



The impact of the MathMagic learning method on students' mathematics cognitive learning outcomes

Desy Nursinta Al Kharomah *, Muhammad Abduh

Primary Teacher Education Study Program, University of Muhammadiyah Surakarta, Central Java, Indonesia

* Correspondence: a510180209@student.ums.ac.id

© The Authors 2023

Abstract

Low cognitive learning outcomes of students can hinder student learning processes. This obstacle occurs because the learning method has yet to facilitate student learning trajectories resulting in low cognitive mathematics learning outcomes for students. The purpose of this research was to determine the impact of the MathMagic learning method on the mathematics cognitive learning outcomes of the students. The method used in this research was a quasi-experimental research design with a nonequivalent control group design. Data collection was done by test technique of students' cognitive learning outcomes. Data analysis techniques in this study used instrument tests in the form of validity and reliability tests, prerequisite tests in the form of normality tests and homogeneity tests, and hypothesis tests in the form of independent sample t-tests. The results show that the MathMagic learning method influenced students' cognitive learning outcomes in mathematics, especially in adding fractions with different denominators. This MathMagic learning method effectively improves understanding of the basic addition of fractions with unlike denominators.

Keywords: cognitive learning outcomes; elementary school students; MathMagic methods

How to cite: Kharomah, D. N. A., & Abduh, M. (2023). The impact of the MathMagic learning method on students' mathematics cognitive learning outcomes. *Jurnal Elemen*, 9(1), 120-131. <https://doi.org/10.29408/jel.v9i1.6838>

Received: 27 October 2022 | Revised: 19 November 2022

Accepted: 6 December 2022 | Published: 2 January 2023



Introduction

Mathematics is a subject that has an essential role in teaching students at every level of formal education. The content of mathematics lessons is also often seen as a tool for finding solutions to various problems in everyday life. According to previous research by [Putri et al. \(2019\)](#), mathematics has the goal of helping to train students' mindsets so that they can solve problems, both problems in the field of mathematics and difficulties in everyday life. However, many people perceive mathematics as a lesson that takes work to accept. [Mundia \(2012\)](#) stated that one of the sources of problems in learning mathematics that originates from students is that some students are influenced by stereotyped beliefs held by many people that mathematics is a complex subject. Students should be positive when accepting mathematics learning. [Akinsola and Olowojaiye \(2008\)](#) argue that the essential thing students have is a positive attitude toward learning mathematics. Students' success in a lesson depends very much on their attitude toward the study.

Students with low mathematics learning outcomes are due to a lack of motivation to study mathematics, so the learning process of mathematics could be more optimal. It is similar to the opinion of [Nabillah and Abadi \(2019\)](#), which states that difficulties in understanding mathematics also cause low results in students' mathematics learning, and students are less motivated to learn mathematics due to poor study habits. According to previous research, a perfect mathematics lesson can develop with student mathematics learning outcomes ([Batubara, 2019](#)). Many factors cause low student learning outcomes in mathematics. [Oktaviani et al. \(2020\)](#) state that internal and external factors influence low learning outcomes. The internal factor includes students not being interested in mathematics, students' basic numeracy skills needing to be stronger, students not understanding symbols in mathematics, students' lack of discipline, and the lack of student learning motivation. External factors include hot classrooms that make them uncomfortable, noisy theoretical classrooms because they are close to the practice room, so the focus of students could be more optimal, and factors from the teacher, which is less attractive to students in delivering material. Hence, students feel bored and do not dare ask.

Another factor is the lack of students' understanding of the basic mathematics concepts in the subject matter. According to [Andamon and Tan \(2018\)](#), students must understand concepts well to understand mathematics in depth. Motivation and interest in learning are essential points in the success of a lesson. In line with previous research, motivation plays an essential role in the success of student learning because motivation is an impulse that arises from within students consciously or unconsciously, which can arise from within themselves or from outside themselves, to take action with the desired goal ([Heriyati, 2017](#)).

