ISSN 2715-7458
E-ISSN 2715-7466

Journal of Mathematical Pedagogy
Volume 4, No. 2, July 2023, pp. 74-83

Students' Deductive Reasoning in Evaluating Solutions to Geometry Problems

Aulia Rahmah[1], Silvia Kumala Dewi[2], Ahmad Wachidul Kohar[3]

[1,2,3] Universitas Negeri Surabaya, Kampus Ketintang Surabaya 60231, Indonesia
Email: auliarahmah.20056@mhs.unesa.ac.id

Abstract

Deductive reasoning is very important in learning mathematics and is one of the formal goals that emphasizes the arrangement of reasoning. This is a qualitative research that aims to describe the deductive reasoning abilities of junior high school students in evaluating problem solutions in geometry material. The subjects of this study were two junior high school students in Gresik who had high mathematical abilities and were of different genders. The instrument used was task-based interviews. The task in question is a deductive reasoning ability test in which there are problems and their solutions. Data analysis was carried out using three indicators of deductive reasoning according to Sumarmo: carrying out calculations based on certain formulas, conducting proofs, and drawing conclusions. The results showed that the deductive reasoning abilities of female and male students were relatively the same. In solving the problem, Both male and female students had similar initial idea by making an example of the length of the side of the given object. However, male students are more capable of proving and considering more effective strategies for solving problems. Therefore, students and teachers need to improve their deductive reasoning abilities and consider all effective strategies for solving problems.

Keywords: Deductive Reasoning, Evaluation of Problem Solutions, Geometry

Abstrak

Penalaran deduktif sangatlah penting dalam pembelajaran matematika dan merupakan salah satu tujuan formal yang memberikan tekanan kepada penataan nalar. Penelitian ini merupakan penelitian kualitatif yang bertujuan untuk mendeskripsikan kemampuan penalaran deduktif siswa SMP dalam mengevaluasi solusi masalah geometri. Subjek penelitian ini adalah 2 siswa SMP di Gresik yang memiliki kemampuan matematika tinggi dengan jenis kelamin yang berbeda. Instrumen yang digunakan adalah wawancara berbasis tugas. Tugas yang dimaksud yaitu tes kemampuan penalaran deduktif yang di dalamnya terdapat permasalahan serta solusinya. Analisis data dilakukan menggunakan 3 indikator penalaran deduktif menurut Sumarmo yaitu melaksanakan perhitungan berdasarkan rumus tertentu, melakukan pembuktian, dan menarik kesimpulan. Hasil penelitian menunjukkan bahwa kemampuan penalaran deduktif siswa perempuan dan laki-laki relatif sama. Dalam menyelesaikan permasalahan, kedua siswa tersebut memiliki ide awal yang serupa dengan membuat permisalan ukuran panjang sisi objek yang diberikan. Namun, siswa laki-laki lebih mampu dalam melakukan pembuktian dan mempertimbangkan strategi yang lebih efektif dalam memecahkan masalah. Oleh karena itu, penting bagi siswa dan guru untuk meningkatkan kemampuan penalaran deduktif serta mempertimbangkan segala strategi yang efektif dalam memecahkan masalah.

Kata kunci: Penalaran Deduktif, Evaluasi Solusi Permasalahan, Geometri.

How to Cite: Rahmah, A., Dewi, S.K., & Kohar, A.W. (2023). Analysis of Deductive Reasoning Ability of Junior High School Students in Evaluating Solutions to Geometry Material Problems. *Journal of Mathematical Pedagogy, 4* (2), 74-83.

Introduction

Reasoning is one ability needed to solve every math problem. Since elementary school, students need to learn mathematical reasoning to equip them with analytical, creative, logical, and systematic thinking skills (Yurianti et al., 2014). Through mathematical reasoning, students can understand that mathematics is logical and makes sense (Fadillah, 2019). Without the development of students' mathematical reasoning abilities, these students will assume that mathematics is material that follows a series of procedures and imitates examples without knowing the meaning (Manyira et al., 2021).

