



## An Analysis of Mathematical Self-Efficacy of the 10<sup>th</sup> Grade MIPA Students of MAN Salatiga

Ahmad Mukhibin<sup>1a)</sup>, Wulan Izzatul Himmah<sup>2b)</sup>

<sup>1,2</sup>IAIN Salatiga, Salatiga, Jawa Tengah, Indonesia

e-mail: <sup>a)</sup>a.mukhibin1@gmail.com, <sup>b)</sup>wulan\_himmah@iainsalatiga.ac.id

Received: 22<sup>nd</sup> February 2020

Revised: 29<sup>th</sup> April 2020

Accepted: 30<sup>th</sup> April 2020

### Abstract

The skills required in the 21<sup>st</sup> century are highly varied. One of them is a skill in the affective aspect, such a self-efficacy which needs to be developed. Self-efficacy can affect someone's future success. Someone who has a high self-efficacy will overshoot something easier than reality. But on the other hand, a person with low self-efficacy will perceive something more difficult than reality. This causes someone to get stress and depression easily. This research aims to find out and describe the mathematical self-efficacy of students. This research is qualitative descriptive research. The subjects of the research were the students of the 10<sup>th</sup> grade MIPA of MAN Salatiga for the academic year 2018/2019 which amounted to 73 students. The instrument is used as a self-efficacy questionnaire format developed from a self-efficacy of Sutanto (2018). The instrument consists of 20 statements and has been validated by expert lecturers. The results of the research showed that 2,74% of students have very low self-efficacy, 21,92% of students have a low self-efficacy, 57,53% of students have a high self-efficacy, and 17,81% of students have very high self-efficacy. This shows that mathematical self-efficacy of students need to be trained in order to be enhanced.

**Keywords:** mathematics, self-efficacy, skill

### INTRODUCTION

The rapid development of the era needs competent and quality human resources who experts in a variety of skills; cognitive, affective, and psychomotor skills. Various efforts have been made to fill these needs, one of the efforts that can be done is through education. In education, the government has made an effort to produce quality human resources by implementing the 2013 curriculum. Students are given more free time to develop a variety of attitudes, knowledge, and skills that are possessed. Students, moreover, must be confident in their abilities so that students can follow the learning processes and able to achieve optimal learning outcomes.

Self-confidence in the ability and potency is called self-efficacy (Sutanto, 2018, p. 277). Bandura (1997, p. 2) stated that

perceived self-efficacy refers to beliefs in one's capabilities to organize and execute the courses of action required to manage the prospective situation. Efficacy beliefs influence how people think, feel, motivate themselves, and act. While Ghufon & Suminta (2010, p. 77) explained self-efficacy, in general, it is one's self-belief about one's abilities to overcome various situations. Self-efficacy is not related to the skills that students have but it is related to students' beliefs to do something with their abilities. Based on these arguments, self-efficacy is a belief to solve any problem.

Self-efficacy has an important role in daily life to deal with and solve any problem (Alifia, et al., 2018, p. 51). Students will be able to use their potency if they have self-efficacy skills (Rustika, 2012, p. 18). Students who have low self-efficacy skills tend to

perceive something more difficult than reality and they prefer to give up before trying to face and solve problems. Students, however, who have high self-efficacy skills will perceive something more easily than the reality and they always try overcoming the problems.

Self-efficacy also has an important role in the process of mathematics learning because mathematics is classified as a difficult subject in school. In consequence, student's perceptions of mathematics in school will greatly determine student learning outcomes. The difficulty of mathematics certainly can not be separated from the notions of mathematics itself. Noer (2017, p. 4) stated that mathematics is a structured science that is organized because mathematical concepts are arranged hierarchically, logically, and systematically starting from simple concepts to the most complex concepts. So, we need deeper comprehension to understand mathematics objects. Shadiq (2014, p. 1) said that to understand mathematics is not as easy as what is imagined because the definition and the purpose of mathematics learning will always change according to the times, mathematics will develop day after day.

