International Journal of STEM Education for Sustainability, Vol.6, No.1, 2026, pp. 19-30
e-ISSN 2798-5091. DOI. 10.52889/ijses.v6i1.812

Structural Equation Model of Mathematics Anxiety and Self-Regulated Learning on Mathematical Literacy

Submitted 14 December 2025, Revised 31 January 2026, Accepted 31 January 2026

Aziz Muhtasyam[1,2], Syamsuri Syamsuri[1*], Cecep Anwar Hadi Firdos Santosa[1]

[1]Mathematics Education Program, Universitas Sultan Ageng Tirtayasa, Serang, Indonesia
[2]MAN 2 Pandeglang, Pandeglang, Indonesia
Corresponding Email: *syamsuri@untirta.ac.id

Abstract

Establishing the significance of the relationship between latent variables in hypotheses that have been shown to have an impact was the goal of this investigation. This study looked at the connection between high school students' self-regulated learning, mathematical literacy, and mathematics anxiety. Pandeglang Regency high school students made up the study's demographic, and the sampling technique, which included 392 participants, was carried out utilizing the Slovin algorithm in terms of accreditation. This study focuses on mathematics anxiety and self-regulated learning. A self-regulated learning questionnaire, a mathematics anxiety survey, and a mathematical literacy exam serve as the study's tools. Additionally, structural equation modeling (SEM) will be used to examine the data gathered for this investigation. The results of this investigation show that: 1) High school students' mathematical literacy skills are negatively and significantly impacted by mathematics anxiety; 2) high school students' mathematical literacy skills are positively and significantly impacted by self-regulated learning; and 3) there is a significant negative correlation between high school students' mathematical literacy skills and mathematics anxiety. It is necessary to encourage kids' self-regulated learning and alleviate their arithmetic anxiety in order to enhance their mathematical literacy.

Keywords: Mathematics Anxiety, Self-Regulated Learning, Mathematical Literacy, SEM

INTRODUCTION

There are numerous reasons why children lack understanding in mathematics. As stated by the OECD (2013), attitudes, beliefs, and emotions have a significant influence on a person's interest, reaction, and engagement in mathematics. Children who have positive attitudes toward mathematics learn better than those who have arithmetic anxiety. Thus, mathematical literacy is lower in children who have math anxiety. These findings support the study of Harefa et al. (2023), which revealed that students who have higher levels of math anxiety have lower mathematical literacy.

Math anxiety, according to Ashcraft (2002), is characterized by tension, concern, and apprehension over the potential effects on one's math abilities. Math anxiety is defined as the sensation of fear, terror, or anxiety when faced with a mathematical issue (Syafri, 2017). Hastuti et al. (2021) claim that math anxiety is an emotional reaction that pupils have when they struggle to understand the material.

Students' concern about mathematics has an impact on their learning outcomes in math classrooms. According to Disai et al. (2018), pupils' learning outcomes in mathematics are significantly correlated negatively with mathematics anxiety. According to Ikhsan (2019), pupils' learning outcomes in mathematics are negatively impacted by mathematics anxiety.

Zuraidah et al. (2020) claim that raising students' anxiety levels about mathematics will improve their learning outcomes, while lowering their anxiety levels will also improve their learning outcomes.

One of the most significant emotional factors affecting the dislike of mathematics among students is mathematics anxiety (Shen, 2009). Thus, one of the most crucial elements in helping pupils develop and succeed in mathematics is helping them overcome math anxiety. Based on the findings of Febryliani (2021), children need autonomy or self-regulated learning to decrease their anxiety towards mathematics. Meanwhile, self-regulated learning and math anxiety are negatively related, as cited by Tevfik (2015).

Self-directed learning or learning independence is the ability of students to learn independently or to discover effective learning strategies that help them behave well in class (Zamnah, 2017). Fitriatien and Mutianingsih (2020) argue that self-directed learning is the process of self-generated thoughts, feelings, and behaviors that are organized and constantly improved to achieve certain goals. They also argued that self-directed learning is a cognitive process related to motivation, attitudes, and environment, and it has the potential to improve students' achievement.

