

Mathematical Self-Efficacy Among Senior High School Students At Man 1 Aceh Utara

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Abstract. *Students with strong mathematical self-efficacy are better equipped to handle challenges in various aspects of life. This study was aimed to assess the self-efficacy of students in mathematics at MAN 1 Aceh Utara, Aceh Utara, during the 2023/2024 academic year. A qualitative research method was employed, with data collected through a questionnaire. The participants were 60 grade XI students. The results revealed that 12 students (20%) demonstrated high self-efficacy, 34 students (56.67%) exhibited moderate self-efficacy, and 14 students (23.33%) had low self-efficacy. The overall average self-efficacy score was 68.38%, placing grade XI students of MAN 1 Aceh Utara in the moderate self-efficacy category.*

Keywords: *Self Efficacy, Learn Math, MAN 1 Aceh Utara*

1. INTRODUCTION

The learning process is a form of communication between educators and students, or among students themselves (Rabiati & Mardika, 2020). Education is understood as a process where knowledge, skills, and attitudes are transmitted to members of society through experience (Nithyanantham, 2021). One of the most important subjects in education is mathematics. Mathematics is often referred to as both the "queen" and the "servant" of the sciences, meaning it serves as the foundation for many other fields of knowledge (Ernawati, et al 2021). Coockrofit (in (Fardani & Surya, 2021)) provides several reasons why mathematics should be taught to students, including: (1) it is used in all aspects of life; (2) all fields of study require appropriate mathematical skills; (3) it is a powerful, clear, and concise means of communication; (4) it can be used to present information in various ways; (5) it enhances logical thinking, accuracy, and spatial awareness; and (6) it offers satisfaction in solving problems and challenges. According to (Darma, et al 2020), mathematics is a universal science that underpins the development of modern technology, plays a critical role across various disciplines, and develops human reasoning abilities. Mathematics, with its diverse roles, is considered essential, and one of its key roles is as a tool for helping students grasp mathematical concepts (Hazrati, et al 2020).

In the process of learning mathematics, in addition to enhancing students' logical-mathematical intelligence, psychological aspects must also be carefully considered. Addressing the psychological dimension is crucial, as it significantly influences students' ability to solve mathematical problems. An effective mathematical learning process must take into account psychological factors such as students' responses, emotions, and feelings. One of

the key psychological factors impacting mathematics learning is students' self-efficacy (Rajagukguk & Hazrati, 2021). Self-efficacy plays a critical role in students' mathematical learning processes (Pajares & Miller, 1994). According to (Oktariani, 2018), self-efficacy is an individual's capacity to assess their own strengths, including self-confidence, adaptability, cognitive abilities, intelligence, and resilience in challenging or pressured situations. Self-efficacy reflects the degree of confidence in one's ability to accomplish tasks (Fonna, 2024). As (Sudwiarrum, et al 2021) notes, self-efficacy is a mental construct that influences students' academic achievement. Developing strong self-efficacy is essential for overcoming mathematical challenges.

Self-efficacy refers to an individual's belief in their ability to face and overcome various challenges, including determining the appropriate actions to successfully complete tasks or solve specific problems (Pajares, 2005). Self-efficacy refers to an individual's confidence in their ability to confront and solve various challenges they encounter, as well as their capacity to determine the appropriate actions for resolving a specific task or problem. Adolescents with high self-efficacy demonstrate resilience (Elisabetta, et al 2020). This psychological trait is crucial, as individuals who possess it are not only more likely to seek out additional knowledge that aids in task completion but are also highly motivated to achieve better and more refined results (Janet, et al 2024). When self-efficacy is developed alongside clear goals and a deeper understanding of academic achievement, it becomes a key determinant of future academic behaviour. In line with (Ali, et al 2022), self-efficacy plays a pivotal role in the process of learning mathematics, serving as a critical factor in achieving success in the subject.

Self-efficacy and motivation in learning mathematics have a significant impact on students' mathematical abilities (Akhsanul and Sutrisno, 2021). Students with low self-efficacy often display heightened sensitivity to failure and a tendency to lose confidence (Bandura, 1993). Meanwhile, (Yuen & Datu, 2021) reveals that an individual's self-efficacy depends on their personal strength, ability to self-regulate, resilience, and capacity to reflect on their goals and actions. However, field observations show that students' self-efficacy remains relatively low. Many students demonstrate a lack of confidence when solving mathematical problems. Furthermore, students often hesitate to ask or answer questions unless directly called upon by the educator. According to (Ferdiansyah, et al 2020), students' inability or reluctance to ask questions and provide answers is one indication of low self-efficacy.

Based on the previous discussion, this study was aimed to explore the mathematical self-efficacy of Senior High School students in mathematics lessons at MAN 1 Aceh Utara.

