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Model Contextual Teaching and Learning: Does it Influence Mathematical Problem-Solving Ability and Self-Concept?

Depriwana Rahmi[1], Suci Yuniati[2]*, Annisah Kurniati[3], Mohamad Firdaus Ahmad[4]
[1,2,3]Department of Mathematics Education, Universitas Islam Negeri Sultan Syarif Kasim, Riau, Indonesia
[4]Faculty of Sports Science and Recreation, UiTM Cawangan Negeri Sembilan, Kampus Seremban
*Correspondence: suci.yuniati@uin-suska.ac.id

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ABSTRACT

The Contextual Teaching and Learning (CTL) model is considered one of the approaches capable of integrating and simultaneously improving KPMM. KPMM itself has a positive and significant relationship with self-concept. This study aims to analyze the effect of implementing the Contextual Teaching and Learning (CTL) model on students' mathematical problem-solving abilities and self-concept compared to conventional learning. Experimental research with a research design, namely factorial design, was used in this research. The study population includes all eighth-grade students at SMPN 40 Pekanbaru. The sample was selected using the cluster random sampling technique, resulting in class VIII A being chosen as the experimental class and class VIII B as the control class. Data collection was done thru tests, questionnaires, and observation. Data analysis was performed using a two-way ANOVA test. The research results indicate no difference in MPSA between students who followed CTL model learning and direct instruction. However, there was a significant difference in MPSA between students with high, medium, and low self-concepts. Additionally, no interaction was found between the CTL learning model and self-concept on students' MPSA. One factor suspected of causing the lack of significant influence of the CTL model on MPSA is students' time management in solving MPSA problems, a lack of practice in solving problem-solving questions, and students' low accuracy in creating mathematical models. Thus, this study found that the CTL model did not have a statistically significant effect on students' mathematical problem-solving abilities.

Keywords: CTL, KPMM, Self-concept, Statistics

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Introduction

In mathematics subjects there is material related to everyday life, one of which is statistics material. This topic is a core part of the curriculum because statistics is considered important in everyday life. By studying statistics, students can develop their ability to collect, process, analyze, and interpret data, enabling them to make more accursate and fact-based decisions. However, the reality is that many students still struggle with learning statistics because they lack a basic understanding of the concepts, find it difficult to apply formulas, and are confused about drawing conclusions. According to (Febrianti dan Chotimah, 2020) many students are still unable to understand statistics because they haven't grasped the basic concepts of statistics, have difficulty understanding the meaning of the questions, and struggle to determine how to solve them. The difficulties experienced by students are certainly not unrelated to their level of understanding. Conceptual understanding ability greatly influences problem-solving skills, so the higher a student's conceptual understanding ability, the higher their ability to understand, solve, and interpret solutions to a problem (Mediyani dan Mahtuum, 2020). Problem-solving skills need to be developed to train students to become proficient and more competent in solving problems and facing challenges in daily life.

Mathematical Problem-Solving Ability (KPMM) is an activity in finding solutions to mathematical problems encountered by using all the knowledge possessed (Fitria dkk., 2018) (George Polya, 1973). Students' KPMM is related to their ability to read and understand the language of word problems, present them in mathematical models, plan calculations from mathematical models, and solve calculations from non-routine problems (Fitria dkk., 2018). KPMM aspects based on Polya are understanding the problem, including the ability to identify known and unknown elements, create a problem-solving plan, implement the problem-solving plan, and interpret the solutions obtained (Nugroho dan Dwijayanti, 2019). According to (Patmaniar, Amin, dan Sulaiman, 2021) and (Permatasari dkk., 2020), mathematical problem-solving ability is a very important skill for students and needs to be developed. This is because KPMM is included as one of the objectives of learning mathematics (Handayani, 2021). Additionally, several studies indicate the importance of KPMM, which helps students solve everyday life problems (Ramadhani 2018) (Permatasari dkk., 2020), trains students to be more responsive, diligent, and have high self-confidence (Reski, Hutapea, dan Saragih, 2019), sharpens one's critical, logical, and creative thinking abilities (Purwasi dan Fitriyana, 2019), helps students face global competition (Apriyani, Ramalis, dan Suwarma, 2019) and can support students' success in mathematics learning in the classroom (Afiyati, Warniasih, dan Utami, 2020). Based on that explanation, students need to have good KPMM. To improve KPMM, an innovative learning model is needed, and one such model is the Contextual Teaching and Learning (CTL) model.