The ability of students to learn independently affects their mastery of mathematics. Hidayat and Marlena (2023) argue that independent learning explains 50.2% of the differences in students' mathematical literacy characteristics, while other variables explain the remaining 49.8%.

Mathematical literacy tasks at the low and intermediate levels can be solved by students in the low learning independence group, while students in the moderate learning independence group will continue to make mistakes in similar questions (Aulia et al., 2021). Students in the high learning independence group will be able to exhibit each of the seven elements of mathematical literacy as they work through these problems. Additionally, the results of the Bahiyyah et al. (2021) study demonstrated that pupils in the group with a high level of learning freedom had outstanding process skills, wrote their final answers accurately, and solved mathematical problems flawlessly. Because of their remarkable process skills, students in the intermediate learning independence group were able to solve arithmetic problems correctly even when they made mistakes.

From the background, it is clear that the author is of the opinion that the mathematical literacy skills of high school students are related to self-regulated learning and mathematics anxiety. However, the author has not yet found a structural equation model that connects the mathematical literacy skills of students to self-regulated learning and mathematics anxiety. So,

this study aims to see the connection between high school students' self-regulated learning, mathematical literacy, and mathematics anxiety.

METHOD

This study used a survey approach and was quantitative in nature. 18,894 high school students from Pandeglang, Indonesia, made up the study's population. In this investigation, a structural equation model was employed. The sample size of 392 students was determined using the Slovin calculation and the proportionate allocation formula.

Mathematics anxiety (X1) and self-regulated learning (X2) are the exogenous variables in this study. The mathematical literacy skills of the respondents are taken as endogenous variables. The data for the variables was collected using two different methods: a questionnaire to collect data on the variables of mathematics anxiety and self-regulated learning, and a test to measure the mathematical skills of the students.

After the data has been collected, the structural equation model analysis method will be employed to analyze the data. The SEM method is widely applied in the education sector to assess the relationship between the hypotheses (or latent variables) that are not directly observed and the observable variables (Gabriel et al., 2020). The SEM method is employed to analyze data using a number of tests, such as the measurement, structural, and model fit tests.

As Hair et al. (2010) argue, the proposed model can be tested using the goodness of fit criterion index to determine its "suitability" or goodness of fit. As Haryono (2016) argues, there are a number of goodness of fit criteria that are observable.

Further, the reliability and validity of the measurement model were verified. The values of AVE and SLF indicate the validity of the indicator, whereas the value of the Construct Reliability (CR) measure indicates the magnitude of the reliability of the indicator. According to Hair et al. (2010), the suitable value of SLF should be greater than 0.5, and the value of CR should be between 0.6 and 0.7, which has adequate reliability because the indicator variables have adequate validity. The minimum value of AVE is 0.5.

The importance of the effect is then validated by the structural model hypothesis test. According to Ghozali & Fuad (2005), the structural model hypothesis test aims to find out whether the actual data collected from the survey is consistent with the assumed relationship in the conceptual model hypothesis. The result of the hypothesis test for the structural model is represented in the path diagram and outer loading value of the computation as shown in the Lisrel 8.8 software. In order to find the result of the hypothesis test for the analysis of the study, one needs to refer to the t-value result. If the t-value is greater than the t-table value, there could

be a strong correlation between the latent variables. The |t-value|> 1.96 represents a strong association.

RESULTS AND DISCUSSION

The model fit test result shows that all criteria fit well, as shown in Figure 1. This suggests that the structural model, which is used to examine the connection between latent variables and the designated component structure, is supported by the data. Table 1 displays the model fit test result.

