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The Effectiveness of Math Magazine Assisted Problem Based Learning on Students' Problem Solving Viewed from Learning Independence

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Abstract

Problem solving ability is one of the abilities that must be possessed by students of the 5 abilities that exist in mathematics education. The fact is that the problem-solving ability and independent learning character of SMA Negeri 5 Semarang students still need to be improved. One of the efforts to improve problem-solving skills and the character of learning independence is to apply Problem Based Leaning with the help of Math Magazine. This research aims (1) to test the effectiveness of Problem Based Learning assisted by math magazine; and (2) describe problem solving abilities with Problem Based Learning assisted by math magazine in terms of learning independence. This research used a mixed method research method with a sequential explanatory research design. The population in this study were students of class XI SMA Negeri 5 Semarang for the 2022/2023 academic year. The selected sample was 33 students as the experimental group and 28 students as the control group. Data collection methods were carried out by tests, independent learning questionnaires, and interviews. The results showed that (1) Problem Based Learning assisted by Math Magazine on the ability to solve problems exceeds classical completeness by 91%, (2) The average problem solving ability in the Problem Based Learning model assisted by Math Magazine is better than the problem solving abilities of control class students, and (3) the average problem solving ability in the Problem Based Learning model assisted by the Mathematics magazine is more than 70.

1. Introduction

Based on the National Council of Teachers Mathematics or better known as NCTM, there are 5 competencies in mathematics education, namely: mathematical problem solving, mathematical communication, mathematical reasoning, mathematical connections, and mathematical representation. Problem solving is defined as an attempt to find a way out of a difficulty (Polya, 1973). Meanwhile, according to Sajadi et al. (2013) that problem solving is an important element in combining real life problems. When students are solving math problems, students are faced with several challenges such as difficulties in understanding the questions because of problems students have faced before. One of the challenges in learning mathematics is to improve problem solving abilities. The importance of problem solving in Indonesia can be seen in Regulation of the Minister of Education and Culture Number 22 of 2016 which makes problem solving part of knowledge and skill competencies in the standard process of primary and secondary education. From the results of the teaching and learning activities that have been carried out, it can be concluded that the minimum criteria of mastery learning in mathematics is 70. From the questions given to 36 students it shows that students' problem-solving abilities are still low. The average obtained is 63.75 and 67% classical completeness.

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In the following, one of the questions and the results of student work related to problem solving abilities is presented.

> The function of the speed of an object is $v = 6t + 3$ determine the distance traveled (s) after moving for $t = 10$ seconds if at the time of $t = 4$ seconds, the distance traveled is 80 m

One of the student's answers is shown in the image below.

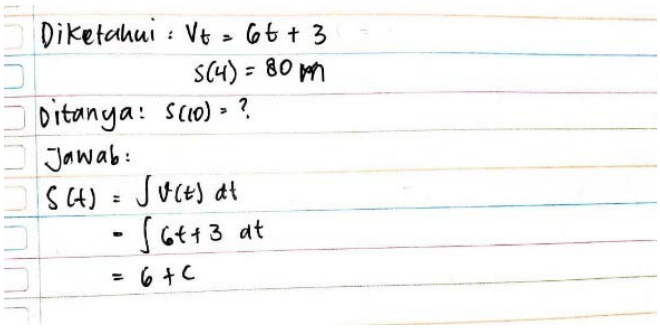

Figure 1. Students work result

Based on the picture above, it can be concluded that students cannot determine the information contained in the problem, students cannot develop a settlement plan and carry out the settlement plan correctly, and students cannot conclude the results of their work. Students only calculate the distance by integrating the speed. This shows that the ability to solve problems before conducting research is still low. Based on the results of observations with the mathematics teacher and analysis of students' daily test results, it was found that there were still many students who had difficulty working on problems that were different from the practice questions. The level of learning outcomes is not solely influenced by the potential of students but also the application of a learning model. The accuracy of applying a good learning model is able to develop students' learning abilities (Masturoh et al., 2014). Problem Based Learning is a learning model or approach that can be used by teachers to improve students' problem solving abilities. Arends (2009) cited by Angkotasan (2014) states "Problem Based Learning helps students develop their thinking and problem solving skills, learn authentic adult roles, and become independent learners." According to Ruchaedi and Baehaki (2016) Problem Based Learning can help students rediscover mathematical concepts, reflection, abstraction, formalization, and problem solving. Problem Based Learning can help make teaching and learning activities more enjoyable and student-centered. Students are given the opportunity to find problems around them that can be used as problems during learning. Students are also given the opportunity to talk about the problem with classmates and think about how to solve the problem. Therefore, it is hoped that students will acquire problem solving skills using the Problem Based Learning model in learning mathematics

