistent and positive in agreeing with the statement, while males tend to be more cautious and exhibit a higher level of doubt. This finding aligns with the research by Rizqiana Harsyah & Ediati (2015), which concludes that there are differences in attitude and confidence levels between males and females, where females often show a more positive attitude in learning and self-evaluation contexts.

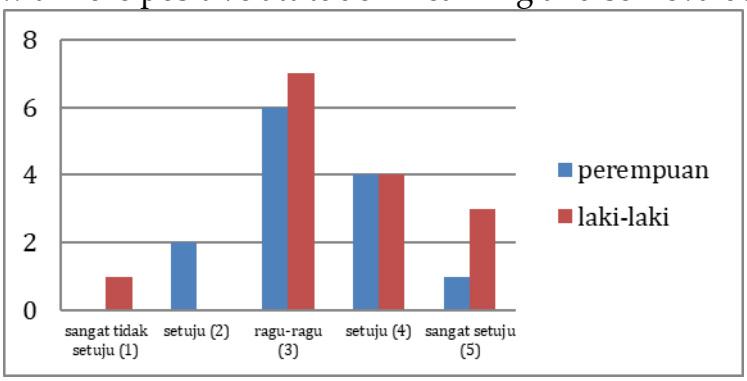

Figure 9. Results for Statement 5: "I enjoy learning mathematics"

Based on the diagram above, it can be seen that male and female respondents show a similar tendency in their responses, but with a slight difference in their level of doubt and agreement. The "neutral" (3) category was the most selected, with 6 female respondents and 7 male respondents. This suggests that most respondents, both male and female, are not entirely confident in the statement given. Furthermore, the number of respondents in the "agree" (4) category was balanced between males and females, with 4 students each, while the number of male respondents in the "strongly agree" (5) category was slightly higher than females. These findings indicate that, despite similar response patterns, females tend to be more cautious in expressing agreement. This finding is consistent with the research by Rizqiana Harsyah & Ediati (2015) in their article *Perbedaan Sikap Laki-Laki dan Perempuan terhadap Infertilitas*, published in *Jurnal Empati*, which shows that males tend to be more expressive in stating their attitudes, compared to females who are more cautious and consider many factors before agreeing with a statement.

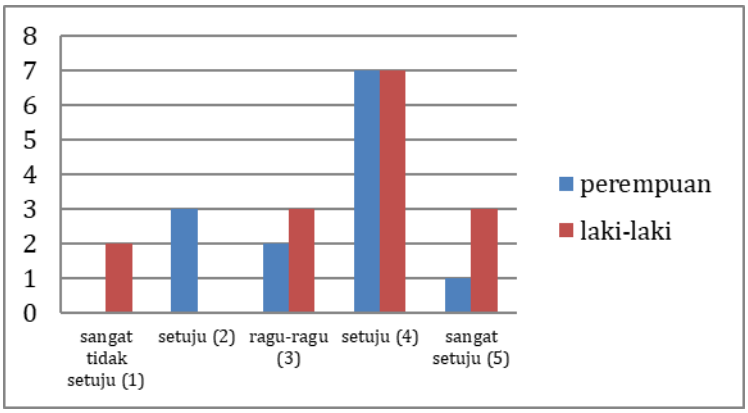

Figure 10. Results for Statement 6: "I give up if I cannot solve a math problem on the first attempt"

Based on the diagram above, it can be seen that both male and female respondents have relatively high levels of agreement with the given statement. Both male and female respondents showed the highest number in the "agree" (4) category, with 7 students each, indicating a shared positive view between both groups. However, there was a slight difference in the "strongly agree" (5) category, with more males (3 students) than females (1 student), while the "strongly disagree" (1) category was filled only by male respondents. This suggests that males tend to have a more extreme range of attitudes, both in agreement and disagreement, while females are more consistent in their level of agreement. This finding aligns with the research by Herlinda (2022), which explains that males tend to be more assertive in expressing attitudes, while females are more stable and cautious in providing judgments.

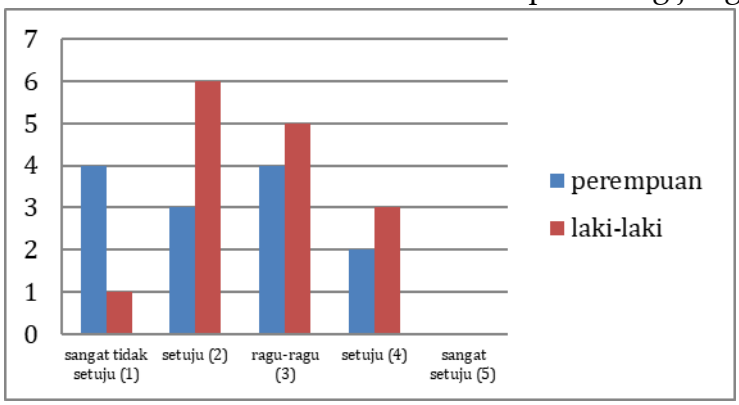

Figure 11. Results for Statement 7: "I study mathematics because my parents tell (encourage or remind) me to"