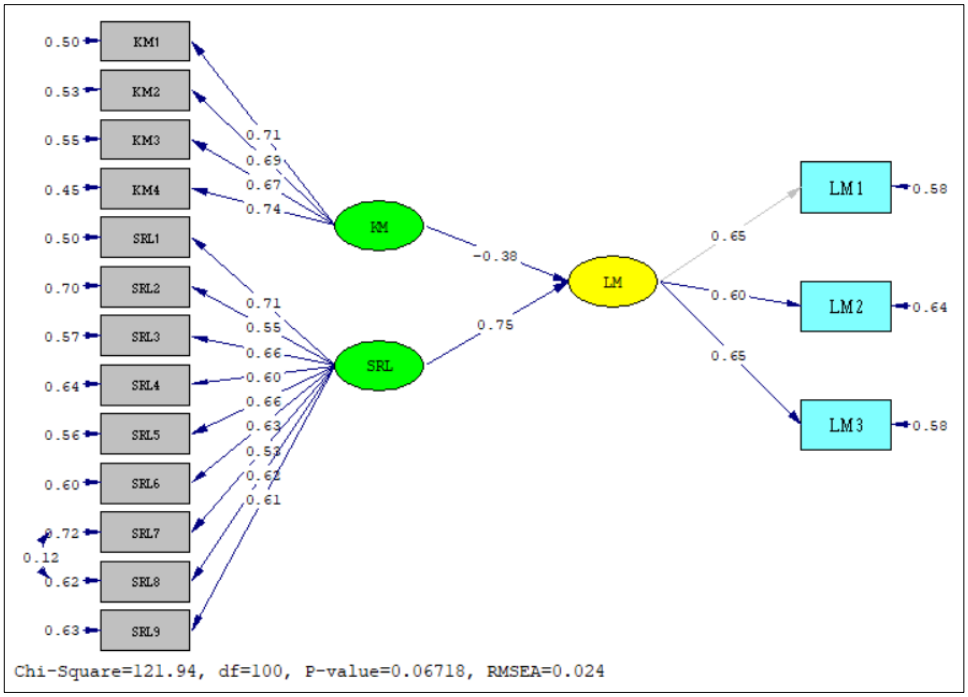

Figure 1. Structural Equation Model

Table 1. The Result of the Model Fit Test

Criteria	Score	Cut off Value	Description
Chi-Kuadrat	121,81	≤ 124,34	Fit
P-Value	0,06	≥ 0,05	Fit
GFI	0,96	≥ 0,90	Fit
AGFI	0,95	≥ 0,90	Fit
CFI	1,00	≥ 0,90	Fit
NNFI	1,00	≥ 0,90	Fit
RMSEA	0,02	≤ 0,08	Fit
RMR	0,01	≤ 0,05	Fit

Once the model has been properly displayed, the evaluation of measurement focuses on the validity and reliability of the model. Table 2 displays the results of testing the measurement model. All the indicators of mathematical literacy, mathematics anxiety, and self-regulated learning are valid since the SLF values for all the indicators of all the variables are above 0.5. The CR and AVE values for each variable will be examined in the next step to show that

construct reliability has been achieved. The results of the calculations for the CR and AVE for each variable are presented in Table 3.

Table 2. The results of the measurement model test

Variable	Indicator	Standardized Loading Factor (SLF)
Mathematics Anxiety	Mathematics Knowledge	0,71
	Somatic	0,69
	Cognitive	0,67
	Attitude	0,74
Self-Regulated Learning	Initiative and motivation to learn	0,71
	Diagnosing learning needs	0,55
	Setting learning goals	0,66
	Organize and control learning	0,60
	Viewing difficulties as challenges	0,66
	Leveraging relevant sources	0,63
	Choosing a learning strategy	0,53
	Evaluating the learning process	0,62
	Self concept	0,61
Mathematical Literacy Skills	Formulate	0,65
	Employ	0,60
	Interpret	0,65

Table 3. The results of the CR and AVE calculations for each variable

Latent Variables	Sum of SLF	Sum of SLF^2	Sum of Error	CR	AVE
Mathematics Anxiety	2,81	1,98	1,19	0,87	0,62
Self-Regulated Learning	5,57	3,47	3,43	0,90	0,51
Mathematical Literacy Skills	1,90	1,21	1,10	0,77	0,52

As shown in Table 3, the AVE of each variable is greater than 0.50, which means that all variables meet the criteria for excellent convergent validity. The CR of each variable is greater than 0.70, which means that the value meets the criteria for good reliability. Therefore, all variables and indicators are ready for the equation model testing.