The CTL learning model is a learning model considered capable of collaborating with KPMM and improving that ability. According to (Harahap, 2019), (Adhyan dan Sopiany, 2022), (Muslihah dan Suryaningrat, 2021), and (Mulhamah dan Putrawangsa, 2016), the average achievement and improvement in students' KPMM using the CTL (Contextual Teaching and Learning) model is better than that of students using conventional learning. In addition, CTL learning is a learning concept that connects subject matter with real-life situations and motivates students to make connections between knowledge and its application in everyday life (Suryawati dan Osman, 2017). The CTL approach can change teachers' habits from being facilitators to active and creative mediators in enhancing students' learning activities (Ekowati dkk., 2015) (Laja, 2024). CTL has 7 components in the learning process, namely constructivism, questioning, inquiry, learning community, modeling, reflection, and authentic assessment (Fadillah dkk., 2017). These components are expected to make students more active in the learning process and make it easier for them to understand mathematical concepts (Nartani, Hidayat, dan Sumiyati, 2015). With the CTL learning model, students can indirectly understand the relationship between learning experiences in school and daily life, enabling them to explore, discuss, think critically, and solve problems. Thus, CTL is one of the learning models that can be used to improve students' KPMM.

Beside KPMM, there is also an affective aspect that influences mathematics learning, namely self-concept. Self-concept is an individual's view, feelings, and self-assessment resulting from their self-observation and the feedback they receive from others, whether general, academic, or social (Risnawati, 2013). A person's view of themselves is influenced by how they interpret others' views of them. Students with a good self-concept tend to be able to complete assigned tasks, are more responsible and optimistic about their answers, and are wise in considering the opinions of others. Conversely, students with a poor self-concept tend to be hesitant in providing answers and are easily influenced by their classmates' responses. According to (Haditia, Nurrahmah, dan Nasution, 2022), there is a positive and significant relationship between self-concept and students' KPMM. Given the relationship between the CTL learning model and KPMM as well as self-concept, the purpose of this study is to determine whether or not the application of the CTL model has an effect on KPMM, viewed from the perspective of self-concept. This research is important because KPMM is a crucial aspect of 21st-century learning. The results of this study are expected to make a significant contribution to improving the quality of mathematics learning at the secondary school level, particularly in developing students' KPMM. Unlike previous studies that only examined the influence of the CTL model or self-concept separately, this research examines both simultaneously within a factorial design, thus offering a new perspective on the interaction between the CTL model and self-concept.

In addition, various studies have examined the effectiveness of the Contextual Teaching and Learning (CTL) model in improving mathematics learning outcomes. Most studies still focus on the general cognitive aspect and have not simultaneously analyzed its influence on students' mathematical problem-solving abilities and self-concept. Furthermore, studies that empirically integrate cognitive and affective aspects in one research design are still relatively limited. Therefore, this study aims to analyze the effect of implementing the CTL model on students' mathematical problem-solving abilities and self-concept, and compare it with conventional learning.

Methods

Research Design

This study uses a quantitative approach with an experimental method. The experimental method is one of the research methods used to investigate the effect of a specific treatment (Sugiyono, 2020). The purpose of experimental research is to determine whether or not there is an effect from the variables selected in the study. The research design used is a factorial design. A factorial design is a modification of a true experimental design, which is a design that considers the presence of a moderating variable that influences the treatment (independent variable) on the outcome (dependent variable) (Sugiyono, 2020). The variables in this study are divided into independent and dependent variables. The independent variable is the CTL learning model, while the dependent variables are KPMM and self-concept.