Furthermore, learning media as a teacher's teaching aid to students can be an alternative in carrying out learning variations. Previous research regarding the use of the Math Magazine media by Munawaroh et al. (2021) showed a positive response with a result of 79.6%. Another study by Savitri (2019) concluded that the average value of the experimental class or trial class was greater than that of the control class. The presentation of magazines is much lighter and more interesting because the portion of the pictures in the magazine is more than in the book, the language used is also not always the standard language. Mathematics learning resources in the form of magazines are still rare. In fact, by activating the sense of sight (such as using books, pictures, maps, charts, films, models, and demonstration tools) students will learn more effectively. This is because by sight it will give a longer impression, easier to remember, and easier to understand. Learning media in the form of magazines has added value compared to ordinary textbooks, one of which is the contents of magazines that are related to everyday life.

Another factor that influences problem-solving abilities is learning independence. Iwamoto, et al in Isnaeni et al. (2018) state that independent learning is described as individuals who are actively involved in the learning environment, organize, train, and use their abilities effectively, and have positive motivational beliefs about their abilities in learning. According to Haris Mujiman in Handayani and Ariyanti (2020) learning independence is a student activity in learning that is carried out because of a desire from within oneself to be able to have a competence in solving problems with the provisions they have. Learning independence can be defined as an attitude of students who have the characteristics of (1) learning initiative; (2) diagnosing learning needs; (3) set learning goals; (4) monitor, regulate and control performance or learning; (5) viewing difficulties as challenges; (6) search for and utilize relevant learning resources; (7) selecting and implementing learning strategies; (8) evaluating learning processes and outcomes, as well as self-concept (self-concept) (Sugandi, 2013). Therefore, independent learning is a person's effort to change behavior on their own accord and not depend on others.

The problem posed in this study is whether the learning methodology Problem-Based supported by Mathematics Magazine is effective for solving skills problem, based on the background information given above. The aim of this research is to evaluate the impact of the Problem Based Learning paradigm, with assistance from Magazine Mathematics, on the ability to solve problems. Indicators used in research these are (1) The ability to solve problems with Problem Based learning assisted by Math Magazine achieves 75% classical completeness; (2) The average problem solving ability using the Problem Based Learning model assisted by Math Magazine is more than the average problem solving ability using the expository learning model; (3) The average mathematical problem solving ability of students with Problem Based Learning assisted by Math Magazine is more than 70.

2. Method

This research used a mixed method research method with a sequential explanatory research design, namely mixed research with quantitative and qualitative research methods which are carried out sequentially (Sugiyono, 2019). The population in this study were students of class XI SMA Negeri 5 Semarang. Sampling on quantitative resilience was carried out by cluster random sampling obtained by class XI IPA 8 (control class) and XI IPA 9 (experimental class). Subjects in the qualitative research were taken from the experimental class with purposive sampling, 6 subjects were selected with 2 subjects from high, medium and low learning independence.

The data collection techniques used were tests, non-tests (learning independence questionnaires), and interviews. The test used to measure the ability to solve problems. The test questions were tested first in the trial class so that the validity, reliability, discriminating power, and difficulty level of the questions were obtained. The student self-efficacy questionnaire contains 19 statement items. The scale used is a Likert scale in the form of a checklist, with the answer choices of strongly agree, Agree, Disagree, and Strongly Disagree. Interviews were conducted with research subjects with the aim of obtaining data on problem solving abilities in terms of student learning independence.

The quantitative data analysis technique in this study was to test hypothesis 1, namely whether problem solving abilities with Problem Based Learning assisted by Math Magazine achieve 75% classical completeness. Hypothesis 2 was used to test the average problem-solving ability using the Problem Based Learning model assisted by Math Magazine, which was higher than the average problem-solving ability using the expository learning model. Testing hypothesis 3 was used to test the average mathematical problem-solving ability of students with Problem-Based Learning assisted by the Mathematics Magazine of more than 70. Qualitative data analysis was carried out in stages: data reduction, data presentation, and drawing conclusions. After that, triangulation is carried out, namely checking data from the same source using different techniques.