Mathematical reasoning is the basis for learning mathematics, enabling students to understand general concepts related to one of the thinking processes to arrive at a conclusion (Nababan, 2020). In addition, reasoning ability is also one of learning mathematics goals at school, namely to train students' ways of reasoning in developing problem-solving abilities and the ability to convey information and communicate ideas (Indah & Nuraeni, 2021). One important type of mathematical reasoning is deductive reasoning. Deductive reasoning is a reasoning process to obtain logical conclusions from one or more general truths (Manyira et al., 2021). This is in line with the opinion of Ayalon & Even (2010) which states that deductive reasoning is the process of concluding from information (premises) that are already known to be true, where these conclusions must come from the information provided and do not need to be proved again.

According to Soedjadi, deductive reasoning is very important in learning mathematics and is one of the formal goals that puts pressure on reasoning (Wijayanti, 2017). In addition, deductive reasoning is also one characteristic of learning mathematics at school (Suherman, 2003). In deductive reasoning, the truth of a concept obtained is a logical consequence of the previous truth, so that the relationship between concepts in mathematics is consistent (Indah & Nuraeni, 2021).

One activity that requires deductive reasoning skills to produce a valid truth, namely the activity of evaluating a conjecture or argument (Ayalon & Even, 2010). Evaluating is a student activity in assessing, supporting, or denying an idea with reasons that can strengthen the answers obtained (Tunnur & Mundilarto, 2017). In assessing, supporting, or denying an idea, of course, it requires a deductively valid proof in mathematics which will involve other mathematical theories or formulas that have been proven to be true deductively as well (Izzah & Azizah, 2019).

The use of deductive reasoning in mathematical problems provides a wider space to explore all strategies (Adnyana, 2012). In addition, Pfeiffer (2011) also stated that evaluating activities provides a wider space to explore all strategies for solving problems. One of the mathematical materials that is rich in exploration activities is geometry material (Noto, 2015). Afini et al. (2021) explain that geometry does not only focus on mastering concepts, but also needs to prove its findings, so students need good reasoning abilities. Deductive reasoning is very important in learning mathematics, especially in geometry material. However, several studies show that students' evaluating abilities and deductive reasoning abilities are still weak. Such as research by Purbaningrum (2017) Which shows that junior high school students' mastery of the ability to evaluate is still in the low category. This means that these students are less able to assess, refute, or support an idea and provide reasons that can strengthen the answers obtained. In addition, Budiarto et al. (2008) stated that one of the students' mistakes in geometry material was that they were not trained in deductive proof. Research by Budiarto & Artiono (2019) also states that the geometric problems that occupy the top rank are problems of deductive use, such as problems of proof and problems of perception.

Students' deductive reasoning abilities in evaluating solutions to geometric problems can be influenced by several factors, one of which is gender differences. Some experts argue that female students are more thorough in several ways than male students. In addition, Krutetskii et al. (1976) explains that the difference between men and women in mathematics is that men are superior in reasoning, while women are superior in accuracy, thoroughness, and thoroughness of thinking. Asmaningtias (2009) argues that no matter how good and brilliant a woman's intelligence is, in essence, women rarely have an overall interest in theoretical issues like men; women are more interested in practical matters than theoretically; women are also closer to concrete practical life problems, while men are more interested in abstract aspects.

Several reseachers did some research about deductive reasoning. Such as research by Afandi (2016) regarding the profile of junior high school students' deductive reasoning in solving geometric problems based on gender differences, and also research by Fadillah (2019) concerning the analysis of students' mathematical deductive reasoning abilities. However, so far, previous studies have tended to

ask students or research subjects to solve a problem. It is still rare to find previous research that analyzes students' deductive reasoning abilities in evaluating solutions to problems. In addition, Syahbana (2012) also stated that student activity in researching or evaluating problem solutions is one activity that is rarely found in learning mathematics at school. Therefore, the researcher is interested in describing the Students' Deductive Reasoning in Evaluating Solutions to Geometry Problems.