Table 4 presents the results of the equation model testing.

Table 4. The Results of the Testing of the Equation Model

Path	Path Coefficient	*T-Value*
KM $\rightarrow$ LM	-0,38	-6,29
SRL $\rightarrow$ LM	0,75	10,54
KM $\leftrightarrow$ SRL	-1,12	-79,96

A positive path coefficient and a t-value more than 1.96 in Table 4 demonstrate the highly substantial negative association between students' mathematical literacy abilities and mathematics anxiety. Furthermore, a t-value of less than -1.96 and a negative path coefficient value indicate that independent learning significantly improves students' mathematical literacy.

The study's first hypothesis is that there is a strong and negative correlation between mathematical literacy and mathematics anxiety.

On the basis of the results obtained from the study, the t-values of mathematical literacy skills and mathematics anxiety were -6.29 and -0.38, respectively. This means that the correlation between mathematics anxiety and mathematical literacy skills is negative and significant. This implies that mathematics anxiety and mathematical literacy skills have a negative effect on each other.

From the above discussion, the initial hypothesis of the study was that "38% of mathematics anxiety has a significant negative impact on mathematical literacy skills." The hypothesis supports the statement by Harefa et al. (2023) that mathematics anxiety influences the mathematical literacy skills of students.

Math anxiety affects the problem-solving skills of pupils, as mentioned by Lestari et al. (2020). As a result, children will have difficulty solving problem-based math problems, especially those that involve mathematical literacy. As mentioned by Ikhsan (2019), students who experience high levels of mathematics anxiety will have difficulty understanding mathematical symbols and will feel afraid, nervous, and worried throughout the lesson.

Math-anxious children will find it difficult to generate queries, which will hinder their ability to solve mathematical literacy difficulties. According to Machromah et al. (2015), students who suffer from high levels of arithmetic anxiety are unable to identify important details and the objectives of the presented issue. Additionally, Setiawan et al. (2021) found that students who experience high levels of math anxiety tend to avoid or seem less enthusiastic when performing arithmetic tasks.

Conversely, students who experience little math anxiety can solve arithmetic problems efficiently, which means that students can solve mathematical literacy problems easily. Students who experience little math anxiety can interpret the arithmetic problems they encounter in an efficient and perfect manner, as stated by Setiawan et al. (2021). In addition to using learned techniques to solve problems, students who experience little math anxiety can also create mathematical statements when solving problems, as stated by Machromah et al. (2015).

Overcoming arithmetic anxiety in students is very important in order to enhance their mathematical literacy skills. According to Saputra (2014), different learning approaches must be employed to reduce math anxiety. By employing group learning and ensuring a calm and comfortable learning environment, arithmetic anxiety in students can be reduced (Dina et al., 2022). To reduce arithmetic anxiety, different learning approaches can be employed, such as

problem-based learning, guided inquiry using the group investigation model, and the discovery learning model (Setiani, 2016).

Based on Muthmainnah & Sumarsih (2019), the level of students' anxiety towards math classes has been reduced due to the implementation of the discovery learning model. According to Setiani (2016), the implementation of the problem-based learning approach has reduced students' anxiety towards mathematics.

However, according to Azizah (2021), students' anxiety towards mathematics can be reduced by using the group investigation method approach in combination with the guided learning approach. This is because the students' level of anxiety will be reduced due to their increased self-confidence after the guided inquiry learning process.