The quality of learning is related to teacher creativity and innovation. This statement is in line with the opinion of previous research, which states that teacher creativity in teaching is required to create innovative learning ([Magdalena et al., 2020](#)). The teacher's way of teaching includes learning approaches, strategies, models, and methods. [Maesaroh \(2013\)](#) stated that learning achievement would be achieved well when all factors support, such as teaching methods, with exciting methods that can be a bridge to achieve competency. Using interactive

learning methods and models can increase student learning outcomes so that students can master the material provided by the teacher and the learning outcomes obtained (Fakhri et al., 2020). Pickard (2004) stated that learning outcomes are a good influence as a measure of success or failure in a learning activity that is carried out.

One component of learning that can increase student enthusiasm for optimal learning outcomes is using appropriate and fun learning methods. It is in line with the opinion of Rima and Kusuma (2016) that the requirement for effective learning is to present a supportive and fun learning component. If the learning process is enjoyable, a high enthusiasm for learning emerges. It is similar to Emda (2017) opinion which states that fun learning can motivate students to learn. One of the learning methods that can make mathematics learning content fun is the MathMagic learning method. The MathMagic method is one of the fun and creative methods. In addition, the MathMagic method also focuses on students' understanding of the correct basic mathematical concepts and how to do things that are not complicated. Maswar (2019) also states that in the learning process, the MathMagic method will increase children's self-confidence so that they will be able and courageous to work on problems and try to solve them quickly.

The MathMagic method is a game that invites students to play with numbers, where they can think about numbers, addition, and multiplication (Koirala & Goodwin, 2000). Students can more easily and quickly solve math problems without complicated formulas. According to previous research by Kusmiyati and Kadar (2018), the MathMagic method can be a fast method in mathematical calculations because if students use reasoning power, students can work on multiplication problems without using complicated formulas.

The choice of method is appropriate and can make learning fun for students, increase student enthusiasm for learning, and be easy for students to understand. It is in line with the opinion of Maswar (2019) that learning mathematics in the classroom will be exciting and fun if various innovative learning methods are applied because learning methods also have links to improving students' cognitive learning outcomes in learning. Previous research conducted by Lim (2019) obtained responses from survey results and focus groups showing that students found activities using the MathMagic method fun and intellectually engaging.

Low cognitive learning outcomes of students can hinder student learning processes. This obstacle occurs because the learning method has yet to facilitate student learning trajectories resulting in low cognitive mathematics learning outcomes for students. Based on the explanation above, the MathMagic learning method is expected to help facilitate a fun learning process. The use of learning methods is beneficial for improving student learning outcomes. Besides that, it can direct learning success, make it easy for students to learn based on interests, and encourage cooperative teaching and learning activities between educators and students. Therefore this study aims to determine the impact of using MathMagic learning methods on cognitive learning outcomes in students' mathematics subjects.

Methods

This study used quantitative methods with a quasi-experimental research type of nonequivalent control group design. This method was chosen based on the needs of the appropriate group analysis and comparing the experimental and control groups to determine the significance of measuring the learning method's impact on students' cognitive learning outcomes. The population in this study was the fifth-grade students of Muhammadiyah 16 Karangasem Elementary School, with as many as 90 students. The sampling technique used purposive sampling selected from two classes considering that the class had homogeneous abilities and had achieved the same material. In addition, in this class, students belong to the medium category, where students are not active and not too passive. Class five A was the control class, with 20 students consisting of nine male students and 11 female students, while the fifth grade B was chosen as the experimental class, with 20 students comprising 12 male students and eight female students.

The data collection instrument was done by test. This test is in the form of multiple choice consisting of subject matter questions and the addition of fractions with different denominators used to determine differences in student learning outcomes through pre-test and post-test.

Before conducting research in the control and experimental classes of the fifth-grade students of Muhammadiyah 16 Karangasem elementary school, the researchers first conducted an instrument test on students who were not used for research. Test the test instrument on the pre-test and post-test questions to determine the validity and reliability. From the results of the pre-test validity test, there were three invalid statement items, so 17 questions were used with a pre-test item reliability value of 0.829. while the results of the validity test on the post-test questions contained seven invalid item items, so the total number of questions used was 13, with a post-test item reliability value of 0.808.

Data analysis techniques use the prerequisite test, namely the normality test using Shapiro Wilk, and the homogeneity test. Moreover, the last is hypothesis testing using an independent sample t-test. Overall, the data from this study were processed using SPSS 25.0.

