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ANALYSIS OF CREATIVE THINKING SKILLS ON THE PYTHAGOREAN THEOREM MATERIAL IN TERMS OF SELF-CONFIDENCE

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ABSTRAK

Dalam kemampuan berpikir kreatif yang dimiliki peserta didik pada pembelajaran matematika dapat memecahkan masalah matematika. Agar dapat mencapai kemampuan berpikir kreatif harus memiliki kepercayaan diri pada peserta didik. Terlebih pada materi teorema Pythagoras berkaitan dengan berpikir kreatif. Tujuan penelitian ini untuk mendeskripsikan kemampuan proses berpikir kreatif peserta didik pada materi teorema phytagoras yang ditinjau berdasarkan *self-confidence.* Subjek penelitian ini adalah peserta didik kelas VIII Sekolah Menengah Pertama (SMP) di kota Jakarta, sebanyak 120 peserta didik. Penelitian ini menggunakan metode kualitatif dengan pendekatan deskriptif. Dengan menggunakan instrument test berpikir kreatif dan angket kepercayaan diri serta analisis data menggunakan *person maps*. Berdasarkan hasil yang diperoleh bahwa, klasifikasi kepercayaan diri peserta didik yang tinggi mempengaruhi kemampuan berpikir kreatif matematis peserta didik yang tinggi pula. Klasifikasi kepercayaan diri sedang, maka kemampuan berpikir kreatif matematis peserta didik cukup baik. Sebaliknya, jika klasifikasi kepercayaan diri peserta didik rendah akan berdampak pada kemampuan berpikir kreatif matematis peserta didik pun rendah.
Kata Kunci: Kemampuan Berpikir Kreatif, Teorema Pythagoras, Kepercayaan Diri

ABSTRACT

With students' creative thinking skills in learning mathematics, they can solve mathematical problems. Students must have confidence in themselves to achieve creative thinking skills, especially in the Pythagorean theorem material related to creative thinking. This study aims to describe students' creative thinking processes abilities on the Pythagorean theorem material reviewed based on self-confidence. The subjects of this study were Junior High School students in grade VIII in Jakarta, as many as 120 students. This study uses a qualitative method with a descriptive approach. The instrument for collecting data is creative thinking test instruments, self-confidence questionnaires and data analysis using person maps. Based on the results obtained, the high self-confidence classification of students affects the students' high mathematical creative thinking skills. The self-confidence category is moderate, then the students' mathematical creative thinking ability is quite good. Conversely, if the classification of a student's self-confidence is low, then a student's mathematical creative thinking skills are also low.
Keywords: Creative Thinking Skill, Pythagorean Theorem, Self-Confidence

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INTRODUCTION

Calculations are optimized by the science of mathematics, which is universal and measurements. Mathematical formulas are used every day, so mathematics becomes the main subject from elementary school to college (Masfufah et al., 2018). Permendikbud No 58 in 2014 reveals that in learning mathematics, students can have the ability to cooperate logically, analytically, systematically, critically, innovatively, and creatively (Safitri et al., 2020). Students must develop creative thinking skills from these abilities to face the generation of modernization and technological developments.

Facts on the ground show that the ability of students to think creatively and numerically has not been well developed in all respects until now. Moreover, students in Indonesia have not increased effectively and remain at a low level. Based on the 2011 Trends in International Mathematics Science Study (TIMSS) research on international mathematics results for class VIII, Indonesia is ranked 36th out of 48 countries. Then in 2015, the TIMSS results also revealed that Indonesia in mathematics was in the bottom six, so it can be concluded that creative thinking remains low (Mulyaningsih & Ratu, 2018). Lack of training or exploration of students' thinking skills is a factor that causes students' mathematical creative thinking skills to be still in the low category (Dilla et al., 2018; Safitri et al., 2021; Trisnawati et al., 2018).