Based on the research findings, the second hypothesis posits that self-regulated learning and mathematical literacy skills have a positive and significant influence on the structural equation model that was developed on the variables of mathematics anxiety, self-regulated learning, and mathematical literacy skills. In the structural equation model, the t-value and route coefficient value for mathematical literacy skills are 0.75 and 10.54, respectively. This illustrates how mathematical literacy skills and self-regulated learning are strongly and favorably correlated. This illustrates how kids' self-regulated learning and mathematical skill are directly related, and vice versa.

The first hypothesis of this research is that mathematical literacy skills can be improved by 75% through independent learning, for the reasons mentioned above. This is supported by the findings of the research conducted by Hidayat and Marlena (2023), which showed that independent learning can have a positive effect on mathematical literacy skills.

Mathematical literacy questions can be solved by students who are highly capable of independent study. Understanding concepts related to the subject matter, explaining information in questions, converting questions into mathematical problems using symbolic language, designing and implementing strategies to interpret problem-solving, evaluating and validating problem solutions to solve prior problems, and solving problems sequentially, clearly, systematically, and effectively are all skills that students with independent learning ability possess (Friska et al., 2024). Conversely, pupils who have a modest level of learning independence are comparatively capable of developing and applying mathematical ideas, facts, methods, and reasoning (Sigiro et al., 2023).

Students who lack self-regulated learning skills, on the other hand, have difficulties in responding to mathematical literacy questions. Students who lack learning independence skills are less capable of understanding, applying, and evaluating results, as stated by Kholifasari et

al. (2020). Students who lack learning independence skills also have difficulties in recording the methods and formulas they use to solve problems, as stated by Yanuarto and Qodariah (2020).

Group guidance is another strategy that schools can adopt to enhance students' skills for independent learning (Elfira, 2013). According to Azhary et al. (2023), in group guidance, students are given the chance to freely express their thoughts, feelings, perceptions, insights, and attitudes so that they can encourage others and give advice in the group.

By offering a variety of learning strategies, educators can also try to improve autonomous learning. Flipped classroom instruction and realistic mathematics learning through e-books are two teaching strategies that can enhance self-directed learning (Siregar et al., 2023). If the proper method is applied in the learning process, such as realistic mathematics education, students will be more enthusiastic about mathematics and take greater responsibility for solving mathematical issues (Ainulluluah et al., 2022).

In addition, the findings of research studies show that initiative and motivation to learn are the most critical factors in evaluating self-regulated learning. Consequently, to enhance self-regulated learning among students, it is essential to enhance student initiative and motivation to learn. Since learning approaches that encourage students to participate in the learning process have the ability to affect students' motivation, the learning approach is one of the most critical factors that affect students' motivation (Savitri et al., 2022). The quantum learning model is a learning method that can increase learning motivation. As stated by Maulidi (2022), students' learning motivation is significantly enhanced by role models, activity, and discipline in quantum learning.

According to the structural equation model that connects the variables of mathematical anxiety, self-regulated learning, and mathematical literacy, the study's findings show a relationship and relevance between mathematics anxiety and self-regulated learning. According to the third hypothesis of this study, the route coefficient and t-value of the structural equation model for self-regulated learning and mathematics anxiety are -1.12 and -79.96, respectively. This suggests a strong negative correlation between self-regulated learning and mathematics fear. This implies that youngsters who are more anxious about math will be less able to learn on their own, and vice versa.

On the basis of the aforementioned rationale, it is possible to accept the final hypothesis of this research, which states that self-regulated learning and mathematics anxiety are significantly correlated negatively. This supports the statement of Tevfik (2015), who stated that the students' self-regulated learning can be increased and the students' motivation to learn

mathematics can be enhanced by reducing their mathematics fear. When the students' concern about mathematics is reduced, their self-efficacy is improved, which further improves their mathematical literacy, as Gabriel et al. (2020) stated.

CONCLUSION

Based on the results and discussion, we can conclude that the mathematics anxiety significantly and negatively affects mathematical literacy skills, independent learning significantly and positively affects mathematical literacy skills, and mathematics anxiety and independent learning significantly and positively affect mathematical literacy skills.