The research process was carried out in four meetings in the control and experimental classes. At the first meeting, the control and experimental students worked on pre-test questions. At the second meeting in the control class, the material learning process was carried out on the basic concept of adding fractions with different denominators—a presentation of the primary concept material for adding fractions with unlike denominators using conventional learning methods. In the experimental class at the second meeting, the material learning process was carried out on the basic concept of adding fractions with different denominators using the MathMagic learning method.

Then at the third meeting, the control class was taught about completing the addition of fractions with different denominators by equating the least common multiple first. Learning in the control class used the conventional method, namely lectures. In contrast, at the third meeting in the experimental class, the students were taught how to solve adding fractions with different denominators in a fast way and with the help of using other media in the form of mica paper and markers. On the fourth day, students from the control and experimental classes were given

a post-test of cognitive mathematics learning outcomes on adding fractions with different denominators.

Results

The study results of the pre-test and post-test score data on students' cognitive learning outcomes in the experimental class and control class can be seen in Table 1.

Table 1. Descriptive statistics of learning outcomes

	N	Minimum Score	Maximum Score	Mean	SD
Experiment pre-test	20	11.76	82.35	51.46	19.82
Experiment post-test	20	53.84	100.00	80.38	14.65
Control pre-test	20	23.52	64.70	45.28	10.98
Control pos-test	20	38.46	84.61	60.76	14.31

Descriptive statistical analysis of cognitive learning outcomes shows that the average value in the experimental class is higher than in the control class. The average value of the post-test in the experimental class was 80.38, while in the control class, it was only 60.76.

After that, the prerequisite test was carried out. The prerequisite tests used are normality tests and homogeneity tests. The normality test in this study was used to determine whether the study sample was normal. The normality test in this study used the Shapiro-Wilk method. The results of the normality test for the pre-test and post-test questions in the experimental and control class can be seen in table 2.

Table 2. Normality test Shapiro-Wilk

Class	Statistics	df	Sig.	Description
Experimental Pre-test	0.943	20	0.267	Normal
Experimental Post-test	0.921	20	0.106	Normal
Control Pre-test	0.946	20	0.311	Normal
Control Post-test	0.945	20	0.295	Normal

Lilliefors Significance Correction, $\alpha=0.05$

Table 2 shows that the normality test results of the pre-test and post-test questions in the experimental and control classes with learning outcome variables are normally distributed. The results of the Shapiro-Wilk test show that the pre-test cognitive learning outcome variable in the experimental class is 0.267, then the pre-test sig in the control class is 0.311. Furthermore, the post-test sig in the experimental class is 0.106, and the post-test sig in the control class is 0.295. The four significant values are more than 0.05, meaning students' cognitive learning outcomes are normally distributed.

After that, the homogeneity test was carried out. The homogeneity test results can be seen in Table 3.

Table 3. Homogeneity test

Statistics	df	Sig.	Description
0.215	20	0.646	Homogeneous

It can be seen in Table 3 that the sig based on the mean of student learning outcomes is $0.646 > 0.05$, which means it is greater than 0.05, then the data is homogeneous. The description that the authors have presented shows that the results of the analysis prerequisite test illustrate that the two sample groups are in a normal distribution and homogeneous. Therefore, it can be continued for the hypothesis testing stage. Hypothesis testing using independent sample t-test. The summary of the calculation results is presented in Table 4.

Table 4. T test (*independent sample t-test*)

Independent sample t-test		
t	df	Sig. (2-tailed)
4.282	38	0.000

The t-test using the independent sample t-test showed that the sig value was $0.000 < \alpha$ value of 0.05. The mathematics learning method variable positively and significantly impacts cognitive mathematics learning outcomes because H_0 is rejected while H_a is accepted.

The following was an implementation of the MathMagic method for calculating the addition of fractions with different denominators using a simple tool with mica paper and markers, which can be seen in the Figure 1 below.