Research Population and Sample

The population in this study consists of all eighth-grade students at SMP Negeri 40 Pekanbaru for the 2023/2024 academic year. Sampling was conducted using cluster random sampling. The research sample consisted of two classes: a control class with 34 students and an experimental class with 34 students.

Research Procedures and Instruments

Data collection techniques used tests, questionnaires, and observation. Tests were used to measure students' KPMM. The test format used was essay form consisting of five questions. The KPMM scoring criteria can be seen in Table 1. Questionnaires were used to measure students' self-concept. The closed-ended questionnaire used in this study had four answer choices (strongly agree, agree, disagree, and strongly disagree) consisting of 33 statement items. Observation is used to see the suitability between planning and the learning process in the classroom. All these instruments are used to obtain data on students' initial and final abilities. The validity of the questionnaire items used the product moment correlation technique, the reliability of the test used Cronbach's alpha, then used the question's discrimination power and level of difficulty. To test the validity of the questionnaire, the product moment correlation technique was used, and the reliability of the questionnaire used Cronbach's alpha. The research was conducted from March to May 2024, while initial ability data was collected before the research began.

Table 1. *KPMM Scoring Criteria*

Indicator	Information	Score
Understanding the Problem	Not stating what is known and what is being asked	0
	Stating what is known without stating what is being asked or vice versa	1
	Stating what is known and what is being asked but not quite right	2
	State what is known and what is being asked accurately.	3
Planning the Settlement	Don't plan a solution no problem at all	0
	Plan a solution problem but not quite right	1
	Plan problem solving appropriately	2
Performing Settlement Calculations	There is no answer at all	0
	Performing calculations by writing down the answers but the answers are wrong or only a small part of the answers are correct	1
	Perform the calculation by writing down half or most of the answers that are correct.	2
	Perform the calculation by writing down the answer completely and correctly.	3
Interpret the results and double-check the correctness of the solution	There is no writing of conclusions	0
	Interpret the results obtained by making conclusions but not quite right	1
	Interpret the results obtained by drawing conclusions appropriately	2

Data Analysis

The data analysis techniques used descriptive statistics and inferential statistics. Descriptive statistics are statistics used to analyze data by describing the collected data as it is, without intending to draw conclusions that apply to the general public (generalization) (Sugiyono, 2020). Inferential statistics are statistical techniques used to analyze sample data and apply the results to the population (Sugiyono, 2020). In this study, the data analysis techniques used were validity, difficulty level, discriminatory power, and reliability. The prerequisite testing techniques were normality and homogeneity tests. Furthermore, hypothesis testing was conducted using a two-way ANOVA. The research procedure can be seen in Figure 1.

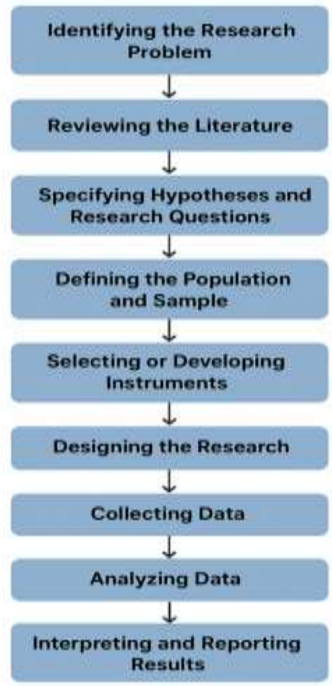

Figure1. *Research Procedures*

Results and Discussion

The research was conducted until the fifth meeting because all stages of the Contextual Teaching and Learning (CTL) learning model had been fully implemented according to the indicators set out in the learning tools and observation sheets. The analysis results showed a consistent increase in teacher and student activity scores at each meeting, indicating that the learning process was increasingly effective and participatory. This increase not only demonstrated the procedural implementation of the model but also reflected students' increasingly active involvement in constructing understanding through meaningful contexts. Practically, these findings confirm that CTL implementation has the potential to improve the quality of classroom learning interactions, as structured and responsive teacher activity correlates with increased student participation. A summary of the average results of observations of teacher and student activity at each meeting is presented in Diagrams 1 and 2.