Method

This research is a type of descriptive research with a qualitative approach that aims to describe the deductive reasoning abilities of junior high school students in Gresik, East Java, in evaluating solutions to geometry problems. This research was conducted in the even semester of the 2022/2023 academic year with two students as subjects. The determination of the subject in this study used a purposive sampling technique by considering the students' ability to understand the initial ability test given. The selection of research subjects begins with the provision of initial ability test questions to students. The questions on this initial ability test are simpler than the questions that will be tested in this study. Next, the research selects two students of different genders who have high mathematical abilities. Students are classified as having high abilities because these students have been able to understand and plan to solve the problems given, while most of the other students struggle with understanding the questions due to the unknown size of the side lengths in the problem.

The instrument used in this study was task-based interviewing. The task in question is a test of deductive reasoning abilities in geometric material in which there are problems and their solutions. From the solution to the problem, students must evaluate it so that the truth of the solution can be known with certainty. Meanwhile, the interviews in this study were used for an in-depth exploration of students' deductive thinking processes in evaluating solutions to geometric material problems.

The test questions used in this study are questions adapted from Fajri (2020) research. The following is a list of deductive reasoning ability tests used in this study:

Dina was given the task of making a replica of a traffic sign in the shape of a square, like the picture above. However, Dina's teacher stated that Dina's traffic sign was too big. The teacher asked Dina to reduce the traffic sign so that it was 1/2 times as wide as before. Therefore, Dina decided to change the size of each side of her traffic sign to 1/2 times the size before. What do you think?

Figure 1. Deductive Reasoning Ability Test Questions

After getting the test results and interviews, the next stage is analyzing the research results. The process of analyzing students' deductive reasoning abilities in geometry material in this study uses three indicators of deductive reasoning abilities proposed by Sumarmo (2016), namely:

1. Perform calculations based on certain formulas or rules.
2. Perform proof directly, indirectly, or using mathematical induction.
3. Draw logical conclusions based on inference rules.

Result and Discussion

The following is a description of the analysis of the results of student answers and the results of interviews with research subjects:

Analysis of the Results of the Female Subject's Answers

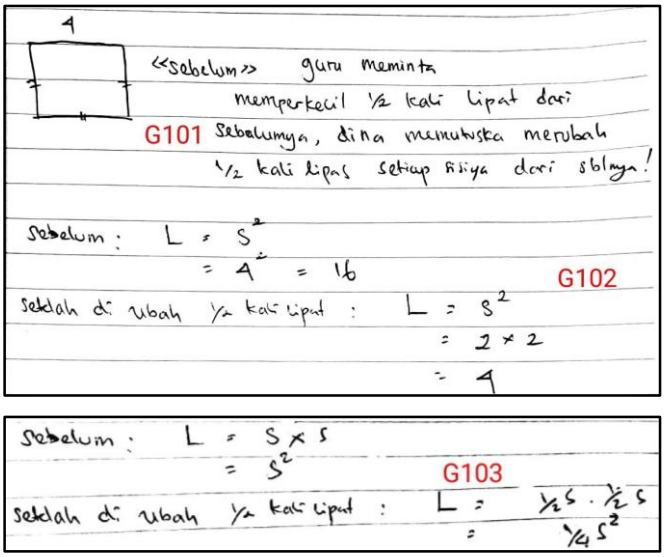

Figure 2. Results of female subjects' answers

To obtain further information about the subject's deductive abilities based on Figure 2, the following is an interview that the researcher conducted with a female subject:

Perform Calculations Based on Certain Formulas or Rules

PP01 : "What is the essence of the problem that you understand?"

SP01 : "In this problem, it is known that the teacher asked Dina to reduce the traffic sign, which is square, so that its area is $\frac{1}{2}$ times the previous size, so Dina changed the size of the side of the traffic sign to be $\frac{1}{2}$ times as much too."

PP02 : "Can you explain what concepts or formulas you used in solving this problem?"

SP02 : "Use the formula for the area of a square, and then compare the results for the area."

PP03 : "What are your reasons for using this method or strategy?"

SP03 : "Because what the teacher asked for was to reduce the area, use the formula for the area of a square. Then, to be sure if the area was $\frac{1}{2}$ times as large, I compared the area."