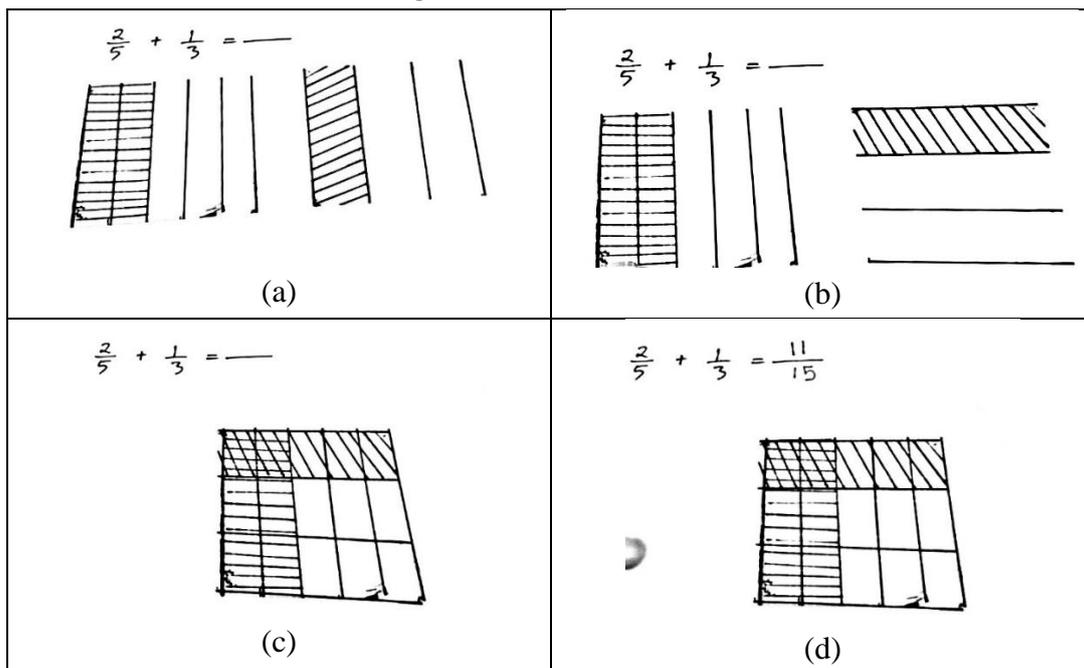


Figure 1. (a) The first step; (b) second step; (c) third step; (d) fourth step

The following describes the steps in the image above in calculating the addition of fractions with different denominators using the MathMagic method. The first step in figure (a) is to make two pictures of fractions on mica paper whose values are $\frac{2}{5}$ and $\frac{1}{3}$ by making a vertical line according to the number of denominator values in the fraction that has been written, then shading the lines as much as the value in the numerator that has been written. The second step in figure (b) is to rotate one of the broken pieces of mica by 90 degrees to the right. In addition, the third step in figure (c) is to combine the two images on mica paper. The last step, figure (d), calculates the quantifier's value by looking at the shaded box. If the shadowy parts of the box

overlap, then the value is counted as two. Then calculate all the boxes, both shaded and not shaded, to get the value of the denominator.

Discussion

The results showed that students' activity in using mathematics learning methods had a significant impact on students' mathematical cognitive learning outcomes. It shows an increase in students' cognitive learning outcomes in mathematics. A line with previous research, [Irawan and Febriyanti \(2016\)](#) showed a much more significant difference in learning outcomes. In the learning carried out in the three schools, it was seen that in each school. There were differences in the characteristics of the students they taught. It can be seen that State Elementary School 1 Cileungsi is superior when compared to State Elementary School 9 Cileungsi and State Elementary School 5 Cileungsi. It can be felt in the teacher's learning process activities. Previous research conducted by [Dian \(2021\)](#) also showed a significant impact on student learning outcomes because the MathMagic method improved student learning outcomes in the material multiplied by two numbers. This research was carried out by multiplying one by 9 for students. In addition, the activity was continued by explaining the material to be taught along with the MathMagic method.

Research that has been carried out gives indications to researchers that the MathMagic learning method has a positive impact on improving students' cognitive mathematics learning outcomes. The early mathematics ability category positively impacts students' cognitive mathematics learning outcomes in both learning classes. The experimental class got better learning results than the control class, which used conventional methods. Similarly, [Wahyunita \(2017\)](#) showed results in research that stated that the mathematical reasoning abilities of students who obtained the MathMagic method were better than those who only obtained conventional methods.