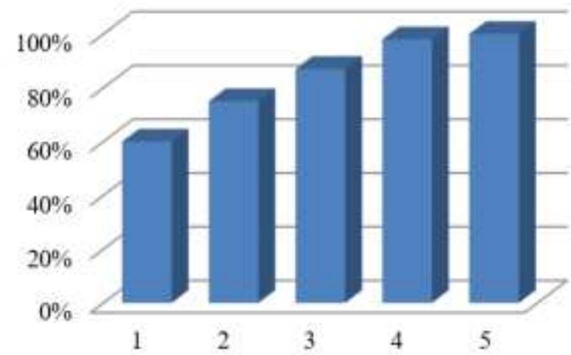

Diagram 1. *Average Teacher Observation Diagram*

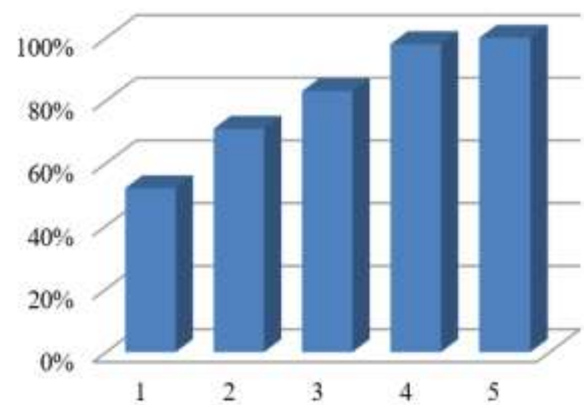

Diagram 2. *Average Student Observation Diagram*

The analysis of the self-concept questionnaire for students yielded results categorized as high, medium, and low self-concept, based on the mean and standard deviation in Table 2.

Table 2. *Categories of Student Self-Concept Grouping*

Category	Condition	Experiment	Control	Total
High	$X \geq 54{,}692$	5 Students	6 Students	11 Students
Medium	$42{,}132 < X < 54{,}692$	24 Students	23 Students	47 Students
Low	$X \leq 42{,}132$	5 Students	5 Students	10 Students

The analysis of KPMM student data began with descriptive statistical data processing, which involved determining measures of central tendency and data dispersion such as the mean, median, mode, maximum value, minimum value, range, standard deviation, and data variance, as presented in Table 3.

Table 3. *Posttest Results for Experimental and Control Classes*

Descriptive Statistics	Class	
	Experiment (VIII A)	Control (VIII B)
Number	995	809
Mean	29,26471	23,79412
Mode	36	17

Maximum Score	42	42
Minimum Score	11	9
Range	31	33
Standard Deviation	7,921237	10,45272
Variance	62,74599	109,2594

After it was found that there was a difference in the average between the experimental and control classes, a further test was then conducted to determine if there was a difference in the KPMM of the two classes. Data analysis was performed using a two-way ANOVA test. Before the two-way ANOVA test was conducted, a normality test was performed. The results of the normality test for student KPMM scores can be seen in Table 4.

Table 4. *Posttest Normality Test Results*

Class	$L_{Calculated}$	L_{table}	Criteria
Experiment	0,084802	0,121948	Normal
Control	0,124502	0,151948	Normal

Based on Table 4, it is known that the calculated L for the experimental and control classes is smaller than the table L, so it can be concluded that the data is normally distributed. Next, a homogeneity test of the KPMM score data was conducted, as shown in Table 5.

Table 5. *Posttest Homogeneity Test Results*

Class	Experimet	Control
Variance	62,74599	109,2594
Number	995	809
Df	33	33
$F_{Calculated}$	1,741296	
F_{table}	1,787822	

Because $F_{calculated} < F_{Table}$ or 1.741296 < 1.787822, it can be concluded that the posttest data for the experimental and control classes are homogeneous.

The final step is to perform a hypothesis test using a two-way ANOVA because the data obtained are normally distributed and homogeneous. The test was conducted with the criteria that if the obtained significance value is less than $\alpha = 0.05$, then $H0$ is accepted. If the obtained significance value is greater than $\alpha = 0.05$, then Ha is accepted. The detailed results of the hypothesis test can be seen in Table 6.