According to Hendriana et al. (2017), for math students, thinking creatively is a crucial mathematical skill that must be studied and cultivated. In line with that, Kadir in (Parotua, 2018), in the world of information and technology that is growing rapidly, one of the important qualities that students get is creative thinking. Then, Rasnawati et al. (2019) said the ability to solve problems in various ways, generate lots of ideas, find new approaches that differ from others, and develop ideas are examples of creative thinking skills. Meanwhile, according to Deddy (2015), Creative thinking is an activity that involves seeing or thinking about something unusual, combining seemingly unrelated facts, and coming up with a new solution or concept that exhibits fluency, flexibility, originality, and elaboration. Thus, students forming new concepts, must have the self-confidence to develop mathematical creative thinking skills.

Students must have positive self-confidence to optimize their abilities (Trisnawati et al., 2018). The ability of students to manage thought patterns and self-confidence is very influential on creative mathematical thinking. Students' self-confidence is more prominent to be trained to appear in all parts of creative mathematical thinking (Masfufah et al., 2018). Trisnawati et al. (2018) revealed that self-confidence is a good mental attitude in which a person places or prepares himself to assess himself and his environment to feel comfortable taking action to achieve the desired results. According to Purwasih (2015), junior high school students can use their self-confidence to construct new knowledge by researching existing talents, presenting conjectures/hypotheses, and trying to find their own using their abilities.

The Pythagorean theorem is a basic material mathematical theorem that deals with the concepts of variables and equations. The concept of variables is one of the most important mathematical concepts for higher-order thinking, including creative thinking. In right triangles,

the Pythagorean theorem states that the square of the hypotenuse or longest side (the hypotenuse) equals the sum of the squares of the other sides (Murniasih, 2016). The Pythagorean Theorem material is also one of the mathematics-oriented resources for 21st-century competencies with creative thinking as an indication in mathematics. As a result, the Pythagorean theorem and creative thinking can be interrelated. In addition, the ability to think creatively in the Pythagorean theorem is still relatively low (Kole & Patricia, 2018). This research attempts to explain the students' capacities for the creative thinking process as they relate to the Pythagorean theorem content. These capacities are evaluated based on self-confidence, fluency, flexibility, originality, and elaboration features. And components of self-confidence include believing in their skills, taking

METHODS

In this study, a qualitative methodology and a descriptive strategy are used. The study's participants were in-class participants VIII SMP in Jakarta, which consisted of 120 students who had taken the Pythagorean theorem material. The instrument in this study was a non-test in the form of a self-confidence scale of students and a question about students' creative thinking skills using the Pythagorean theorem material. The initial stage in this research is compiling a self-confidence questionnaire. In this situation, the researcher employs indications derived from existing sources, namely from Hendriana et al. (2018) and Nufus et al. (2018). The indicator was then adjusted by the researcher such that it became 20 statements, each of which had four potential answers: strongly agree (SS), agree (S), disagree (TS), and strongly disagree (STS). The questionnaire scoring for each positive answer choice is 4, 3, 2, 1 and vice versa for the negative. The students' self-confidence levels will be high, medium and low.

In addition to using a questionnaire, the researcher tested the mathematical creative thinking question instrument, which consisted of 8 Pythagorean theorem questions that had been validated by two lecturers and one junior high school teacher with the validation results that the instrument used was valid. In each question, there are four indicators of creative mathematical thinking. Use the existing scoring guide rubric to analyze students' answers to each question. Data collection techniques carried out in this study include a) tests by providing mathematical creative thinking questions with Pythagorean theorem questions, b) self-confidence of pupils is measured by questionnaires, c) documentation in the form of students' answers to creative thinking questions, d) interviews with students to consider the answers to the written test by obtaining information and clarifying the results of students. Using Winsteps' person map, do a data analysis to categorize the level of student confidence.

RESULT AND DISCUSSION

In this study, the data processed is qualitative data obtained from the test results of mathematical creative thinking skills and subject interviews. Instruments tested is a test of the description of the Pythagorean theorem chapter with eight questions. The interviews were carried out to know the level of self-confidence and the mathematical creative thinking process of the research subject. Level classification for self-confident questionnaires using a person map via Winstep is shown in Figure 1. According to Lestari & Yudhanegara (2018), determining students' self-confidence levels resulted in high, medium and low confidence classifiers. In line

with Arikunto (2015), the research's high, medium, and low self-confidence classifier employs a technique for determining where each student stands in three ranks.