Students, who have a high level of self-efficacy, will try to survive when they have difficult mathematical tasks, try to build a strong commitment to complete the tasks, and try to increase their efforts so they tend to achieve maximum outcomes. Conversely, students, who have a low level of self-efficacy, tend to avoid mathematics assignments because they feel threatened by the assignments. This concern can enervate students' commitment to completing assignments so students prefer to give up and get stressed more easily. These situations cause higher students' self-efficacy, the higher their motivation. On the other side, the lower students' self-efficacy, the lower their motivation (Yuliantika, et al., 2017, p. 57). This is supported by the earlier opinion of Bandura (2015) which stated that the higher student's self-efficacy, the higher the goals that they set for themselves.

The concept of self-efficacy in mathematics learning is called mathematical self-efficacy. Yates defined that mathematical self-efficacy is a self-concept that related to one's belief to do or complete a mathematics problem (Pardimin, 2018, p. 32). This is in line with the opinion of Jumroh, et al. (2018, p. 31) which defined that self-efficacy is the ability of students to present and solve mathematical problems, how to learn and understand the concepts of mathematics, and also the ability to communicate both with peers and teachers.

In self-efficacy, three dimensions can be used to distinguish individual self-efficacy from others. First, the magnitude dimension, this dimension reveals how strong the students' beliefs can complete assignments according to their abilities. Second, the strength dimension, this dimension relates to the students' belief to complete a given task; this dimension also relates to students' enthusiasm and struggle. Third, the generality dimension, this dimension is published on the breadth of knowledge and on students' mastery about the material that has been previously studied in the class.

Based on the problem descriptions above, researchers are interested in conducting a study of mathematical self-efficacy of students of the 10<sup>th</sup> grade MIPA of MAN Salatiga in the 2018/2019 academic year. This study aims to analyze and describe the level of students' mathematical self-efficacy.

## RESEARCH METHOD

This research is descriptive qualitative research. Qualitative research is a research method that emphasizes the deep aspect understanding of a phenomenon (Agustinova, 2015, p. 10). While descriptive research is a type of research aimed at describing a situation based on the original phenomenon (Sudaryono, 2016).

The subject in this research was 73 students of the 10<sup>th</sup> grade MIPA at MAN Salatiga. The instrument in this study was the questionnaire of mathematical self-efficacy that was used to measure the level of students'

mathematical self-efficacy. This questionnaire adopted a Likert scale that contains four answer choice options, namely: strongly agree, agree, disagree, and strongly disagree. The development of the mathematical self-efficacy questionnaire was based on the academic self-

efficacy theory by Sutanto (2018), then organized into indicators that were used as statements in the questionnaire. The self-efficacy indicators are presented in Table 1 as follows.

Tabel 1. Indicators of Self-Efficacy Questionnaire

Dimensions	Indicators
Magnitude	Interested in a difficult task
	Look at the task as a challenge
	Ability to complete all given tasks
Strength	Commit to completing tasks
	Standing in solving problems in any condition
	Having a fighting spirit in the face of obstacles
	Perseverance doing the tasks
	Overcoming learning difficulties
Generality	Confident with the capabilities
	Learn from experiences
	Plan the completing of the tasks
	Having knowledge about various materials

Furthermore, the questionnaire score was started from 20 to 80. Researchers classified the results of the mathematical self-efficacy based on the level of students' self-efficacy that is divided into four categories, namely: very low, low, high, and very high. This classification was based on the ideal mean (Mi) and the ideal standard deviation (Si). For  $X \geq 60$  classified to very high,  $50 \leq X < 60$  classified to high,  $40 \leq X < 50$  classified to low, and  $X < 40$  classified to very low.

The results of the mathematical self-efficacy questionnaire are calculated as a percentage to present the classification of indicators in each dimension and subsequent the data is presented in tabular form. Finally, the data is described and made the conclusions based on the level of students' mathematical self-efficacy of the 10<sup>th</sup> grade MIPA of MAN Salatiga.

## RESULT AND DISCUSSION

Research data on students' mathematical self-efficacy were obtained from the 10<sup>th</sup> grade MIPA of MAN Salatiga. This mathematical self-efficacy data is obtained by filling out a questionnaire that is conducted by students. The mathematical self-efficacy questionnaire

consisted of 20 statements that had been previously validated by two expert judgments and had also passed the validity and reliability tests.