PP04 : "Did you do all the steps of the strategy or method that you had planned before?"

SP04 : "Yes"

In the indicators of carrying out calculations based on certain formulas or rules, female subjects have been able to understand the problems given and determine which formulas are used appropriately (SP01, SP02, and G101). Female subjects can also determine and explain what steps must be taken to solve the problem (SP03). In addition, the female subject performs calculations correctly according to the previously planned concept (G102).

Perform Proof

PP05 : "How do you make sure the answers you write are correct. Did you check it?"

SP05 : "Yes, I checked whether it was under what was in the question, and I also checked the results of the calculations."

PP06 : "the solution that you calculated and checked is only 4 cm and 2 cm, then for the other side length measurements, for example, 6 cm and 3 cm, 16 cm and 8 cm, and the others, how is that?"

SP06 : "I'll give an example to make it easier, this means you also need to calculate the overall side length, right?"

PP07 : "Yeah right."

SP07 : "Okay, I'll try it in a moment."

PP08 : "How are the results?"

SP08 : "The answer is still the same."

In the indicators for proving, the female subject initially tried to exemplify the size of the given problem object with the aim of making it easier to perform calculations (SP06). However, when the researcher asked the subject to provide proof, the female subject could provide proof correctly (SP08 and G103).

Draw Logical Conclusions Based on Inference Rules

PP09 : "Are you sure the steps you are taking are correct?"

SP09 : "Sure."

PP10 : "Okay, after you compared the area, what's the answer to this question?"

SP10 : "Because the result of the comparison is $\frac{1}{4}$ times as much, not $\frac{1}{2}$ times. Dina was wrong."

In the indicator of drawing conclusions, female subjects can provide conclusions with answers accompanied by reasons precisely according to what is asked in the problem and the results of the calculations that have been carried out (SP10).

Analysis of the Results of the Male Subject's Answers

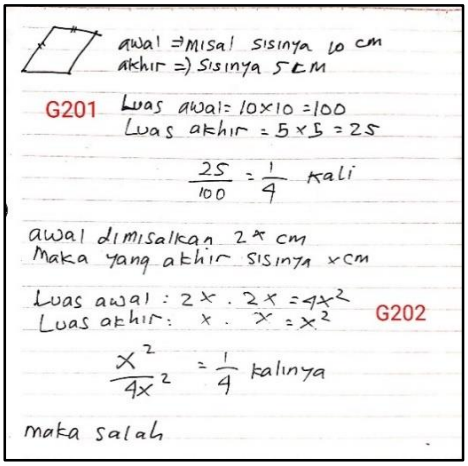

Figure 3. Results of male subjects' answers

To obtain further information about the subject's deductive abilities based on Figure 3, the following is an interview that the researcher conducted with a male subject:

Perform Calculations Based on Certain Formulas or Rules

PL01 : "What do you understand from the problem?"

SL01 : "Dina's traffic sign is too big, so Dina changed the size of the side of the traffic sign to $\frac{1}{2}$

times the size so that the area is $\frac{1}{2}$ times the size before."

PL02 : "What concepts or formulas do you use in solving this problem?"

SL02 : "Square area"

PL03 : "What is your reason for using this method or strategy? "

SL03 : "Earlier, Dina wanted a bigger area, so use the formula for the area of a square."

PL04 : "After knowing the area of the square, what do you do?"

SL04 : "Comparing"

PL05 : "Did you use all the strategies or methods that you planned before?"

SL04 : "Yes"

In the indicators of carrying out calculations based on certain formulas or rules, male subjects have been able to understand the problems given and determine the formulas to be used appropriately (SL01 and SL02). Male subjects can also determine and explain what steps must be taken in solving problems (SL03 and SL04). In addition, the male subject performs calculations correctly according to the previously planned concepts (G201 and G202).

Perform Proof

PL06 : "How do you make sure the answers you write are correct? Did you check it?"

SL06 : "Yes, I checked the calculation results."

PL07 : "This is the first one, why are there side measurements?"