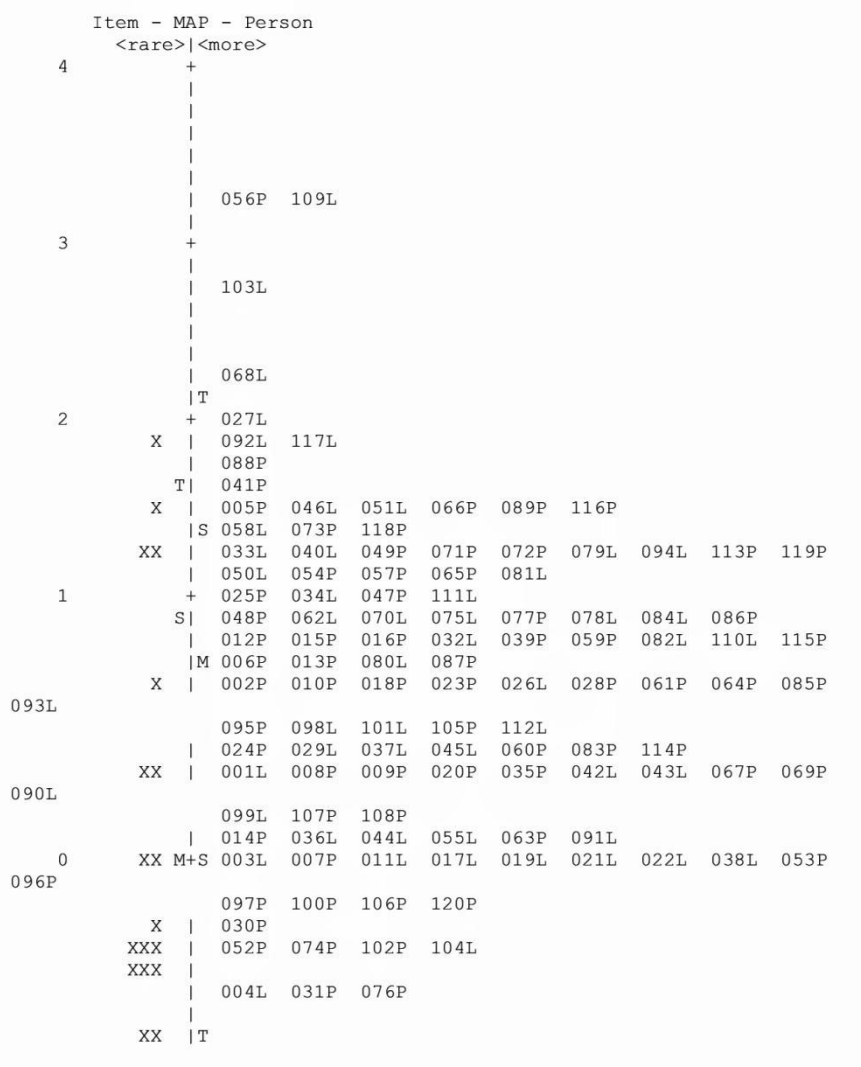

Figure 1. Person Maps Self-Confidence

According to Figure 1, Four students have high self-confidence, 28 have moderate self-confidence, and 88 have low self-confidence. Because this research is based on students' self-confidence, the researcher chose six students. As for the six students, Table 1 shows the subject of this research.

Table 1. Research Subject

No	Name	*Self-Confidence* Level
1	MF	High
2	MA	High
3	JMS	Medium
4	AGP	Medium
5	DA	Low
6	MAS	Low

High Self-Confidence and Creative Mathematical Thinking Ability

According to the written exam results utilizing the Pythagorean theorem material, MA students with high confidence in answering Pythagorean questions can answer all problems that need creative thinking. Because MA students can understand the questions by stating what is known and asked correctly, can There are many ways to solve a problem well, be able to describe the stages of completion clearly and correctly and write conclusions clearly and correctly in creative thinking. MA students feel confident with the answers obtained, so they do not doubt their answers and can provide reasons MA feel satisfied with that answer. Meanwhile, MF students with high self-confidence can also complete three indicators of creative thinking skills: fluency, originality and elaboration. Because MF can provide alternative answers and able to write down the steps of completion with true, but in some numbers, the MF students do not write down how to solve it using complete because MF students do not understand the question, can write a conclusion from the answer in creative thinking. MF can explain the answer briefly and correctly but is a little less clear. However, MF students feel confident with the answers they get even though MF don't clearly explain why MF students feel satisfied with the answers. The answers of MA and MF is shown in Figure 2.