Table 6. *Results of Two-Way ANOVA Test*

Source of Variance	Between Rows (Model) A	Between Columns (*Self-Concept*) B	Interaction (Model× *Self-Concept*) A×B
dk	1	2	2
JK	13,23529	4066,953	388,7318

RK	13,23529	2033,476	194,3659
fh	0,084487	12,98068	1,240733
ft	3,996	3,145	3,145
Conclusion	There is no effect of KPMM between students who learn using the CTL learning model and direct instruction.	There is an effect of KPMM between students with high, medium, and low self-concept.	There is no interaction effect between the CTL learning model and self-concept on KPMM.

From Table 6, the results of the first hypothesis were obtained, where $F_{\text{Calculated}} < F_{\text{Table}}$, which is 0.084487 < 3.996 at a significance level of 5%. Therefore, $H0$ is accepted and Ha is rejected. This means there is no influence of KPMM between students who learn using the CTL learning model and students who learn using direct instruction. For the second hypothesis, $F_{\text{Calculated}} \geq F_{\text{Table}}$, which is 12.98068 ≥ 3.145 at a significance level of 5%. Therefore, $H0$ is rejected and Ha is accepted. This means there is an influence of KPMM between students with high, medium, and low self-concept. For the third hypothesis, $F_{\text{Calculated}} < F_{\text{Table}}$, which is 1.240733 < 3.145 at a significance level of 5%. Therefore, $H0$ is accepted and Ha is rejected. This means there is no interaction effect between the CTL learning model and self-concept on students' KPMM.

The first hypothesis indicates that there is no significant difference in KPMM skills between students who learn using the CTL learning model and those who learn thru direct instruction. The results of this study contradict previous research, such as the studies by (Zuliyanti dan Pujiastuti, 2020) (Adhyan dan Sopiany, 2022), (Mamartohiroh, Muhandaz, dan Revita, 2020), which showed that the CTL learning model influences students' mathematical problem-solving skills. There are many factors that contribute to the lack of difference in mathematical problem-solving skills between students who learn using the CTL learning model and those who learn thru direct instruction. These factors include students not understanding how to define the problems when answering posttest questions, such as writing down what is known and what is being asked; some students already understanding the problems while others are less careful in creating mathematical models for the questions; some students making mistakes when solving the problems; and a lack of time during the posttest. Generally, students are not yet accustomed to thinking systematically, which makes it difficult for them to solve complex problems. Thus, teachers can provide diverse and systematic problem-solving exercises, as well as positive support or encouragement to enable students to be creative in solving problems.

The second hypothesis indicates that there is an influence of KPMM among students with high, medium, and low self-concept. This is in line with the research results (Priyastutik, Suhendri, dan Kasyadi, 2019) (Musriandi 2017) (Sidabutar dan Kusnandi 2021) which state that there is a significant influence of high, medium, and low self-concept on KPMM. According to (Musriandi, 2017) (Septiyani dan Alyani, 2021), self-concept has a positive influence on students' KPMM. Students who are able to solve problems tend to have a more positive self-concept because their success in overcoming problems can boost their self-confidence and self-esteem. Conversely, difficulties students face in solving problems will negatively impact their self-concept, leading to self-doubt and feelings of inadequacy. Therefore, teachers need to build good relationships with students to create a safe and comfortable classroom environment. Teachers should focus more on the students' learning process rather than the final outcome and provide constructive feedback to help students see their progress and boost their self-confidence. Thus, self-concept becomes one of the important factors determining students' mathematical communication skills, where students with high self-concept tend to show better performance in conveying mathematical ideas.