Based on the results of the students' mathematical self-efficacy questionnaire, researchers obtained data that subsequent is classified based on the dimensions of mathematical self-efficacy. The data regarding students' mathematical self-efficacy is presented in Table 2.

Table 2. Percentage of Dimensions of Students' Mathematical Self-Efficacy

No	Dimensions	Percentage
1	Magnitude	28,3 %
2	Strength	52,8 %
3	Generality	18,9 %

The information about students' mathematical self-efficacy that is obtained from Table 2 based on the dimensions of self-efficacy varies greatly, namely, the magnitude dimension is 28.3%, the strength dimension is 52.8%, and the generality dimension is 18.9%. From Table 3 above, it can be seen that the generality dimension has the smallest percentage and the strength dimension has the greatest percentage compared to other

dimensions. This calculation is taken into account for self-efficacy indicators because all of the indicators from Sutanto (2018) were used to identify students' mathematical self-efficacy; researchers calculate all of the dimensions.

Generally, students' mathematical self-efficacy is classified into four categories, namely: very high, high, low, and very low. The results of students' mathematical self-efficacy questionnaire are presented in Table 3.

Table 3. Percentage of Students' Mathematical Self-Efficacy

No	Categories	Percentage
1	Very High	17,81 %
2	High	57,53 %
3	Low	21,92 %
4	Very Low	2,74 %

Based on Table 3, the percentage of students' mathematical self-efficacy shows that students who have mathematical self-efficacy in the very high category are 17.81%, in the high category are 57.53%, in the low category are 21.92%, and in the very low category are 2.74%. Generally, students' mathematical self-efficacy is in the high category with 53.93% of students.

The magnitude dimension refers to the difficulty level of a given task or students' confidence in being able to solve difficult problems. Indicators in the magnitude dimension include interest in doing difficult tasks, perspective on tasks, ability to complete tasks, and commitment to complete tasks. The results of this dimension were classified by the ideal mean (Mi) and the ideal standard deviation (Si). For  $X \geq 16,3$  is classified to very high,  $12,5 \leq X < 16,3$  is classified to high,  $8,67 \leq X < 12,5$  is classified to low, and  $X < 8,67$  is classified to very low. Based on the results of the questionnaire, students' mathematical self-efficacy data on the magnitude dimension are presented in Table 4.

Table 4. Percentage of Students' Mathematical Self-Efficacy on the Magnitude Dimension

No	Categories	Total Students	Percentage
1	Very High	12	16,44 %
2	High	38	52,05 %
3	Low	22	30,14 %
4	Very Low	1	1,37 %

Based on Table 4, 12 students have very high mathematical self-efficacy, 38 students have high mathematical self-efficacy, 22 students have low mathematical self-efficacy, and only 1 student has very low mathematical self-efficacy. Further, the average of students' mathematical self-efficacy on the magnitude dimension is in the high category.

The strength dimension reveals how strong students' beliefs are in completing difficult math tasks. The indicators of the strength dimension include the ability to survive when students have mathematical tasks, fighting spirit in facing obstacles, perseverance in doing assignments, overcoming learning difficulties, confidence in abilities, and learning from previous experiences. The results of this dimension were classified by the ideal mean (Mi) and the ideal standard deviation (Si). For  $X \geq 19,2$  is classified to very high,  $14,5 \leq X < 19,2$  is classified to high,  $9,8 \leq X < 14,5$  is classified to low, and  $X < 9,8$  is classified to very low. The results of students' mathematical self-efficacy on the strength dimension are presented in Table 5.

Table 5. Percentage of Students' Mathematical Self-Efficacy on the Strength Dimension

No	Categories	Total Students	Percentage
1	Very High	30	41,09 %
2	High	34	46,57 %
3	Low	8	10,96 %
4	Very Low	1	1,37 %

Based on Table 5, 30 students have very high mathematical self-efficacy, 34 students have high mathematical self-efficacy, 8 students have low mathematical self-efficacy, and only 1 student has very low mathematical self-efficacy. Further, the average mathematical self-efficacy of students on the strength dimension is in the high category.