It is necessary to encourage kids' self-regulated learning and alleviate their arithmetic anxiety in order to enhance their mathematical literacy. This goal can be achieved in several ways. Learning strategies such as flipped classrooms based on e-books should be employed by teachers to encourage kids to learn independently, while real-world math learning strategies such as group investigations, problem-based learning, or discovery learning should be employed to help kids who are anxious about math.

REFERENCES

Ainulluluah, A., Boeriswati, E., Rahmawati, Y., & Setiawan, B. (2022). Systematic Literature Review: Improving Self Regulated Learning Through The Flipped Classroom Model Based on Interactive E-Books. *Jurnal Basicedu*, *6*(3), 4679–4685. https://doi.org/10.31004/basicedu.v6i3.2853

Ashcraft, M. H. (2002). Math Anxiety: Personal, Educational, and Cognitive Consequences. *Current Directions in Psychological Science*, *11*(5), 181–185.

Aulia, N. M., Suyitno, A., & Asikin, M. (2021). Kemampuan Literasi Matematis Ditinjau dari Kemandirian Belajar di MTs Darul Hikmah Kedung Jepara. *Jurnal Kajian Pembelajaran Matematika*, *5*(2), 11–17.

Azhary, T. A., Kardo, R., & Dianto, M. (2023). Peningkatan Self Regulated Learning Peserta Didik melalui Bimbingan Kelompok (Studi Ekperimen pada Peserta Didik Fase F7 SMAN 8 Padang). *INNOVATIVE: Journal Of Social Science Research*, *3*(4), 4504–4513.

Azizah, L. N. (2021). Guided Inquiry dengan Model Group Investigation untuk Meningkatkan Prestasi dan Mengurangi Kecemasan Matematika Siswa. *Jurnal Pengembangan Pembelajaran Matematika*, *3*(1), 22–31. https://doi.org/10.14421/jppm.2021.031-03

Bahiyyah, S. F., Indiati, I., & Sutrisno. (2021). Analisis kesalahan siswa SMP dalam menyelesaikan soal literasi matematika berdasarkan metode newman ditinjau dari kemandirian belajar. *AKSIOMA: Jurnal Matematika Dan Pendidikan Matematika*, *12*(3), 436–446.

Dina, A. S., Ambarwati, L., & Meliasari. (2022). Literature Review: Faktor Kecemasan Matematika Siswa dan Upaya Mengatasinya. *J-Pimat*, *4*(1), 443–450.

Disai, W. I., Dariyo, A., & Basaria, D. (2018). Hubungan antara Kecemasan Matematika dan Self-Efficacy dengan Hasil Belajar Matematika Siswa SMA X Kota Palangka Raya. *Jurnal Muara Ilmu Sosial, Humaniora, Dan Seni*, *1*(2), 556–568. https://doi.org/10.24912/jmishumsen.v1i2.799

Elfira, N. (2013). Peningkatan Kemandirian Belajar Siswa melalui Layanan Bimbingan Kelompok. *Koselor: Jurnal Ilmiah Konseling*, *2*(1), 279–282.

Febryliani, I. (2021). Hubungan Kecemasan Matematika dan Self-Regulated Learning terhadap Motivasi Siswa Sekolah Menengah Atas dalam Pembelajaran Matematika pada Kelas Virtual. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, *05*(03), 2302–2312.

Fitriatien, S. R., & Mutianingsih, N. (2020). Peningkatan Kemampuan Belajar Mandiri pada Mata Kuliah Operasional Riset melalui Self Regulated Learning. *Mosharafa: Jurnal Pendidikan Matematika*, *9*(1), 95–106.

Friska, D., Sukestiyarno, & Kartono. (2024). Analisis Literasi Matematis Siswa ditinjau dari Self Regulated Learning pada Pembelajaran Problem Based Learning (PBL) berbasis E-Modul. *Euclid*, *11*(1), 33–54.