3. Results & Discussions

3.1. Quantitative Research

In quantitative research, a prerequisite test is carried out before testing the hypothesis. The data was taken from the results of students' problem-solving ability tests. Prerequisite test for normality test and homogeneity test with the help of the SPSS program. The results of the experimental class and control class data show that both data are normally distributed and homogeneous. Table 1 shows the results of problem solving ability tests in the experimental and control classes.

Table 1. Experimental and Control Class problem-solving ability test results

Class	Data	Result
Experimental	Average	86
	Max	100
	Min	55
Control	Average	79.6
	Max	100
	Min	65

Calculation of hypothesis 1, Hypothesis test 1 aims to determine the classical completeness of the problem solving abilities of class XI students of SMA Negeri 5 Semarang using Problem Based Learning assisted by math magazine to achieve classical completeness of 75% with the minimum criteria of mastery learning 70. The test criterion is reject H_0 if $z_{count} > z_{0.5-a}$ where $z_{0.5-a}$ is obtained from a list of tables with a standard normal distribution with probability $(0.5 - a)$ and $\alpha = 0.05$. Based on the calculations obtained $Z_{count} = 2.169$ and $Z_{table} = 1.64$. So that $Z_{count} > Z_{table}$. Because $Z_{count} = 2.169 > Z_{table} = 1.64$, then H_0 is rejected. This means that the percentage of completeness of the problem-solving ability test results using Problem-Based Learning assisted by math magazine reaches 75% with the minimum criteria of mastery learning 70.

Hypothesis 2 test was used to compare the results of the average problem-solving abilities of experimental class students better than the average results of problem-solving abilities of control class students. The test criterion is Accept H_0 if $t < t_{1-a}$, where t_{1-a} is obtained from the distribution list t with $dk = n_1 + n_2 - 2$ and probability $(1 - a)$. Reject H_0 for $t \geq t_{1-a}$. Based on the calculation results, the $t_{count} = 2.264$ and $t_{table} = 1.67$ values are obtained. Because $t_{count} = 2.264 > t_{table} = 1.67$ then H_0 is rejected. So, the average problem-solving ability of the experimental class students is more than the average problem-solving ability of the control class students.

In determining the minimum completeness average test, in this study using a predetermined the minimum criteria of mastery learning of 70. The test criterion is reject H_0 if $t \geq t_{1-\alpha}$ with $t_{1-\alpha}$ obtained from the student t distribution list using probability $(1 - \alpha)$ and $dk = n - 1$. Based on the calculation results obtained $t_{count} = 5.58$ and $t_{table} = 1.69$. Because $t_{count} = 5.58 > t_{table} = 1.69$, then H_0 is rejected. So, the average problem solving ability of students with the problem based learning model assisted by math magazine is more than 70.

3.2. Qualitative Research

Qualitative data analysis in this study includes data reduction, data presentation, and data verification (drawing conclusions). Data reduction by summarizing the results of interviews for each subject and arranged in an orderly language that is easy to understand. Examination of students' problem-solving ability test results is carried out with reference to the guidelines for assessing problem-solving ability tests.

Table 2. Classification of learning independence criteria

Category	Total
High	7
Medium	23
Low	3
Total	33

After knowing the description of the achievement of each stage, a description of the results of the mathematical literacy test is carried out based on students' self-efficacy. The next step is to present the data with tables and brief descriptions. This stage makes it easier to understand the data because the data can be arranged neatly, orderly, and arranged in a pattern of data relationships that help draw conclusions.

3.2.1. Analysis of Problem Solving Ability with High Learning Independence

Another factor that influences the success of learning is learning independence. Problem solving abilities are influenced by learning independence, this is in line with research by Ambiyar, et al. (2020) entitled "The Relationship between Student Learning Independence and Students' Mathematical Problem Solving Ability" which concludes that the greater the student's learning independence, the problem solving ability students' mathematics is getting better and better.

On the indicator of problem solving ability Building new mathematical knowledge through problem solving shows that both subjects fulfill the indicator of mathematical problem solving ability namely Building new mathematical knowledge through problem solving. On the indicator of problem solving ability Applying and using various appropriate strategies to solve problems shows that both subjects meet the indicators of problem solving ability Applying and using various appropriate strategies to solve problems. The indicators for solving problems that arise in mathematics and other contexts show that both subjects meet the indicators of problem-solving ability to solve problems that arise in mathematics and other contexts. The indicator of observing and reflecting on the problem-solving process shows that both subjects fulfill the problem-solving ability indicator of observing and reflecting on the problem-solving process.