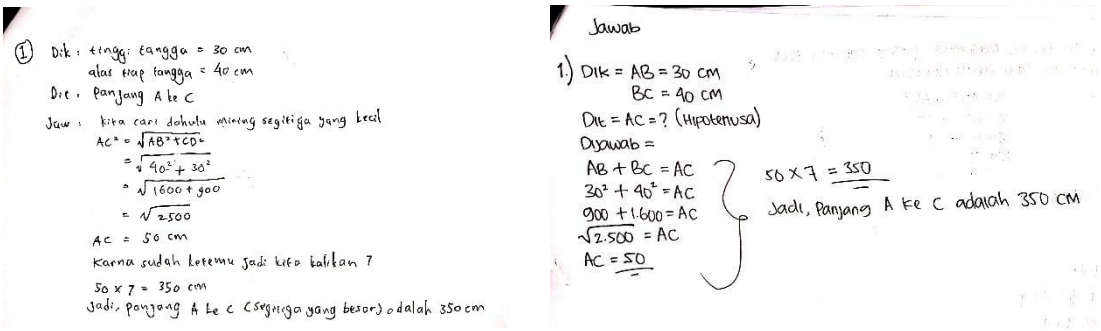

Figure 2. MA and MF Students' Answers

The interview result is shown in Table 2. MA is more confident in solving the Pythagorean theorem problems than MF students. MA students can explain other alternative answers, solve problems with the right and correct steps, and provide clear ideas from problem-solving. This description shows that MA students have excellent creative thinking skills and a high self-confidence classification. Meanwhile, MF students can solve problems correctly. Still, when re-explaining the answers they write are unclear, they can explain alternative answers other than what they have written and express an idea clearly. From this description, MF students have good creative thinking skills and self-confidence with a high classification level. It aligns with the research results (Trisnawati et al., 2018). Students' curiosity will be stimulated, and their ability to think creatively about mathematics will increase as their self-confidence grows. It is reinforced by Pratiwi et al. (2018), Students' self-confidence has a good impact on their mathematical creative thinking skills, which can be read as students who are confident in their abilities because they have high self-confidence.

Table 2. Interview Result

Question	MA's Answer	MF's Answer
Q: Have you understood question no.1?	**MA**: Understand.	**MF**: I was initially confused, but after rereading the problem, I understood.
Q: If you understand it, try to rephrase question no. 1 in your own words!	**MA**: First, calculate the hypotenuse of one of the steps using the Pythagorean formula. The result is 50 cm, then multiplying by the number of steps by 7, the result is 350 cm.	**MF**: Calculate the hypotenuse of the rung, then multiply by the number of steps.
Q: In your opinion, is there any other way to solve it?	**MA**: There is. It could also be with the base and height of the steps multiplied by the number of steps and then using the Pythagorean formula.	**MF**: Reverse the base and height times the number of steps and then look for the sloping side.
Q: Are you sure about the answer to no.1?	**MA**: Sure.	**MF**: Sure.
Q: How do you make sure your answer is correct?	**MA**: Because the method I use is correct, although there are other methods, the method I use is also correct.	**MF**: I don't know.

Medium Self-Confidence and Creative Mathematical Thinking Ability

Based on the results of tests conducted on JMS and AGP students with a moderate level of confidence classification in solving Pythagorean theorem problems, they can solve two indicators of creative thinking ability. JMS can understand the questions well even though JMS students only write down what is known and asked in 2 questions, cannot provide alternative answers, and can correctly write the stages of completion. Still, one of the JMS student numbers is incomplete in the writing stages of completion and can write the conclusions of JMS students in creative thinking. And JMS can re-explain the answers obtained briefly, clearly and correctly. JMS felt confident with the answer because he felt that the formula and solution method were correct and had been explained with a similar problem to the teacher.