Gabriel, F., Buckley, S., & Barthakur, A. (2020). The impact of mathematics anxiety on self-regulated learning and mathematical literacy. *Australian Journal of Education*, *64*(3), 227–242. https://doi.org/10.1177/0004944120947881

Ghozali, I., & Fuad, M. (2005). Structural equation modeling. Badan Penerbit Universitas Diponegoro, Semarang.

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2010). *Multivariate data analysis, 7th Ed*n. Hoboken.

Harefa, A. D., Lase, S., & Zega, Y. (2023). Hubungan Kecemasan Matematika Dan Kemampuan Literasi Matematika Terhadap Hasil Belajar Peserta Didik. *Educativo: Jurnal Pendidikan*, *2*(1), 144–151. https://doi.org/10.56248/educativo.v2i1.96

Haryono, S. (2016). *Metode SEM untuk Penelitian Manajemen* (H. Mintardja, Ed.; 1st ed.). PT. Intermedia Personalia Utama.

Hastuti, E. S., Umam, K., Eclarin, L., & Perbowo, K. S. (2021). Kecemasan Siswa Sekolah Menengah Pertama dalam Menyelesaikan Masalah SPLDV pada Kelas Virtual. *International Journal of Progressive Mathematics Education*, *1*(1), 63–84. https://doi.org/10.22236/ijopme.v1i1.6914

Hidayat, T., & Marlena, L. (2023). Pengaruh Kemandirian Belajar Terhadap Kemampuan Literasi Matematis Siswa SMAN Olahragawan Ragunan. *Journal Mathematics Education Sigma*, *4*(1), 48–54.

Ikhsan, M. (2019). Pengaruh Kecemasan Matematis Terhadap Hasil Belajar Matematika Siswa. *De Fermat: Jurnal Pendidikan Matematika*, *2*(1), 1–6.

Kholifasari, R., Utami, C., & Mariyam. (2020). Analisis Kemampuan Literasi Matematis Siswa ditinjau dari Karakter Kemandirian Belajar Materi Aljabar. *Jurnal Derivat*, *7*(2), 117–125.

Lestari, H., Fitriza, R., & A, H. (2020). Pengaruh Kecemasan Matematika (Mathematics Anxiety) terhadap Kemampuan Pemecahan Masalah Peserta Didik Kelas VII MTs. *Math Educa: Jurnal Matematika Dan Pendidikan Matematika*, *4*(1), 103–113.

Machromah, I. U., Riyadi, & Usodo, B. (2015). Analisis Proses dan Tingkat Berpikir Kreatif Siswa SMP dalam Pemecahan Masalah Bentuk Soal Cerita Materi Lingkaran ditinjau dari Kecemasan Matematika. *Jurnal Elektronik Pembelajaran Matematika*, *3*(6), 613–624.

Maulidi, A. (2022). Implementasi Model Pembelajaran Quantum Learning dalam Meningkatkan Motivasi Belajar. *Fakta: Jurnal Pendidikan Agama Islam*, *2*(1), 2774–9118.

Muthmainnah, R. N., & Sumarsih. (2019). Penerapan Metode Discovery Learning Materi Pola Bilangan sebagai Upaya Mengurangi Kecemasan Siswa pada Pelajaran Matematika. *Fibonacci: Jurnal Pendidikan Matematika Dan Matematika*, *5*(2), 189–194.

OECD. (2013). *PISA 2012 assessment and analytical framework : mathematics, reading, science, problem solving and financial literacy.* OECD.

OECD. (2019). *PISA 2018 Assessment and Analytical Framework*. OECD. https://doi.org/10.1787/b25efab8-en

OECD. (2023). *PISA 2022 Results (Volume I): The State of Learning and Equity in Education*. OECD. https://doi.org/10.1787/53f23881-en

Saputra, P. R. (2014). Kecemasan Matematika dan Cara Menguranginya (Mathematic Anxiety and How to Reduce It). *Pythagoras*, *3*(2), 75–84.