Based on the analysis of the research results obtained, it can be concluded that there is an influence of independent learning on students' mathematical problem solving abilities. Students with high learning independence are able to understand the information contained in the problem and visualize it and can build new mathematical knowledge through problem solving; apply and adapt various appropriate strategies to solve problems; solve problems that arise in mathematics and in other contexts; and monitor and reflect on the problem-solving process.

3.2.2. Analysis of Problem Solving Ability with moderate Learning Independence

According to Firdaus, et al. (2020) students with a moderate level of learning independence tend to have moderate mathematical problem solving abilities. On the indicator of problem solving ability Building new mathematical knowledge through problem solving shows that both subjects fulfill the indicator of mathematical problem solving ability namely Building new mathematical knowledge through problem solving. On the indicator of problem solving ability Applying and using various appropriate strategies to solve problems shows that both subjects meet the indicators of problem solving ability Applying and using various appropriate strategies to solve problems. The indicators for solving problems that arise in mathematics and other contexts show that the indicators fulfill the problem-solving ability to solve problems that arise in mathematics and other contexts. The indicator of observing and reflecting on the problem-solving process shows that the subject sufficiently fulfills the problem-solving ability indicator of observing and reflecting on the problem-solving process. Based on the results obtained, the two subjects were classified as students with moderate learning independence categories.

Students in this category are able to fulfill the indicators even though they have not been fulfilled properly. Students with moderate learning independence are still unable to understand what information is in the problem; be able to adapt a variety of appropriate strategies to solve problems solving problems that arise in mathematics and in other contexts, can make a solution plan and then solve it but it is not complete; and monitor and reflect on the problem-solving process.

3.2.3. Analysis of Problem Solving Ability with Low Learning Independence

According to Firdaus, et al. (2020) students with a low level of learning independence tend to have low mathematical problem solving abilities. Students in this category are only able to meet a few indicators. On the indicator of problem-solving ability to build new mathematical knowledge through problem solving, it showed that both subjects did not meet the indicator of mathematical problem-solving ability, namely building new mathematical knowledge through problem solving. On the problem-solving ability indicator Applying and using various appropriate strategies to solve problems shows that both subjects do not meet the problem-solving ability indicators Applying and using various appropriate strategies to solve problems. The indicators for solving problems that arise in mathematics and other contexts show that it is sufficient to meet the indicators of problem-solving ability to solve problems that arise in mathematics and other contexts. The indicator of observing and reflecting on the problem-solving process shows that the subject does not meet the problem-solving ability indicator of observing and reflecting on the problem-solving process. Based on the results obtained, the two subjects were classified as students with low learning independence categories.

Students with low learning independence are still unable to understand what information is in the questions; be able to adapt a variety of appropriate strategies to solve problems solving problems that arise in mathematics and in other contexts can make a solution plan then solve it but it is not complete; and does not monitor and reflect on the problem-solving process.

4. Conclusion

Based on the results of the research and discussion that has been described, the analysis of problem solving abilities in the Problem Based Learning model assisted by Math Magazine in terms of student learning independence obtains the following conclusions. (1) Problem Based Learning assisted by Math Magazine on problem solving abilities beyond classical completeness by 91%; (2) The average problem solving ability in the Problem Based Learning model assisted by math Magazine is better than the problem solving ability of control class students; (3) The average problem solving ability in the Problem Based Learning model assisted by Math magazine is more than 70. So it can be said that the Problem Based Learning model assisted by Math Magazine is effective for students' problem solving abilities in terms of learning independence.

The description of problem solving abilities in the Problem Based Learning model assisted by Math Magazine in terms of learning independence shows the following results. (1) Students with high learning independence are able to understand the information contained in the problem and visualize it and can build new mathematical knowledge through problem solving; apply and adapt various appropriate strategies to solve problems; solve problems that arise in mathematics and in other contexts; and monitor and reflect on the problem-solving process; (2) Students with moderate learning independence are still unable to understand what information is in the problem; be able to adapt a variety of appropriate strategies to solve problems solving problems that arise in mathematics and in other contexts, can make a solution plan and then solve it but it is not complete; and monitor and reflect on the problem-solving process; (3) Students with low learning independence are still unable to understand what information is in the questions; be able to adapt a variety of appropriate strategies to solve problems solving problems that arise in mathematics and in other contexts can make a solution plan then solve it but it is not complete; and does not monitor and reflect on the problem-solving process.