Meanwhile, AGP student no able to understand the questions well, but AGP students cannot write down what is known and asked in the question, cannot give ways, can compete for the stages of completion correctly, as well as participants AGP students cannot give conclusions from the answers they get in creative thinking. And AGP students, can It is known that AGP students can re-explain the answers obtained briefly and concisely but a little less clear. AGP feel confident with the answer because AGP students think the teacher has explained them. The answers of JMS and AGP are shown in Figure 3.

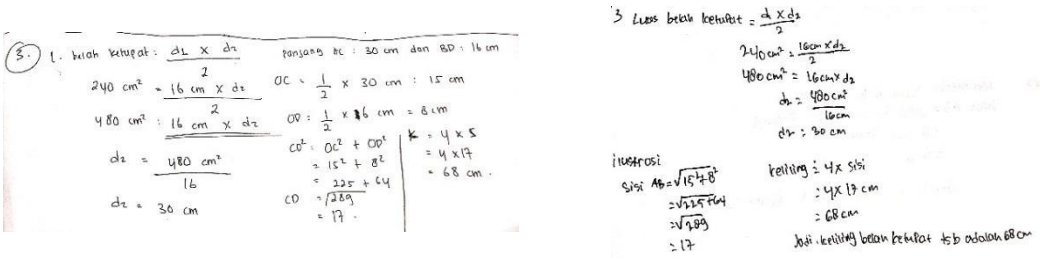

Figure 3. JMS and AGP Student Answer Results

The interview result is shown in Table 3.

Table 3. Interview Result

Question	JMS's Answer	AGP's Answer
Q: Have you understood question No. 3?	**JMS**: Understand.	**AGP**: Understand.
Q: If you understand it, try to rephrase question no. 3 in your own words!	**JMS**: Calculate from the diagonal first because the known plane figure is a rhombus, then we get the result 30 cm from using the area of the rhombus. Then 30 cm and 16 cm are divided by two for each from point O. After that, find the hypotenuse AB using Pythagoras.	**AGP**: Using the formula for the area equal to the diagonal one times the diagonal two divided by two after getting the result and then using the Pythagorean formula, maybe.
Q: In your opinion, is there any other way to solve it?	**JMS**: I don't know.	**AGP**: I don't know because I won't think of another if I've used one method.
Q: Are you sure about the answer to this number 3?	**JMS**: sure.	**AGP**: sure.
Q: How do you make sure your answer is correct?	**JMS**: Because of using the correct formula.	**AGP**: I don't know.

Based on the findings of the initial interviews, JMS students can describe things clearly and correctly and are easy to understand. Still, the answers on the answer sheets are correct but incomplete and unclear and have not provided unique solutions. Compared to AGP students who can give answers correctly even though they explain answers that are incomplete and doubtful, they are still unable to provide answers that are different from the others. From the description above, both JMS and AGP students have good creative thinking skills and a moderate self-confidence classification. It is in line with research by Trisnawati et al. (2018) the lower the self-confidence of students, the less motivated their curiosity will be, and The growth of mathematical creativity will be impacted by self-confidence. So, students with a moderate sense of their worth also have a modest capacity for original thought.

Low Self-Confidence and Creative Mathematical Thinking Ability

Based on the results of the tests carried out, it can be seen that the low self-confidence of DA and MAS students in solving Pythagorean theorem problems are only able to solve one indicator and do not meet all indicators of creative thinking ability. Because DA students can write down what is known and asked in the question, unable to provide other alternative answers, they can solve with completion of the correct stages. Still, the DA students incorrectly entered value into the formula so that his final answer is wrong, and DA could not give conclusions from the answers obtained in creative thinking. DA could not re-explain the correct answer they got because he was confused about what step to explain it. DA students felt doubtful about the right answer obtained and did not give a clear reason.

Meanwhile, MAS can write down what is known and asked in the question but not enough, cannot provide alternative answers and can solve with the completion of the correct stages. Still, MAS students are less clear in describing the stages of completion, and MAS students cannot conclude the answers obtained through creative thinking. And MAS students cannot do the question because students feel confused and do not understand the question, and feel unsure of the answer. The answers of MAS and DA are shown in Figure 4.