Based on the diagram above, it can be seen that most male students selected "agree" (2) with the statement "I find mathematics interesting," with 6 students, while female students were more concentrated in the "neutral" (3) category, with 4 students. Furthermore, there were 3 female students and 5 male students who also selected "agree" (3), and 2 female students and 3 male students who selected "agree" (4). Four female students and 1 male student strongly disagreed (1), and no respondents selected "strongly agree" (5). These results suggest that most students, particularly males, have a higher interest in mathematics compared to female students, who tend to be more doubtful. This difference could be due to varying levels of self-confidence and perceptions of learning challenges between the genders. This finding is supported by the research by Athifah & Khusna (2022), which states that male students are more

confident and show a more open attitude towards mathematics compared to female students who often feel anxious or doubtful about their abilities.

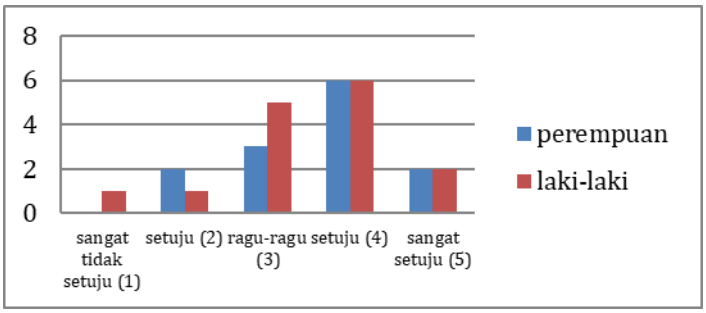

Figure 12. Results for Statement 8: "I do not feel anxious when learning mathematics"

Based on the diagram above, it can be seen that most students, both male and female, selected "agree" (4) with the statement "Only good grades make learning mathematics enjoyable for me," with 6 students each. Additionally, there were 5 male students and 3 female students who selected "neutral" (3), suggesting that some students are not entirely sure whether their enjoyment of mathematics is solely influenced by good grades. A small number of students selected "strongly agree" (5), with 2 students in each group, and several female students selected "agree" (2), while 1 male student strongly disagreed (1). These results indicate that the majority of students still see grades as an important factor in enjoying mathematics, which means their motivation for learning tends to be extrinsic. This finding aligns with the research by Basalamah & Risman (2025), which explains that extrinsic motivation—such as rewards in the form of grades or praise—can enhance learning motivation, but is often less enduring compared to intrinsic motivation that arises from students' interest and curiosity about the subject matter itself.

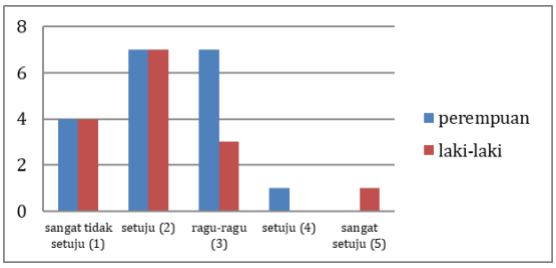

Figure 13. Results for Statement 9: "I cannot improve my mathematical abilities, no matter how hard I study"

Based on the diagram above, it can be seen that most students, both male and female, responded "agree" (2) and "neutral" (3) to the statement "I enjoy learning mathematics." Seven male students and 7 female students selected "agree" (2), while 7 female students and 3 male students selected "neutral" (3). Additionally, only 1 female student selected "agree" (4) and 1 male student selected "strongly agree" (5), while 4

students from each group selected "strongly disagree" (1). These results suggest that most students do not have a strong sense of enjoyment in learning mathematics and remain in a neutral position. This reflects a lack of intrinsic motivation in learning mathematics, where students study not out of interest in the material, but due to external factors such as the demand for grades or tasks. This finding is consistent with the research by Nurhayati et al. (2021), which states that low interest in learning and a positive attitude towards mathematics can lower academic performance, thus requiring creative and meaningful teaching strategies to foster enjoyment and engagement in the learning process. Furthermore, ICT-integrated learning environments, as explored by Miftachurohmah, Nasruddin, and Palobo (2026), have been shown to significantly improve students' achievement across different demographic groups, providing equitable access to quality mathematics learning.

Conclusions and Suggestions

This study indicates that, in general, students' attitudes towards mathematics are fairly positive, with a higher tendency observed among male students compared to female students. However, students' mathematical abilities overall remain in the very low category, with no significant differences based on gender. These findings suggest that gender differences are not the primary factor influencing mathematical achievement. Therefore, a contextual and student-centered learning approach should be implemented to enhance students' motivation and competence, without reinforcing gender stereotypes in the classroom. Future research is recommended to involve a larger sample and consider other factors such as learning styles, family environment, and perceptions of teachers.

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