2. LITERATURE REVIEW

Self-efficacy is the ability to produce a level of performance and situation that can convince a person of their success in performing an activity. According to Fauziana (2022); Hussain, et al (2022), self-efficacy is a person's confidence in their ability to perform a task. Self-efficacy is related to an individual's belief in using personal control over motivation, cognition, and affect within their social environment. Theory and research by Schunk & DiBenedetto, (2021) support the idea that self-efficacy is a personal construct that influences and is influenced by behavior and social/environmental variables.

According to Mahsunah, et al (2023), the dimensions that shape self-efficacy are level, strength, and generality. Bandura (1993) explains that self-efficacy in an individual can be influenced by four factors: successful experiences, experiences of others, verbal persuasion, and physical conditions. An individual's view of self-efficacy indicates the extent of their effort and how long they will persist when facing obstacles (Oktariani, 2018). Self-efficacy reflects self-confidence that one can continuously perform challenging and new tasks while overcoming difficulties (Caliendo, et al 2023).

Based on the above views, mathematical self-efficacy can be defined as the ability to learn mathematics, including time management, critical thinking, creative thinking, and confidently solving mathematical problems.

3. METHODS

This study employed a qualitative descriptive research approach, characterized by methods that analyze written or oral information from people that can be observed. This approach was used to describe and analyze individual or group phenomena, including events, social dynamics, attitudes, beliefs, and perceptions (Moleong, 2005). The purpose of this study was to investigate students' self-efficacy in learning mathematics.

The method utilized was a survey conducted with a number of 60 students from Class XI of MAN 1 Aceh Utara. The research instrument used was a self-efficacy questionnaire designed to assess students' mathematical self-efficacy. The data analysis technique in this study was carried out in three phases: data reduction, data presentation, and drawing conclusions. Data reduction involved selecting key data, focusing on relevant information, coding the data, and categorizing it (Andini et al., 2018). The questionnaire was structured using a Likert scale format, with items based on the indicators discussed in the previous chapter. The Likert scale is commonly used to measure attitudes and opinions. Responses to

each item reflect different levels of agreement or disagreement, ranging from positive to negative. The rating scale used for these responses is shown in the following table.

Tabel 1. Scoring of Questionnaire Responses

Student Response Category	Positive Score	Negative Score
Strongly Agree (SA)	4	1
Setuju (S)	3	2
Disagree (D)	2	3
Strongly Disagree (SD)	1	4

(Source: Sugiyono, 2019)

Once the self-efficacy scores were calculated, the categorization of self-efficacy levels was performed using Microsoft Excel, based on the intervals presented in Table 2.

Tabel 2. Self-Efficacy Categorization

No	Interval	Category
1	$x \geq x + SD$	High
2	$x - SD \leq x < x + SD$	Medium
3	$x < x - SD$	Low

4. RESULTS AND DISCUSSION

The main objective of this qualitative research was to measure students' self-efficacy in learning mathematics. The study was conducted at MAN 1 Aceh Utara, Aceh Utara, with Class XI students. Data collection was carried out by distributing questionnaires directly to 60 students.

Tabel 3. Students' Self-Efficacy

Interval Value	Score Range	Number of Students	Percentage	Category
$x \geq x + SD$	$x \geq 74,15$	12	20%	High
$x - SD \leq x < x + SD$	$60.57 \leq x < 74.15$	34	56.67%	Medium
$x < x - SD$	$x < 60.57$	14	23.33%	Low

Based on Table 3, it can be seen that 12 students (20%) have a high level of self-efficacy in learning mathematics, 34 students (56.67%) have a medium level of self-efficacy, and 14 students (23.33%) have a low level of self-efficacy in mathematics learning.

The conclusion drawn from this data is that the overall self-efficacy of Class XI students at MAN 1 Aceh Utara, North Aceh, for the 2023/2024 academic year, falls into the medium category. This was evident from the fact that 56.67% of the students, or 34 students, exhibited a medium level of self-efficacy in learning mathematics.

Tabel 4. Percentage and Categorization of Students' Self-Efficacy by Indicator

No	Indicator	Score Obtained	Total Score Expected	Percentage (%)	Category
1	Confidence in solving problems with various difficulty levels, and belief in understanding and determining solutions	365	576	63.37	Medium
2	Confidence in the effort put forth when facing problems and challenges	426	576	73.96	Medium
3	Confidence in achieving learning goals in mathematics, and belief in solving unfamiliar problems	398	576	69.10	Medium
	Total Score	1189	1728	206.43	Medium
	Average	396.3	576	68.81	Medium

The following presented the research findings on student self-efficacy across various indicators. The first indicator of self-efficacy was confidence in the ability to solve problems of varying levels of difficulty. The confidence in understanding and determining how to solve problems, based on the questionnaire results, stood at 63.37%, placing it in the medium category. The analysis of the questionnaire data indicated that the majority of students were confident in their ability to face and complete mathematics assignments. Most students felt challenged by difficult mathematical problems, yet there were some who hesitated or felt

uncertain when given a challenging task due to a lack of understanding and proficiency in learning mathematics. Occasionally, students also exhibited reluctance to complete difficult assignments. However, they still made an effort to attempt these tasks. This demonstrated that students took their mathematics assignments seriously, guided by their individual confidence levels. This aligned with research by (Tamba & Santi, 2021), which asserted the importance of self-confidence when faced with demanding tasks to succeed in achieving desired outcomes.