References

Ambiyar, A., Aziz, I., & Delyana, H. (2020). Hubungan kemandirian belajar siswa terhadap kemampuan pemecahan masalah matematis siswa. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, 4(2), 1171-1183.

Angkotasan, N. (2014). Keefektifan Model Problem-Based Learning Ditinjau dari Kemampuan Pemecahan Masalah Matematis. *Delta-Pi: Jurnal Matematika dan Pendidikan Matematika* 3(1), 11-19.

Ansori, Y., & Herdiman, I. (2019). Pengaruh kemandirian belajar terhadap kemampuan pemecahan masalah matematis siswa SMP. *Journal of Medives: Journal of Mathematics Education IKIP Veteran Semarang*, *3*(1), 11-19.

Arends (2009). Learning to Teach: Belajar untuk Mengajar. Yogyakarta Pustaka Belajar

Firdaus, A. E., Pujiastuti, H., & FS, C. A. H. (2020). Analisis Kemampuan Pemecahan Masalah Matematis Ditinjau Dari Kemandirian Belajar Siswa. *Wilangan: Jurnal Inovasi Dan Riset Pendidikan Matematika*, 1(4), 367-382.

Aulia, L. N., Susilo, S., & Subali, B. (2019). Upaya peningkatan kemandirian belajar siswa dengan model problem-based learning berbantuan media Edmodo. *Jurnal Inovasi Pendidikan IPA*, *5*(1), 69-78.

Edy S, Feria A.P.,dan Mukhtar. 2017. Improving Mathematical Problem Solving Ability And Self-Confidence Of High School Students Through Contextual Learning Model. *Journal on Mathematical Education*, 8(1):85- 94

Handayani, A. S., & Ariyanti,I. (2020). Kemandirian Belajar Matematika Siswa SMP disaat Pandemi COVID-19. 6-10

Indriyana, E., & Tirta, S. I. M. (2017). The Students' Thinking Process on Mathematics Problem Solving Through Scaffolding. The International *Journal of Social Sciences and Humanities Invention*, 4(8), 3774–3782.

Irfan, M. (2017). Analisis Kesalahan Siswa dalam Pemecahan Masalah Berdasarkan Kecemasan Belajar Matematika. *Kreano, Jurnal Matematika Kreatif-Inovatif*, 8(2):143-149.

Isnaeni, S., Fajriyah, L., Risky, E. S., Purwasih, R., & Hidayat, W. (2018). Analisis Kemampuan Penalaran Matematis dan Kemandirian Belajar Siswa pada Materi Persamaan Garis Lurus. *Journal of Medives*, 2(1), 107–115.

Jumaisyaroh, T., Napitupulu, E. E., & Hasratuddin, H. (2015). Peningkatan kemampuan berpikir kritis matematis dan kemandirian belajar siswa SMP melalui pembelajaran berbasis masalah. *Kreano, Jurnal Matematika Kreatif-Inovatif*, *5*(2): 157-169.

Kementerian Pendidikan dan Kebudayaan, Badan Pengembangan Sumber Daya Manusia Pendidikan dan Kebudayaan dan Penjaminan Mutu. (2013). Pendidikan tentang Model Pembelajaran Penemuan (Discovery Learning). Jakarta: Kementerian Pendidikan Nasional.

Masrinah, E. N., Aripin, I., & Gaffar, A. A. (2019, October). Problem based learning (PBL) untuk meningkatkan keterampilan berpikir kritis. In *Prosiding Seminar Nasional Pendidikan* (Vol. 1, pp. 924-932).

Masturoh, U., Winarti, E. R., & Kharis, M. (2014). Implementasi pembelajaran mea berbantuan Cabri 3D terhadap hasil belajar materi jarak. *Unnes Journal of Mathematics Education*, *3*(1).

Mayasari, & Rosyana, T. (2019). Pengaruh Kemandirian Belajar terhadap Kemampuan Pemecahan Masalah Matematis Siswa SMP Kota Bandung. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, 3(1), 82–89

Sajadi, M., Amiripour, P., & Rostamy-Malkhalifeh, M. (2013). The examining mathematical word problems solving ability under efficient representation aspect. *Mathematics Education Trends and Research*, 2013(1), 1-11.