The third hypothesis indicates that there is no interaction effect between the CTL learning model and self-concept on KPMM. This means that the effectiveness of improving students' KPMM who participate in CTL model learning is not specifically influenced by the students' self-concept (high, medium, or low). In other words, the CTL model has a relatively consistent impact on KPMM. The results of this study are supported by (Lestari, Andinny, dan Seruni, 2023), which states that there is no interaction effect of the CTL learning model and moderator variables on KPMM. The implication is that the CTL model does not entirely depend on students' self-concept to influence their KPMM, and conversely, students' self-concept is not the main determinant of the effectiveness of the learning model used in developing KPMM. This is reflected in the KPMM test results, where students with high, medium, or low self-concepts showed varying scores, both in the experimental and control groups. This situation indicates that beside self-concept, there are other factors that play an important role in influencing students' KPMM. These factors include motivation, student activity, interest, learning enthusiasm, learning media, and professional educators (Nuraulia, Uswatun, dan Nurrochmah, 2020). In other words, the success of the CTL model in improving KPMM does not depend solely on students' self-concept, but is also influenced by various other factors such as motivation, student activity, interest, learning media, and students' active involvement in the learning process.

The implications of these findings indicate that the implementation of the CTL learning model is not yet statistically effective, but it has practical significance in improving the quality of the classroom learning process. The increase in teacher and student activity at each meeting indicates that context-based learning can encourage active engagement, more meaningful interactions, and a more collaborative learning atmosphere. Pedagogically, this confirms the need for teachers to design learning that connects material to real-world situations to facilitate students in building conceptual understanding. Furthermore, the successful implementation of CTL in this study can be an alternative learning strategy recommended for teachers to increase participation and the quality of learning interactions, particularly in mathematics.

This study has several limitations that should be considered when interpreting the results. First, this study was limited to statistics topics. Therefore, the findings cannot be generalized to determine the influence of the CTL model on students' mathematical problem-solving abilities in other mathematics topics. Second, some students experienced time constraints when completing the KPMM test, which potentially impacted their performance in optimally representing their abilities. Third, the limited learning time allocation requires more thorough planning to ensure that each stage of the CTL can be implemented optimally and not solely focused on procedural completion.

Based on these findings, further research is recommended to test the application of CTL to various mathematics materials to obtain a more comprehensive picture of the consistency of its effectiveness. Learning time and test timing also need to be designed more proportionally according to student characteristics and abilities. Furthermore, the use of a wider range of evaluation instruments, such as project assignments, interviews, or performance assessments, can help measure KPMM more thoroughly and authentically. With these developments, future research is expected to make stronger contributions, both theoretically and practically, to the development of mathematics learning.

Conclusion

Based on the research results, it can be concluded that there is no effect of KPMM between students who received learning with the CTL learning model and students who received direct learning. There is an effect of KPMM between students with high, medium, and low self-concepts, and there is no interaction effect between the CTL learning model and self-concept on students' KPMM. In this case, students with a good self-concept can follow a more enjoyable learning process, feel no anxiety, and can understand the material presented, resulting in students having good KPMM. Therefore, in an effort to improve KPMM, teachers should motivate students more in improving their self-concept, and teachers can implement the CTL learning model with more mature planning.

The findings of this study can serve as a reference for other researchers examining the CTL learning model from other aspects (cognitive, psychomotor, or affective). Furthermore, teachers can use the CTL model in their teaching as an alternative learning approach.

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References

Adhyan, A., R, Sutirno, Sopiany, H., N. (2022). Pengaruh Model Pembelajaran CTL terhadap Kemampuan Pemecahan Masalah matematis Siswa kelas VII SMP. *Jurnal Pembelajaran Matematika Inovatif*. 3(5). 559-566. https://doi.org/10.22460/jpmi.v5i6.1749-1760

Afiyanti, Y., Warniasih, K., & Utami, N. W. (2020). Problem Solving with Guided Inquiry Learning: An Analysis of Student's Problem-Solving Ability. *Journal of Physics: Conference Series*, 1(1). https://doi.org/10.1088/17426596/1581/1/012035

Apriyani, Ramalis, T. R., & Suwarma, I. R. (2019). Analyzing Student's Problem-Solving Abilities of Direct Current Electricity in STEM-based Learning. *Journal of Science Learning*, 2(3), 85-91. https://doi.org/10.17509/jsl.v2i3.1 7559

Ekowati, Ch. Krisnandari, Darwis, Muhammad, Upa, H. M. D. Pua; Tahmir, Suradi. (2015). The Application of Contextual Approach in Learning Mathematics to Improve Students Motivation at SMPN 1 Kupang. *Jurnal International Education Studies*. 8(8).12-13.