The generality dimension reveals how wide the mastery of the material and the achievement of students toward mathematical assignments. Indicators in the generality dimension consist of students' ability to plan task completion and the breadth of students' knowledge about various materials. The results of this dimension were also classified by the ideal mean (Mi) and the ideal standard deviation (Si). For  $X \geq 11$  is classified to very high,  $8,5 \leq X < 11$  is classified to high,  $6 \leq X < 8,5$  is classified to low, and  $X < 6$  is classified to very low. The results of students' mathematical self-efficacy on the generality dimension are presented in Table 6.

Table 6. Percentage of Students' Mathematical Self-efficacy on the Generality Dimension

No	Categories	Total Students	Percentage
1	Very High	16	21,92 %
2	High	34	46,57 %
3	Low	19	26,03 %
4	Very Low	4	5,48 %

Based on Table 6, 16 students have very high mathematical self-efficacy, 34 students have high mathematical self-efficacy, 19 students have low mathematical self-efficacy, and 4 students have very low mathematical self-efficacy. Further, the average mathematical self-efficacy of students on the generality dimension is in the high category.

Based on the results of the study, it was obtained that the strength dimension had the highest percentage which was 52.8%, the magnitude dimension was 28.3%, and the generality dimension had the smallest percentage which was only 18.9%. The results also showed that 2 students had very low mathematical self-efficacy, 16 students had

low mathematical self-efficacy, 42 students had high mathematical self-efficacy category, and only 13 students have very high levels of mathematical self-efficacy. The average mathematical self-efficacy of students was in the high category. This result is in line with research conducted by Novferma (2016, p. 86) which showed that the average self-efficacy of students from four junior high schools was in the high category.

The indicators of mathematical self-efficacy on the magnitude dimension include interest in doing difficult tasks, perspective on tasks, ability to complete tasks, and commitment to complete tasks. Besides, student interest can also be influenced by how teachers teach mathematics in the classroom (Nurfauziah, et al., 2018, p. 67). Based on the results of the study, the percentage of mathematical self-efficacy of students on the magnitude dimension was 28.3% and its average was in the high category. Therefore, students' mathematical self-efficacy toward the level of difficult tasks needs to be increased through practicing to complete questions every day.

The indicators of the strength dimension include the ability to survive when students have mathematical tasks, fighting spirit in facing obstacles, perseverance in doing assignments, overcoming learning difficulties, confidence in abilities, and learning from previous experiences. Based on the results of the study, the percentage of students' mathematical self-efficacy on the strength dimension has reached 52.8% and its average was in the high category. This means that the majority of students already have strong self-efficacy in dealing with various problems and obstacles students face. However, it does not rule out the possibility that self-efficacy in the strength dimension also still needs to be improved.

Indicators in the generality dimension consist of students' ability to plan task completion and the breadth of students' knowledge about various materials. The percentage of students' mathematical self-

efficacy on the generality dimension was only 18.9% and its average was in the high category. This means that students are still lacking confidence in the planning the completion of tasks and in mastering the materials that have been studied. Students who have low self-efficacy often repeat the same failures. This is supported by Gao (2019, p. 720) who stated that low self-efficacy students had got used to repeated failures and described their occasional achievement as “a big surprise”. So that students’ mathematical self-efficacy on the generality dimension also still needs to be improved to decrease this occasion. One of the ways that can be used to implant and improve students’ mathematical self-efficacy is to create a pleasant learning atmosphere so that students tend to be easier to remember the material that has been taught (Subaidi, 2016, p. 67).

## CONCLUSION

Based on the results of the analysis of the data, it can be concluded that the mathematical self-efficacy of 10<sup>th</sup> grade MIPA of MAN Salatiga students in the academic year 2018/2019 is in the very high category with students percentage 17.81%. The mathematical self-efficacy in the high category reaches 57.53%, in the low category is 21.92%, and in the very low category is only 2.74%. From the results of this study, self-efficacy must get more attention and still needs to be increased. This is supported by Johar, et al., (2018, p. 204) who stated that self-efficacy need major attention. So teachers must pay more attention to the affective aspects of students during mathematics learning, especially students’ mathematical self-efficacy because self-efficacy is very influential aspects of the achievement of students’ mathematics learning in school. For future studies, researchers must be able to investigate students’ self-efficacy in the process of mathematics learning more deeply.