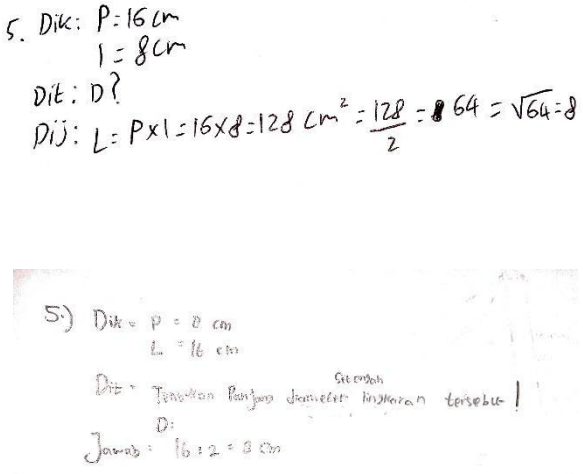

Figure 4. Results of MAS and DA Students' Answers

The interview result is shown in Table 4. Based on the findings of the DA students' interviews, DA failed to respond because they misunderstood the question's intent. Meanwhile, MAS students did not answer the question because they were confused by the steps to solve the problem, but MAS students could explain a little of what they understood. It is consistent with studies by Trisnawati et al. (2018) that the lack of self-confidence students have, the less motivated their curiosity will be. It will impact how well pupils develop their mathematics and creative thinking skills.

Table 4. Interview Result

Question	DA's Answer	MAS's Answer
Q: Have you understood question No. 5?	**DA**: I don't understand.	**MAS**: I'm confused.
Q: Which part makes you confused?	**DA**: I don't know the meaning of that question. So I do what I think.	**MAS**: I'm confused about what step to start with.
Q: Try to explain what you understand.		**MAS**: The problem has length, width and two semicircles. Since we are looking for a diameter, we divide the width by two.

CONCLUSION

Based on the discussion about mathematical creative thinking skills in the Pythagorean theorem material in terms of self-confidence, with class VIII students in one of the junior high schools in Jakarta, the following is the conclusion, students who have high self-confidence classification have all indicators or three indicators of good creative thinking skills in solving problems and fulfilling all indicators, namely fluency, flexibility, novelty and elaboration. Students with a moderate level of self-confidence possess good creative thinking skills in solving problems and meet two indicators of creative thinking abilities: fluency and flexibility. Meanwhile, Low levels of creativity are classified among students that lack self-confidence in solving problems and only meet one indicator or do not meet all indicators of creative thinking ability, namely fluency. Thus, it may be said that students' self-confidence influences their mathematical creativity abilities.

REFERENCES

Arikunto, S. (2015). *Dasar-Dasar Evaluasi Pendidikan.* Jakarta: PT Bumi Askara.

Irawan, D. (2015). *Analisis kemampuan berpikir kreatif matematis dan kemandirian melalui pembelajaran model 4K ditinjau dari gaya belajar siswa kelas VII* [Skripsi, Universitas Negeri Malang[. http://lib.unnes.ac.id/id/eprint/22254

Dilla, S. C., Hidayat, W., & Rohaeti, E. E. (2018). Faktor gender dan resiliensi dalam pencapaian kemampuan berpikir kreatif matematis siswa SMA. *Journal of Medives : Journal of Mathematics Education IKIP Veteran Semarang*, 2(1), 129-236. https://doi.org/10.31331/medives.v2i1.553

Hendriana, H., Johanto, T., & Sumarmo, U. (2018). The role of problem-based learning to improve students' mathematical problem-solving ability and self confidence. *Journal on Mathematics Education, 9(2), 291-300*. https://doi.org/10.22342/jme.9.2.5394.291-300

Herdiana, H., Rohaeti, E. E., & Sumarmo, U. (2017). Hard skills dan soft skills matematika siswa. *Worksheets begin on*, 325.