SL07 : "I'll give an example to make it easier."

PL08 : "Then can you explain below?"

SL08 : "I'll say that the side lengths are 2x and x because in the question there is no description of the side lengths"

PL09 : "Why did you start with 2x sides but not x?"

SL09 : "To make it easier, if you start with x, later it will be $\frac{1}{2}$ x at the end, and it will be more difficult to count it."

In the indicators for proving, the male subject exemplifies the size of the given problem object to get an overview so that it makes it easier for the next step (SL07). After that, the male subject can do proof according to the previous methods (SL08 and G202). When doing the proof, the male subject can compare which method is easier so that it is not too complex or difficult to perform calculations (SL09).

Draw Logical Conclusions Based on Inference Rules

PL10 : "Are you sure the steps you are taking are correct?"

SL10 : "Yes"

PL11 : "After you compared the area, what is the answer to this question?"

SL11 : "The answer is wrong because the ratio of the area is $\frac{1}{4}$, not $\frac{1}{2}$"

In the indicator of drawing conclusions, the male subject can provide conclusions and answers accompanied by reasons according to what is asked in the problem correctly (SL11). After previously being able to determine the strategy that will be used in solving the problem and carrying out proof correctly, the male subject can draw conclusions based on the results of the solution that has been carried out.

The results obtained in this study indicate that female and male students in this study have several similarities in evaluating solutions to geometric problems. The similarities are that female and male students can understand the problem, as indicated by students being able to name all the elements

contained in the problem and being able to retell the information contained in the problem. Students can also design and implement strategies to be used in solving problems and can carry out calculations correctly under the strategy that has been previously designed. Thus, it can be concluded that female and male students have been able to fulfill the indicators of performing calculations based on certain formulas or rules. In addition, female and male students in evaluating solutions to problems can also draw conclusions based on the results of their calculations according to what is asked in the problem. This shows that female and male students have been able to meet the indicators to conclude. Apart from these similarities, female and male students also have the same initial ideas for evaluating solutions to problems. The similarity of the initial idea in question is that it tries to exemplify the size of the given problem object to make it easier to perform calculations.

In addition to similarities, there are also slight differences between female and male students in evaluating solutions to geometry problems; namely, female students in this study still need instructions to generalize problem solving according to indicators of proof, while male students can generalize problem solving according to the indicators of proof without requiring instructions from the researcher. This is in accordance with the results of Subarinah (2013) research which stated that the generalization abilities of male students were better than female students. Male students in solving problems have the ability to create complex patterns, make conjectures about generalizations, and test them on the answers they want. Meanwhile, female students only make simple patterns and are reluctant to try complicated calculations. Even though female students still need instructions in generalizing answers, these female students can prove the results of their general solutions correctly. This shows that female and male students have been able to fulfill the indicators of proof.

Another difference between female students and male students is that male students can compare which method is more effective so that it is not too complex or difficult to perform calculations. In solving problems, female students solve them in a structured manner according to the statement in the problem without trying to determine other alternative solutions that are more effective in solving the problem. Based on the results of Rasyid (2017) research, which states that in the strategic planning stage, male students can contemplate or consider the strategies used, while female students do so only to the extent of believing without considering based on their experience in problem solving. This is also in accordance with what was suggested from the results of Nugroho et al. (2021) research, which states that teachers should be able to facilitate female students in studying mathematical problems that do not only emphasize procedural skills, so that students can be trained to be able to determine many alternative solutions to the problems given.

Conclusion

Based on the results and discussion related to the analysis of the deductive reasoning abilities of junior high school students in evaluating solutions to geometric material problems for female and male students who have high levels of mathematical ability, it can be concluded that female and male students have almost equal deductive reasoning abilities. This is because the two students have been able to fulfill all indicators of deductive reasoning ability, namely being able to carry out calculations based on certain formulas or rules, being able to do proofs, and being able to draw logical conclusions based on rules of inference.