The second indicator of self-efficacy was the confidence to persist in facing problems and challenges, with a questionnaire result of 73.96%, also in the medium category. The analysis showed that most students sought help from peers or teachers when they encountered material they did not understand. The majority of students did not easily give up before attempting to solve problems and find answers, although there were still some who were hesitant to ask questions about material they struggled with. Additionally, there were a few students who gave up before making an attempt to solve the problems or find answers.

The third indicator of students' self-efficacy was the confidence in achieving success in mathematics learning and the ability to solve unfamiliar problems, with a percentage of 69.10%, which fell into the medium category. The analysis of questionnaire data revealed that most students put in considerable effort to solve the problems given by their teacher, while some students did not procrastinate in completing the assigned tasks. There was a divided opinion regarding whether tasks should be completed only close to the deadline. Some students disagreed with procrastinating, while others believed that completing tasks at the deadline was acceptable. This finding aligned with the view of (Oktariani, 2018), which stated that self-efficacy emphasizes an individual's belief in their own abilities.

5. CONCLUSION

Based on the findings and analysis, 20% of students (12 students) had a high level of self-efficacy, while 56.67% (34 students) demonstrated a moderate level, and 23.33% (14 students) showed a low level of self-efficacy. The overall average self-efficacy score for the students was 68.381%, positioning the Grade XI students of MAN 1 Aceh Utara in the medium self-efficacy category. It was evident that the self-efficacy levels of the students needed to be enhanced to improve their comprehension and performance in mathematics.

REFERENCES

- Ali, M., Assagaf, G., and Hukom, J. (2022). self-efficacy and Students Mathematics Learnig Ability in Indonesia: A Meta Analysis Atudy. *International Journal of Instruction*, 15(3), 1131–1146. <https://doi.org/https://doi.org/10.29333/iji.2022.15360a>
- Andini, S., Fitriana, L., & Budiyo, B. (2018). Geometry in flipbook multimedia, a role of technology to improve mathematics learning quality: the case in madiun, east java. *Journal of Physics: Conference Series*, 1008(1). <https://doi.org/10.1088/1742-6596/1008/1/012077>
- Bandura, A. (1993). Perceived self-efficacy in Cognitif Development and Functioning. *Educational Psychologist*, 28(2), 117–148. https://doi.org/https://doi.org/10.1207/s15326985ep2802_3
- Caliendo, M., Kritikos, A. S., Rodriguez, D., & Stier, C. (2023). Self-Efficacy and Entrepreneurial Performance of Start-Ups. *Small Business Economics*, 61(3), 1027–1051.
- Darma, I. K., Karma, I. G. M., & Santiana, I. m. A. (2020). Blended Learning, Inovasi Strategi Pembelajaran Matematika di Era Revolusi Industri 4.0 Bagi Pendidikan Tinggi. In *PRISMA, Prosiding Seminar Nasional Matematika*, 3, 527–539.
- Elisabetta Sagone, Maria Elvira De Caroli, Rossella Falanga, & M. L. I. (2020). Resilience and Perceived Self-Efficacy in Life Skill from Early to Late Adolescence. *International Journal of Adolescence and Youth*, 25(1), 882–890. <https://doi.org/https://doi.org/10.1080/02673843.2020.1771599>
- Ernawati, Zulmaulida, R., Saputra, E., Munir, M., Zanthi, L. S., Rusdin, Wahyuni, M., I., & M., Akmal, N., & N. (2021). Problematika Pembelajaran Matematika (M. Supratman (Ed.)). *Yayasan Penerbit Muhammad Zaini*.
- Fardani, Z., Surya, E., & M. (2021). Analisis Kepercayaan Diri (Self-Confidence) Siswa Dalam Pembelajaran Matematika Melalui Model Problem Based Learning. *Paradikma Pendidikan Matematika*, 14(1).
- Fauziana. (2022). Pengaruh Self Efficacy terhadap Kemampuan Memecahkan Masalah IPA. *Jurnal Pendidikan*, 11(2), 154.
- Ferdiansyah, A., Rohaeti, E. E., & Suherman, M., & M. (2020). GAMBARAN SELF EFFICACY SISWA TERHADAP PEMBELAJARAN. *Fokus*, 3(1).
- Fonna, M. (2024). Self-Efficacy of Pre-Service Mathematics Teachers in Online Learning Based on Video Conference. In *Proceedings of Malikussaleh International Conference on Education Social Humanities and Innovation (Miceshi)*, 1. <https://doi.org/https://ojs.unimal.ac.id/mijeshi/MICHESI>
- Hazrati, K., Minarni, A., & Rajagukguk, W. (2020). Differences in Mathematics Connection Abilities and Self-Efficacy Between Students Given Approach Inquiry at Senior High School 2 Tanjung Morawa. *Budapest International Research and Critics in Linguistics and Education (BirLE)*, 3(3), 1489–1500. <https://doi.org/https://doi.org/10.33258/birle.v3i3.1222>