Based on the description and analysis of the data obtained, it is clear that the experimental class obtained an average pre-test score of 51.4, while in the control class, the average pre-test was 45.2. Through the results of the post-test, it is known that the learning outcomes of the experimental class after being treated with the mathematics method are higher than the control class using conventional methods. It can be seen from the experimental class's average value of 80.38 and the control class's 60.76. By paying attention to the average pre-test and post-test scores, it can be concluded that the cognitive mathematics learning outcomes of students who were taught using the MathMagic method were better than students who only used conventional methods. It is in line with the research conducted by [Marbun et al. \(2019\)](#), showing an increase between the average pre-test score not using MathMagic, which was 10.14, and the post-test average score, which was 16.72 when the MathMagic method was applied.

Other studies and research results also indicate the positive implications of using the MathMagic learning method in improving student learning outcomes in mathematics. Previous research on the MathMagic method combined with the talking stick model also increased student mathematics learning outcomes. [Jamiah and Surya \(2016\)](#) chose the talking stick learning model combined with the MathMagic method because this combination makes

students happier and more accessible to solving calculation problems. Research conducted by [Marbun et al. \(2019\)](#) also combined the MathMagic method through the scramble learning model, which showed an increase in student learning outcomes supported by learning achievement test instruments given to students. The reason for choosing the application of MathMagic by using the scramble learning model in learning activities is because in MathMagic, not only priority is given to speed, but also the correctness and logic of the answers produced. Besides improving learning outcomes, the MathMagic learning method can also increase student motivation. Research conducted by [Siregar and Surya \(2017\)](#) showed that students' learning motivation increased after being given treatment by applying the MathMagic method during learning activities. According to [Pasangka et al. \(2020\)](#), motivation is essential for educators to achieve targets that aim to improve learning.

The results of this study also show students' enthusiasm in receiving learning and the activeness of students during the learning process. It can be seen from the activeness of the experimental class students when answering questions and asking about how to find answers to the problem of adding fractions with different denominators using quick tricks in the applied MathMagic learning method because the activeness of students can also improve the results and the process of developing thinking. It is in line with the research of [Wibowo \(2016\)](#), which states that active student participation greatly influences the process of thinking and emotions, and social development. Collaborative efforts in teaching and learning activities between educators and students are going very well due to the MathMagic method applied by the teacher in the experimental class. The students become easier in the learning process.

The MathMagic method teaches basic counting concepts such as addition, subtraction, multiplication, division, powers, roots, and fractions, emphasizing the child's mental aspects. Similar to [Jamiah and Surya \(2016\)](#) opinion, which states that material in learning using the MathMagic method is presented in a fun, concrete way and pays attention to psychological aspects, how the brain works, learning styles, and students' personalities. According to previous research, the MathMagic method helps make basic calculations more accessible and more straightforward, giving the initial impression that mathematics is simple and fun ([Irawan & Febriyanti, 2016](#)). It is because the method used is appropriate and fun for students. As [Juliandri \(2016\)](#) stated, the correct learning method can create new ideas and make students think creatively.

Each stage in the MathMagic learning method can train students to solve mathematical connection ability questions, such as multiplication memorizing activities. They are carried out to recall expansion that has been learned so that multiplication that has been memorized is not easily forgotten and makes it easier to calculate math problems. It is in line with [Pasangka et al. \(2020\)](#) opinion, which states that with MathMagic, doing basic math calculations will become much easier and simpler so that an initial impression will be embedded that mathematics is easy and fun. Besides that, to make it easier to understand a mathematical concept, it is necessary to carry out a developmental stage where students are given concrete examples related to the material. It is in line with one of the indicators of students' mathematical connections: applying mathematical concepts to other fields of study and everyday life. It is in line with [Noto et al. \(2016\)](#) argument that proper mathematical connections can help students

make mathematical ideas concrete and connect one concept to another, enabling them to see mathematics as a whole.

The MathMagic learning method provides opportunities for students to be active in learning through the stages of searching for answers from tricks or riddles. According to previous research, the MathMagic method in mathematics content can support many classic games, ranging from simple games based on arithmetic to presenting tricks as a way to find mathematical problems (Mulcahy, 2018). That way, it can help train students to associate mathematical concepts with simple tricks to solve math problems. Students' enthusiasm can show increased learning outcomes and student involvement in the MathMagic learning method for the learning process activities. Students will focus on participating in learning activities. Students who are eager to find answers and answer questions will not carry out activities other than learning activities. The MathMagic method can provide a setting for exploring meaningful mathematical concepts (Matthews, 2008).