In evaluating solutions to geometric problems, female and male students also had similar initial idea, namely by trying to give an example of the size of the given problem object. The two students did this to make it easier to do calculations at a later stage. In addition to the similarities between the two students, female and male students also have differences in evaluating solutions to geometric problems; namely, female students still need instructions or guidance in proving. In addition, male students are also more able to consider the strategies used to be more effective. Therefore, it is still necessary to

increase students' deductive reasoning and the need for habituation for students to consider all strategies that are effective in solving problems.

Based on the differences in carrying out proofs and in choosing effective strategies between male and female students, teachers should be able to design learning that can improve deductive reasoning abilities and need to familiarize students with considering all effective strategies in solving problems. However, this research does not rule out the possibility of producing different research results because it only uses subjects with high mathematical abilities and this research is also limited to geometry material. Therefore, this research can be continued by focusing on deductive reasoning in evaluating solutions on other materials or by considering other variables.

References

Adnyana, G. P. (2012). Keterampilan Berpikir Kritis dan Pemahaman Konsep Siswa pada Model Siklus Belajar Hipotetis Deduktif. *Jurnal Pendidikan Dan Pengajaran*, *45*(3).

Afandi, A. (2016). Profil Penalaran Deduktif Siswa SMP Dalam Menyelesaikan Masalah Geometri Berdasarkan Perbedaan Gender. *APOTEMA: Jurnal Program Studi Pendidikan Matematika*, *2*(1), 8–21.

Afini, D. W., Mujahidawati, D., & Sabil, H. (2021). *Pengaruh Model Pembelajaran POE (Predict Observe Explain) Terhadap Kemampuan Penalaran Matematis Siswa Pada Materi Geometri Kelas VII SMPN Megang Sakti Kabupaten Musi Rawas*. https://repository.unja.ac.id/id/eprint/27924

Asmaningtias, Y. T. (2009). Kemampuan matematika laki-laki dan perempuan. *Madrasah: Jurnal Pendidikan Dan Pembelajaran Dasar*, *1*(2).

Ayalon, M., & Even, R. (2010). Mathematics Educators' Views on the Role of Mathematics Learning in Developing Deductive Reasoning. *Article in International Journal of Science and Mathematics Education*, *8*, 1131–1154. https://doi.org/10.1007/s10763-010-9238-z

Budiarto, M. T., & Artiono, R. (2019). Geometri dan permasalahan dalam pembelajarannya (suatu penelitian meta analisis). *Jurnal Magister Pendidikan Matematika (JUMADIKA)*, *1*(1), 9–18.

Budiarto, M. T., Khabibah, S., & Setianingsih, R. (2008). Membangun Level Abstraksi Siswa SMP dalam Memahami konsep Geometeri. *Penelitian Fundamental Tahun Pertama, Pusat Penelitian Unesa Surabaya.*

Fadillah, A. (2019). Analisis Kemampuan Penalaran Deduktif Matematis Siswa. *JTAM (Jurnal Teori Dan Aplikasi Matematika)*, *3*(1), 15–21. https://doi.org/10.31764/JTAM.V3I1.752

Fajri, S. R. (2020). Profil Kemampuan Penalaran Matematis Siswa Sekolah Menengah Pertama dalam Menyelesaikan Soal Limas dan Prisma. *(Doctoral Dissertation, UIN AR-RANIRY).*

Indah, P., & Nuraeni, R. (2021). Perbandingan Kemampuan Penalaran Deduktif Matematis Melalui Model PBL dan IBL Berdasarkan KAM. *Mosharafa: Jurnal Pendidikan Matematika* , *10*(1). http://journal.institutpendidikan.ac.id/index.php/mosharafa

Izzah, K. H., & Azizah, M. (2019). Analisis Kemampuan Penalaran Siswa dalam Pemecahan Masalah Matematika Siswa Kelas IV. *Indonesian Journal Of Educational Research and Review*, *2*(2), 210–218. https://doi.org/10.23887/IJERR.V2I2.17629

Krutetskii, V. A., Teller, J., Kilptrick, J., & Wirszup, I. (1976). *The psychology of mathematical abilities in schoolchildren* (Vol. 8). University of Chicago Press Chicago.