Fadillah, A., Dewi, N., P., Ridho, D. Nurkholis, M., Prastiwi, M., N. (2017). The Effect of Application of Contextual Teaching and Learning (CTL) Model Based on Lesson Study with Mind Mapping Media to Assess Student Learning Outcomes on Chemistry on Colloid Systems. *International Journal of Science and Applied Science: Conference Series*. 1(2). 101-108. https://doi.org/10.20961/ijsascs.v1i2.5128

Febrianti, V., Chotimah, S. (2020). Analisis Kesulitan pada Materi Statistika Kelas VIII Siswa SMP. *Jurnal Pembelajaran Matematika Inovatif*. 3(5). 559-566. https://doi.org/10.22460/jpmi.v3i5.559-566

Fitria, N., F., N., Nurul, H, Hendriana, H. Risma, A. (2018). Analisis Kemampuan Pemecahan Masalah Matematik Siswa SMP dengan Materi Segitiga dan Segiempat. *Edumatica: Jurnal Pendidikan Matematika*. 8(1). 49-57.

Haditia, N, C., Nurrahmah, A., & Nasution, S. (2022). Pengaruh Self-Concept terhadap Kemampuan Pemecahan Masalah Matematika Siswa Kelas VII di SMP Negeri 275 Jakarta. *Prosiding Diskusi Panel Nasional Pendidikan Matematika*. 1-6

Handayani, U. F. (2022). Kreativitas Siswa Kemampuan Tinggi dalam Memecahkan Masalah Matematika Kontekstual. *Pi: Mathematics Educations Journal*, 4(2), 91–101. https://doi.org/10.21067/pmej.v4i2.5757

Harahap, Nur Hajijah. (2019). Pengaruh Penerapan Pembelajaran Kontekstual terhadap Kemampuan Pemecahan Masalah Matematis Siswa Kelas XI MAN Barumun Tengah. *MathEdu (Mathematic Education Journal.* 2. 28–32

Laja, P.W. (2024). The Differencesin Effectiveness of Learning Using Contextual Teaching and Learning (CTL) and the Missouri Mathematics Project (MMP) in Termsof Mathematics Learning. *Range: Jurnal Pendidikan Matematika*, 6(1), 112-122

Lestari, I., Y. (2023). Kemampuan Pemecahan Masalah Matematika Melalui Model Pembelajaran Kontekstual ditinjau dari Kecerdasan Visual Spasial. *Jurnal Ilmiah Matematika Realistik.* 4(2). 297-304.

Mamartohiroh, S., Muhandaz, R., & Revita, R. (2020). Pengaruh Model Contextual Teaching and Learning Terhadap Kemampuan Pemecahan Masalah Matematis Berdasarkan Kemandirian Belajar Siswa SMP/MTs. *Tarbawi: Jurnal Ilmu Pendidikan*, 16(1), 46–58. https://doi.org/10.32939/tarbawi.v16i01.524

Mediyani, D., & Mahtuum, Z. A. (2020). Analisis Kesulitan Siswa dalam Menyelesaikan Soal Materi Statistika pada Siswa SMP Kelas VIII. *Jurnal Pembelajaran Matematika Inovatif*, 3(4), 385. https://doi.org/10.32528/gammath.v5i1.3189

Mulhamah & Putrawangsa, S. (2017). Penerapan Pembelajaran Kontekstual dalam Meningkatkan Kemampuan Pemecahan Masalah Matematika. *Jurnal Pendidikan Matematika*. 10(1). https://doi.org/10.22342/jpm.10.1.3279.58-80

Muslihah, N., N & Suryaningrat, E. F. (2021). Model Pembelajaran Contextual Teaching and Learning terhadap Kemampuan Pemecahan Masalah Matematis. *Plusminus: Jurnal Pendidikan Matematika*, 1(3). 553-564. https://journal.institutpendidikan.ac.id/index.php/plusminus