## REFERENCES

- Alifia, N. N., & Rakhmawati, I. A. (2018). Kajian kemampuan self-efficacy matematis siswa dalam pemecahan masalah matematika. *Jurnal Elektronik Pembelajaran Matematika*, 5(1), 44-54.
- Agustinova, D. E. (2015). *Memahami metode penelitian kualitatif: Teori & praktik*. Yogyakarta: Calpulis.
- Bandura, A. (1997). *Self-efficacy the exercise of control*. New York: W. H. Freeman.
- Bandura, A. (2015). On deconstructing commentaries regarding alternative theories of self-regulation. *Journal of Management*, 41(4), 1025-1044. doi:<https://doi.org/10.1177/0149206315572826>
- Gao, J. (2019). Sources of mathematics self-efficacy in Chinese students: A mixed-method study with q-sorting procedure. *International Journal of Science and Mathematics Education*, 18, 713-732. doi:10.1007/s10763-019-09984-1
- Ghufron, M. N., & Suminta, R. R. (2010). *Teori-teori psikologi*. Yogyakarta: Ar-Ruzz Media.
- Johar, R., Junita, E., & Saminan. (2018). Student’s mathematical communication ability and self-efficacy using team quiz learning model. *International Journal on Emerging Mathematics Education*, 2(2), 203-214. doi:<http://dx.doi.org/10.12928/ijeme.v2i2.8702>
- Jumroh, Mulbasari, A. S., & Fitriasisari, P. (2018). Self-efficacy siswa dalam pembelajaran matematika dengan strategi inquiry based learning di kelas VII SMP Palembang. *Jurnal Pendidikan Matematika RAFA*, 4(1), 29-42. doi:<https://doi.org/10.19109/jpmrafa.v4i1.2480>
- Noer, S. H.. (2017). *Strategi pembelajaran matematika*. Yogyakarta: Matematika.

- Novferma. (2016). Analisis kesulitan dan self-efficacy siswa SMP dalam pemecahan masalah matematika berbentuk soal cerita. *Jurnal Riset Pendidikan Matematika*, 3(1), 76-87.  
doi:<https://doi.org/10.21831/jrpm.v3i1.10403>
- Nurfauziah, P., Faudziah, L., Nuryatin, S., & Mustaqimah, I. A. (2018). Analisis self-efficacy matematik siswa kelas VIII SMP 7 Cimahi dilihat dari gender. *Jurnal Matematika dan Pendidikan Matematika*, 3(1), 61-70.  
doi:<https://doi.org/10.26594/jmpm.v3i1.1046>
- Pardimin. (2018). Self-efficacy matematika dan self-efficacy mengajar matematika guru matematika. *Jurnal Ilmu Pendidikan*, 24(1), 29-37.  
doi:<http://dx.doi.org/10.17977/um048v24i1p29-37>
- Rustika, I. M. (2012). Efikasi diri: Tinjauan teori Albert Bandura. *Buletin Psikologi Fakultas Psikologi Universitas Gadjah Mada*, 20(1-2), 18-25.
- Shadiq, F. (2014). *Pembelajaran matematika; Cara meningkatkan kemampuan berfikir kritis*. Yogyakarta: Graha Ilmu.
- Subaidi, A. (2016). Self-efficacy siswa dalam pemecahan masalah matematika. *Sigma*, 1(2), 64-68.  
doi:<http://dx.doi.org/10.0324/sigma.v1i1.68>
- Sudaryono. (2016). *Metode penelitian pendidikan*. Jakarta: Kencana.
- Sutanto, A. (2018). *Bimbingan dan konseling di sekolah*. Jakarta: Prenadamedia Group.
- Yuliantika, D., Rahmawati, S. W., & Palupi, S. R. (2017). Self-efficacy dan motivasi berprestasi siswa SMA Negeri 7 Purworejo. *Jurnal Psiko Utama*, 5(2), 51-59.