Munawaroh S, Ahmadah I. F' Purbaningrum M. (2021). E-Magmath Berbasis Flipbook pada Materi Himpunan di Kelas VII SMP/MTS. *Jurnal Pembelajaran Matematika Inovatif* (volume 4, N0 1)

NCTM. (2000). Principles and Standards for School Mathematics. USA: NCTM.

NCTM. 2000. Principles and Standards for School Mathematics. Reston: Then National Council of Teachers of Mathematics, Inc

Ningsih, R., & Nurrahmah, A. (2016). Pengaruh Kemandirian Belajar dan Perhatian Orang Tua Terhadap Prestasi Belajar Matematika. *Formatif: Jurnal Ilmiah Pendidikan MIPA*, 6(1).

Peraturan Pemerintah Pendidikan dan Kebudayaan. 2016. Permendikbud Nomor 22 Tahun 2016 tentang Standar Proses Pendidikan Dasar dan Menengah. Jakarta: Departemen Pendidikan dan Kebudayaan

Polya, G. (1973). How To Solve It (2nd ed.). New Jersey: Princeton University Press.

Pratiwi, I. D., & Laksmiwati, H. (2016). Kepercayaan Diri dan Kemandirian Belajar Pada Siswa SMA Negeri œX. *Jurnal Psikologi Teori dan Terapan*, *7*(1), 43-49.

Pratiwi, R. Y., Y. L. Sukestiyarno & M. Asikin. (2014). Pembentukan Karakter dan Pemecahan Masalah melalui Model Superitem Berbantuan Scaffolding. *Unnes Journal of Mathematics Education*, 3(1).

Rambe, A. S. & E. Surya. (2017). Meningkatkan Kemandirian Belajar Matematika Melalui Model Number Head Together pada Siswa SMP Swasta IMELDA Medan TP 2016/2017. *Mathematics Education Research Journal.*

Ramdan, Z. M., Veralita, L., Rohaeti, E. E., & Purwasih, R. (2018). Analisis Self Confidence Terhadap Kemampuan Pemecahan Masalah Matematis Siswa Smk Pada Materi Barisan Dan Deret. *AKSIOMA: Jurnal Program*

Rosita, N. T., & Yuliawati, L. (2017). Analisis Kemampuan Pemecahan Masalah Matematis Pada Materi Aljabar Smp Berdasarkan Disposisi Matematis. *Symmetry: Pasundan Journal of Research in Mathematics Learning and Education*, 2(2):46-51.

Ruchaedi, D., & Baehaki, I. (2016). Pengaruh problem based learning (PBL) terhadap kemampuan heuristik pemecahan masalah dan sikap matematis siswa sekolah dasar. *Jurnal Cakrawala Pendas*, *2*(2).

Savitri, I. A (2019). Pengembangan Majalah Elektronik Berbasis Literasi Matematika untuk Siswa SMP Kelas VII. Universitas Islam Negeri Raden Intan

Sugandi, A. I. (2013). Pengaruh pembelajaran berbasis masalah dengan setting kooperatif jigsaw terhadap kemandirian belajar siswa SMA. *Infinity Journal*, *2*(2), 144-155. https://doi.org/10.22460/infinity.v2i2 .31

Sugiyono. (2019). Metode Penelitian Kuantitatif, Kualitatif dan R&D. Bandung: Alfabeta.

Suhendri, H. (2015). Pengaruh Metode Pembelajaran Problem Solving terhadap hasil Belajar matematika Ditinjau dari Kemandirian Belajar. *Formatif: Jurnal Ilmiah Pendidikan MIPA*, 3(2).

Sumarmo, U. (2010). Kemandirian Belajar: Apa, Mengapa dan Bagaimana Dikembangkan Pada Peserta Didik. *Jurnal FMIPA pascasarjana UPI*. 33(2): 99-108.

Sumarmo, U., Hidayat, W., Zukarnaen, R., Hamidah, M., & Sariningsih, R. (2012). Kemampuan dan Disposisi Berpikir Logis, Kritis, dan Kreatif Matematik (Eksperimen terhadap Siswa SMA

Menggunakan Pembelajaran Berbasis Masalah dan Strategi Think-Talk-Write). *Jurnal Pengajaran Matematika dan Ilmu Pengetahuan Alam*, 17(1).