Musriandi, R. (2017). Hubungan antara Self-concept dengan Kemampuan Pemecahan Masalah Matematis Siska. *Jurnal Dedikasi*. 1(2). 150-160

Nartani, C. I, Hidayat, R. A. & Sumiyati, Y. (2015). Communication In Mathematics Contextual. *International Journal of Innovation and Research in Educational Sciences*. 2(4). 284-287

Nugroho, A.A., & Dwijayanti, I. (2019). Analisis Kemampuan Pemecahan Masalah Mahasiswa Calon Guru Matematika Pada Mata Kuliah Program Linier. *AKSIOMA: Jurnal Matematika dan Pendidikan Matematika*. 10 (2), 277-284

Nuraulia, N., Uswatun, D. A., Nurrochman, A. (2020). Analisis Kemampuan Pemecahan Masalah Matematika Siswa melalui Soal Kelas II SDN 1 Selabintana. *JIKAP PGSD: Jurnal Ilmiah Ilmu Kependidikan*. 4(3). 247-256.

Patmaniar, Amin, S. M., & Sulaiman, R. (2021). Student's Growing Understanding In Solving Mathematics Problem Based on Gender Elaborating Folding Back. *Journal on Mathematics Education*, 12(3), 507–530. https://doi.org/10.22342/JME.12.3 .14267.507-530

Permatasari, C. P., Yerizon, Y., Arnawa, I. M., & Musdi, E. (2020). Improving Students' Problem-Solving Ability through Learning Tools Based on Problem Based Learning. *Journal of Physics: Conference Series*, 1554(1). https://doi.org/10.1088/1742- 6596/1554/1/012017

Polya, G. (1973). *How to Solve it*. In Stochastic Optimization in Continuous Time. https://doi.org/10.1017/cbo9780511616747.007

Priyastutik, Syela, Huri Suhendri, and Soeparlan Kasyadi. (2019). Pengaruh Kemandirian dan Konsep Diri terhadap Pemecahan Masalah Matematika Siswa. *JKPM (Jurnal Kajian Pendidikan Matematika).* 4(1) https://doi.org/10.30998/jkpm.v4i1.2826

Purwasi, L. A., & Fitriyana, N. (2019). Pengembangan Lembar Kerja Siswa Berbasis Pendekatan Open-Ended untuk Melatih Kemampuan Pemecahan Masalah Matematis Siswa SMP. *Kreano: Jurnal Matematika Kreatif-Inovatif*, 10(1), 18-26.

Ramadhani, R. (2018). The Enhancement of Mathematical Problem-Solving Ability and Self-confidence of Students Through Problem Based Learning. *Jurnal Riset Pendidikan Matematika*, 5(1), 127–134. https://doi.org/10.21831/jrpm.v5i1.13269

Reski, R., Hutapea, N., & Saragih, S. (2019). Peranan Model Problem Based Learning (PBL) terhadap Kemampuan Pemecahan Masalah Matematis dan Kemandirian Belajar Siswa. *JURING (Journal for Research in Mathematics Learning)*, 2(1), 049-057.

Rija, Legina Alma, and Kusnandi. (2021). Analisis Kemampuan Pemecahan Masalah Matematis Siswa ditinjau dari Self-Concept. *Journal on Mathematics Education Research. 2(1).* 21–34.

Risnawati. (2013). *Keterampilan Belajar Matematika*. Yogyakarta: Aswaja Pressindo,

Septiyani, N. O., & Alyani, F. (2021). Analisis Konsep Diri terhadap Kemampuan Pemahaman Matematis Siswa di SMA. *Vygotsky: Jurnal Pendidikan Matematika dan Matematika*, 3(2), 133-144.

Sugiyono. (2020). *Metode Penelitian Pendidikan*. Alfabeta.

Zuliyanti, P & Pujiastuti, H. (2020). Model Contextual Teaching Learning (CTL) untuk Meningkatkan Kemampuan Pemecahan Masalah Matematis Siswa SMP. *Jurnal Prisma*. 9(1). 98-107