The increase in learning outcomes between the experimental and control classes was apparent. Learning in the control class using conventional methods, namely lectures, even though there was an increase in learning outcomes and activeness, many students were still passive in learning. In contrast, in the experimental class, the students were enthusiastic about learning the material being taught using the method of solving the addition of fractions with different denominators fast and with the help of tricks on the MathMagic learning method. These two classes' results showed significant differences in cognitive mathematics learning outcomes. Therefore, the MathMagic learning method is better and positively impacts students' cognitive learning outcomes compared to conventional methods.

Conclusion

This research improved students' cognitive learning outcomes in mathematics, especially the material for adding fractions with different denominators. The results of this study indicate an increase in student learning outcomes in the experimental class based on a comparison of post-test scores in the control class. This research also increased students' activeness during the learning process. Applying the MathMagic method in experimental learning has increased the activeness in discussions during learning and the student's enthusiasm in doing the assignments given. In addition to improving cognitive learning outcomes in mathematics, the results of this study are also expected to make it easier for students to learn based on interest.

The limitation of this research is that it has yet to be able to design instruments in detail regarding the use of MathMagic. Suggestions for further research are expected to be able to develop MathMagic methods on a broader topic or material knowledge of mathematics.

Acknowledgment

The authors would like to express our gratitude of Muhammadiyah 16 Elementary School Karangasem, who has permitted me to conduct this research.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding this publication script. In addition, the ethical issues, including plagiarism, misconduct, data fabrication or falsification, double publication or submission, and redundancies, have been completed by the authors.

Funding Statement

This work will receive a publication incentive from the University of Muhammadiyah Surakarta student achievement system.

Author Contributions

Desy Nursinta Al Kharomah: Conceptualization, writing - original draft, editing, visualization, formal analysis, and methodology; **Muhammad Abduh:** Writing - review, validation and supervision.

References

- Akinsola, M. K., & Olowojaiye, F. B. (2008). Teacher instructional methods and student attitudes towards mathematics. *International Electronic Journal of Mathematics Education*, 3(1), 60–73. <https://doi.org/10.29333/iejme/218>
- Andamon, J. C., & Tan, D. A. (2018). Conceptual understanding, attitude and performance in mathematics of grade 7 students. *International Journal of Scientific and Technology Research*, 7(8), 96–105.
- Batubara, I. H. (2019). Improving student's critical thinking ability through guided discovery learning methods assisted by GeoGebra. *International Journal for Educational and Vocational Studies*, 1(2), 116–119. <https://doi.org/10.29103/ijevs.v1i2.1371>
- Dian, G. P. (2021). The effect of the mathmagics method on mathematics learning outcomes in multiplication for deaf student elementary grade 5A in SLB B Karnnamanohara. *Jurnal Widia Ortodidaktika*, 10(1), 45–56.
- Emda, A. (2017). Kedudukan motivasi belajar siswa dalam pembelajaran [The position of students' learning motivation in learning]. *Lantanida Journal*, 5(2), 93–196. <https://doi.org/10.22373/lj.v5i2.2838>
- Fakhri, M., Taufik, M., & Ismail, A. D. (2020). Improvement of mathematics learning outcomes by applying the missouri mathematics project learning model and Dienes game theory. *Mathematics Education Journal*, 4(1), 95–101. <https://doi.org/10.22219/mej.v4i1.11474>
- Heriyati. (2017). Pengaruh minat dan motivasi belajar terhadap prestasi belajar matematika [The effect of interest and motivation to learn on mathematics learning achievement]. *Jurnal Formatif*, 7(1), 22–32. <https://doi.org/10.30998/formatif.v7i1.1383>
- Irawan, A., & Febriyanti, C. (2016). Efektifitas MathMagic dalam peningkatan hasil belajar matematika [The effectiveness of MathMagic in improving mathematics learning outcomes]. *Formatif: Jurnal Ilmiah Pendidikan MIPA*, 6(1), 85–92. <https://doi.org/10.30998/formatif.v6i1.755>
- Jamiah, R., & Surya, E. (2016). Pengaruh model pembelajaran talking stick dengan metode MathMagic terhadap hasil belajar matematika [The effect of the talking stick learning