Savitri, A. S., Sallamah, D., Permatasari, N. A., & Prihantini, P. (2022). Peran Strategi Pembelajaran terhadap Motivasi Belajar Siswa. *Jurnal Pendidikan Sosiologi Dan Humaniora*, *13*(2), 505. https://doi.org/10.26418/j-psh.v13i2.54825

Setiani, A. (2016). Pembelajaran Matematika dengan Pendekatan Problem Based Learning untuk Mengurangi Kecemasan Matematika dan Meningkatkan Kemampuan Pemecahan Masalah Matematis Siswa MTs. *Mathline: Jurnal Matematika Dan Pendidikan Matematika*, *1*(2), 135–148.

Setiawan, M., Pujiastuti, E., & Susilo, B. E. (2021). Tinjauan Pustaka Systematik: Pengaruh Kecemasan Matematika Terhadap Kemampuan Pemecahan Masalah Siswa. *QALAMUNA: Jurnal Pendidikan, Sosial, Dan Agama*, *13*(2), 239–256. https://doi.org/10.37680/qalamuna.v13i2.870

Shen, E. (2009). *The Effects of Agent Emotional Support and Cognitive Motivational Messages on Math Anxiety, Learning, and Motivation*. Florida State University.

Sidabutar, E. R., Simanjuntak, R. M., & Hutauruk, A. (2023). Analisis Kemampuan Literasi Matematika Siswa Dalam Menyelesaikan Soal Hots Dan Self-Regulated Learning Pada Materi SPLTV Di SMA Swasta Pamasta Tanjung Morawa. *Innovative: Journal of Social Science Research*, *3*(2), 5926–5939.

Sigiro, A., Sukestiyarno, S., & Mulyono, M. (2023). Analysis of Mathematical Literacy viewed from Student Learning Independence in Problem-based Learning assisted by e-Modules

with a Local Culture Themes. *Jurnal Pendidikan MIPA, 24*(3), 670–689. https://doi.org/10.23960/jpmipa/v24i3.pp670-689

Siregar, R. N., Suryadi, D., Prabawanto, S., & Mujib, A. (2023). Increasing Student Self-Regulated Learning Through A Realistic Mathematical Education. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, *12*(1), 1197–1212. https://doi.org/10.24127/ajpm.v12i1.6748

Syafri, F. S. (2017). Ada Apa Dengan Kecemasan Matematika? *Journal of Medives Journal of Mathematics Education IKIP*, *1*(1), 59–65.

Tevfik, I. (2015). The relationship between secondary school students mathematics anxiety and self-regulation. *Educational Research and Reviews*, *10*(5), 684–690. https://doi.org/10.5897/err2014.1896

Yanuarto, W. N., & Qodariah, L. N. (2020). Deskripsi Literasi Matematis Siswa SMP Ditinjau dari Kemandirian Belajar. *MATH LOCUS: Jurnal Riset Dan Inovasi Pendidikan Matematika*, *1*(2), 41–53.

Zamnah, L. N. (2017). Hubungan antara Self-Regulated Learning dengan Kemampuan Pemecahan Masalah Matematis pada Mata Pelajaran Matematika Kelas VIII SMP Negeri Cipaku Tahun Pelajaran 2011/2012. *Jurnal Teori Dan Riset Matematika (TEOREMA)*, *1*(2), 31.

Zimmerman, B. J. (2000). Attaining Self-Regulation: A Social Cognitive Perspective. In *Handbook of Self-Regulation* (pp. 13–39). Academic Press.

Zuraidah, Sari, T. H. N. I., & Yunarti, S. (2020). Pengaruh Kecemasan Matematika dan Prokrastinasi Akademik Siswa terhadap Hasil Belajar Matematika Siswa Kelas VIII SMP Negeri 7 Balikpapan. *Jurnal Inovasi Pendidikan Dan Pembelajaran Matematika*, *6*(1), 1–7.