Manyira, M., Saidi, S., & Hamid, H. (2021). Analisis Kemampuan Penalaran Deduktif Matematis Siswa SMP dalam Menyelesaikan Masalah Pertidaksamaan Linear Satu Variabel. *Jurnal Pendidikan Guru Matematika*, *1*(3). https://doi.org/10.33387/jpgm.v1i3.3529

Nababan, S. A. (2020). Analisis Kemampuan Penalaran Matematis Siswa Melalui Model Problem Based Learning. *Genta Mulia : Jurnal Ilmiah Pendidikan*, *11*(1). https://www.ejournal.stkipbbm.ac.id/index.php/gm/article/view/386

Noto, M. S. (2015). Efektivitas Pendekatan Metakognisi terhadap Penalaran Matematis pada Mata Kuliah Geometri Transformasi. *Infinity Journal*, *4*(1), 22–31. http://www.e-journal.stkipsiliwangi.ac.id/index.php/infinity/article/view/68

Nugroho, M., Setyawati, R. D., & Sutrisno, S. (2021). Problem-Solving Ability of Female Students with Moderate Cognitive Level in Function Relation. *Journal of Mathematical Pedagogy (JoMP)*, *3*(1), 33–44.

Pfeiffer, K. (2011). Features and purposes of mathematical proofs in the view of novice students: Observations from proof validation and evaluation performances. *Unpublished Doctoral Dissertation). National University of Ireland, Galway*.

Purbaningrum, K. A. (2017). Kemampuan Berpikir Tingkat Tinggi Siswa SMP dalam Pemecahan Masalah Matematika ditinjau dari Gaya Belajar. *JPPM (Jurnal Penelitian Dan Pembelajaran Matematika)*, *10*(2). https://jurnal.untirta.ac.id/index.php/JPPM/article/view/2029

Rasyid, M. A. (2017). Profil Berpikir Reflektif Siswa SMP dalam Pemecahan Masalah Pecahan Ditinjau dari Perbedaan Gender. *Kreano, Jurnal Matematika Kreatif-Inovatif*, *8*(2), 171–181.

Subarinah, S. (2013). Profil berpikir kreatif siswa dalam memecahkan masalah tipe investigasi matematik ditinjau dari perbedaan gender. *Seminar Nasional Matematika Dan Pendidikan Matematika*, 541–548.

Suherman, E. (2003). Strategi pembelajaran matematika kontemporer. *Bandung: Jica*.

Sumarmo, U. (2016). Pedoman pemberian skor pada beragam tes kemampuan matematik. *Kelengkapan Bahan Ajar Mata Kuliah Evaluasi Pembelajaran Matematika Pada Program Magister Pendidikan Matematika STKIP Siliwangi: Tidak Diterbitkan*.

Syahbana, A. (2012). Peningkatan Kemampuan Berpikir Kritis Matematis Siswa SMP melalui Pendekatan Contextual Teaching and Learning. *Edumatica: Jurnal Pendidikan Matematika*. https://mail.online-journal.unja.ac.id/edumatica/article/view/604/7052

Tunnur, R., & Mundilarto. (2017). Pengembangan Model IDACR untuk Meningkatkan Kemampuan Mengevaluasi Peserta Didik SMA pada Mata Pelajaran Fisika. *Prosiding Seminar Nasional Pascasarjana Unsyiah*, *0*(0). https://doi.org/10.17969/rtp.v%vi%i.6882

Wijayanti, P. S. (2017). Profil Kemampuan Penalaran Deduktif Mahasiswa Pada Materi Ruang Vektor. *INSPIRAMATIKA*, *3*(2), 75–82. https://doi.org/10.52166/inspiramatika.v3i2.414

Yurianti, S., Yusmin, E., & Nursangaji, A. (2014). Kemampuan Penalaran Matematis Siswa pada Materi Sistem Persamaan Linear Dua Variabel Kelas X SMA. *Jurnal Pendidikan Dan Pembelajaran Khatulistiwa (JPPK)*, *3*(6). https://doi.org/10.26418/jppk.v3i6.5461