- Hussain, M., S., Khan, S. A., & Bidar, M. C. (2022). Self-Efficacy of Teachers: A Review of the Literature. *Multi-Disciplinary Research Journal*, *10(1)*, 110–116.
- In'am Akhsanul and Eko Sabdo Sutrisno. (2021). Strengthening Students Self-Efficacy and Motivation in Learning Mathematics Through the Cooperative Learning Model. *International Journal of Instruction*, *14(1)*, 395–410. <https://doi.org/https://doi.org/10.29333/iji.2021.14123a>
- Janet M. clemente., osias Kit T. Kilag., Annabel Q. Ypon., Elma S. Groenewald., Coenrad Adolph Groenewald., R. G. U. (2024). Enhancing Mathematics Self-Efficacy : Intervention Strategies and effectiveness-A Systematic Review. *International Multidisciplinary Journal of Research for Innovation, Sustainability, and Excellence (IMJRISE)*, *1(2)*, 274–280.
- Mahsunah, A., Musbikhin., Muhimmatul, H. (2023). Pengaruh Self Efficacy terhadap Kepercayaan Diri pada Siswa. *Jurnal Bimbingan Dan Konseling Islam*, *2(2)*, 39.
- Moleong, L. J. (2005). *metodologi penelitian kualitatif*. Bandung: Remaja Rosdakarya.
- Nithyanantham, V. (2021). Self-Efficacy for Professional Development-A Need of Present Educational Scenario. *International Journal of Social Sciences & Educational Studies*, *8(3)*, 149.
- Oktariani. (2018). Peranan Self Efficacy dalam Meningkatkan Prestasi Belajar Siswa. *Jurnal Kognisi*, *3(1)*, 46.
- Pajares F., & Miller, M. D. (1994). The Role of Self-Efficacy and Self-Concept Beliefs in Mathematical Solving: A Path Analysis. *Psychology, Journal of Educational*, *86*, 193–201.
- Pajares, F. (2005). Gender Differences in Mathematics Self-Efficacy Beliefs. In A. M. Gallagher & kaufman, J.C. *In Gender Differences in Mathematics: An Integrative Psychology Approach*, Cambridge University Press: Cambridge, UK, 294–315.
- Rabiati, R., & Mardika, F. (2020). Peningkatan Hasil Belajar Matematika Siswa SMA Melalui Penerapan Strategi Learning Tournament. *Math Educa Journal*, *4(1)*, 55–63. <https://doi.org/https://doi.org/10.15548/mej.v4i1.1248>
- Rajagukguk, W., & Hazrati, H. (2021). Analisis Self-Efficacy Siswa dalam PenelitiN Pembelajaran Matematika dengan Pendekatan Matematika Realistik dan Inkuiri. *Jurnal Pendidikan Matematika*, 2077–2089.
- Schunk, D. H., & DiBenedetto, M. K. (2021). Self-Efficacy and Human Motivation. *In Advances in Motivation Science. Elsevier*, *8*, 153–179. <https://doi.org/https://doi.org/10.1016/bs.adms.2020.10.001>
- Sudwiarrum, D.A., Nuryana, Ratna, P. (2021). Pengaruh Self Efficacy terhadap Prestasi Belajar IPS Siswa Kelas VIII SMP. *Jurnal Edueksos*, *10(2)*, 296.
- Sugiyono. (2019). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*.

- Tamba, J. J., & Santi, E. (2021). Efikasi Diri dengan Stres Akademik Siswa SMA Selama Pembelajaran Daring Masa Pandemi COVID-19. Seminar Nasional “Memperkuat Kontribusi Kesehatan Mental Dalam Penyelesaian Pandemi Covid-19. *Tinjauan Multidisipliner*, 136–142.
<https://doi.org/http://conference.um.ac.id/index.php/psi/article/download/1135/575>
- Yuen, M., Datu, J. (2021). Meaning in life, connectedness, academic self-efficacy, and personal self-efficacy: A winning combination. *School Psychology International*, 42(1), 79–99.