Kole, P. K., & Patricia, F. A. (2018). Analisis berpikir kreatif siswa dalam menyelesaikan soal pythagoras melalui model JUCAMA. *PRISMATIKA: Jurnal Pendidikan Dan Riset Matematika, 1(1), 23-31*. https://doi.org/10.33503/prismatika.v1i1.300

Lestari, K. E., & Yudhanegara, M. R. (2018). *Penelitian Pendidikan Matematika*. Banding: *PT. Refika Aditama*.

Masfufah, S. H., Winarsih, P., & Kadarisma, G. (2018). Hubungan self confidence terhadap

kemampuan berfikir kreatif matematis siswa MTs. *JPMI (Jurnal Pembelajaran Matematika Inovatif), 1(5), 895-902*. https://doi.org/10.22460/jpmi.v1i5.p895-902

Mulyaningsih, T., & Ratu, N. (2018). Analisis kemampuan berpikir kreatif siswa SMP dalam memecahkan masalah matematika pada materi pola barisan bilangan. *Pendekar : Jurnal Pendidikan Berkarakter, 1(1), 34-41*. https://doi.org/10.31764/pendekar.v1i1.266

Murniasih, T. R. (2016). Penggunaan Media Manipulatif Untuk Meningkatkan Pemahaman Konsep Siswa Pada Teorema Pythagoras. In *Prosiding Seminar Nasional Pendidikan Matematika* (pp. 142–152).

Nufus, H., & Duskri, M. (2018). Mathematical creative thinking and student self-confidence in the challenge-based learning approach. *Journal of Research and Advances in Mathematics Education*, 3(2), 57-68. https://doi.org/10.23917/jramathedu.v3i2.6367

Parotua, A. J. (2018). *Kemampuan berpikir kreatif matematis ditinjau dari minat belajar siswa kelas VIII pada pembelajaran creative problem solving pendekatan kontekstual* [Skripsi, Universitas Negeri Semarang]. http://lib.unnes.ac.id/id/eprint/36071

Pratiwi, I., Yulianti, D., Malinda, P., Pitriyani, P., Hajar, M. S., & Hidayat, W. (2018). Pengaruh self confidence siswa SMP terhadap kemampuan berpikir kreatif matematis siswa. *JPMI (Jurnal Pembelajaran Matematika Inovatif), 1(4), 667-672*. https://doi.org/10.22460/jpmi.v1i4.p667-672

Purwasih, R. (2015). Peningkatan kemampuan pemahaman matematis dan self confidence siswa MTS di kota cimahi melalui model pembelajaran inkuiri terbimbing. *Didaktik, 9(1), 16-25.* http://e-journal.stkipsiliwangi.ac.id/index.php/didaktik/article/view/113

Rasnawati, A., Rahmawati, W., Akbar, P., & Putra, H. D. (2019). Analisis kemampuan berfikir kreatif matematis siswa SMK pada Materi Sistem Persamaan Linier Dua Variabel (SPLDV) di Kota Cimahi. *Jurnal Cendekia : Jurnal Pendidikan Matematika, 3(1), 164-177*. https://doi.org/10.31004/cendekia.v3i1.87

Safitri, D., & Maryati, M. (2021). Analisis Kemampuan Berpikir Kreatif Matematis Siswa dalam Menyelesaikan Soal pada Materi Pola Bilangan Kelas VIII Ditinjau dari Kepercayaan Diri. *MATH LOCUS: Jurnal Riset dan Inovasi Pendidikan Matematika*, 2(1), 23-33. https://doi.org/10.31002/mathlocus.v2i1.1513

Safitri, W. D., Susanto, H. P., & Mulyadi. (2020). *Pengembangan Instrumen Angket untuk Mengukur Tingkat Resiliensi Matematis Siswa* [Skripsi, STKIP Pacitam). https://repository.stkippacitan.ac.id/id/eprint/154/

Trisnawati, I., Pratiwi, W., Nurfauziah, P., & Maya, R. (2018). Analisis kemampuan berpikir kreatif matematis siswa sma kelas xi pada materi trigonometri di tinjau dari self confidence. *JPMI (Jurnal Pembelajaran Matematika Inovatif), 1(3), 383-394*. https://doi.org/10.22460/jpmi.v1i3.p383-394