- model with MathMagic method on mathematics learning outcomes]. *Axiom*, 5(2), 244–255.
- Juliandri, D. P. (2016). Meningkatkan hasil belajar siswa dengan metode pembelajaran langsung [Improving student learning outcomes with direct learning methods]. *Matematics Paedagogic*, 1(1), 83–90. <https://doi.org/10.24114/inpafi.v6i3.11115>
- Koirala, H. P., & Goodwin, P. M. (2000). Teaching algebra in the middle grades using MathMagic. *National Council of Teachers of Mathematics*, 5(9), 562–566. <https://doi.org/10.5951/MTMS.5.9.0562>
- Kusmiyati, A., & Kadar, S. (2018). Iptek bagi masyarakat usaha meningkatkan pembelajaran matematika inovatif dan menyenangkan berbantuan media [Science and technology for the business community to improve innovative and fun mathematics learning with the help of media]. *Jurnal Pengabdian Masyarakat LPPM Untag Surabaya*, 3(1), 64–47.
- Lim, K. H. (2019). Using MathMagic to reinforce algebraic concepts: An exploratory study. *International Journal of Mathematical Education in Science and Technology*, 50(5), 747–765. <https://doi.org/10.1080/0020739X.2018.1537450>
- Maesaroh, S. (2013). Peranan metode pembelajaran terhadap minat dan prestasi belajar pendidikan agama Islam [The role of learning methods on interest and learning achievement in Islamic religious education]. *Jurnal Kependidikan*, 1(1), 150–168. <https://doi.org/10.24090/jk.v1i1.536>
- Magdalena, I., Ramadhanty Wahidah, A., Rahmah, G., & Claudia Maharani, S. (2020). Pembelajaran inovatif dalam pembentukan karakter siswa kelas 1 SD Negeri Pangadegan 2 [Innovative learning in character building for grade 1 students at Pangadegan 2 Public Elementary School]. *PENSA: Jurnal Pendidikan dan Ilmu Sosial*, 2(3), 376–392.
- Marbun, N. E., Rohani, M. a., R., & Suriyani. (2019). Pengaruh MathMagic dengan model pembelajaran scramble terhadap hasil belajar siswa [The effect of MathMagic with the scramble learning model on student learning outcomes]. *MES: Journal of Mathematics Education and Science*, 5(1), 1–10.
- Maswar, M. (2019). Strategi pembelajaran matematika menyenangkan siswa berbasis metode permainan MatheMagic, teka-teki dan cerita matematis [Fun math learning strategies for students based on MatheMatic game methods, puzzles and mathematical stories]. *Alifmatika: Jurnal Pendidikan dan Pembelajaran Matematika*, 1(1), 28–43. <https://doi.org/10.35316/alifmatika.2019.v1i1.28-43>
- Matthews, M. E. (2008). Selecting and using MatheMagic tricks in the classroom. *The Mathematics Teacher*, 102(2), 98–101. <https://doi.org/10.5951/MT.102.2.0098>
- Mulcahy, C. (2018, 2018). *A personal approach to the art of MatheMagic with a deck of cards* Bridges 2018 Conference Proceedings,
- Mundia, L. (2012). The assessment of math learning difficulties in a primary grade-4 child with high support needs: Mixed methods approach. *International Electronic Journal of Elementary Education*, 4(2), 347–366.
- Nabillah, T., & Abadi, A. P. (2019). Faktor penyebab rendahnya hasil belajar siswa [Factors causing low student learning outcomes]. *Prosiding Seminar Nasional Matematika dan Pendidikan Matematika Sesiomadika*, 2(1C), 659–663.
- Noto, M. S., Hartono, W., & Sundawan, M. D. (2016). Analysis of students mathematical representation and connection on analytical geometry subject. *Infinity Journal of Mathematics Education*, 5(2), 99–108. <https://doi.org/10.22460/infinity.v5i2.216>
- Oktaviani, U., Kumawati, S., Apriliyani, M. N., Nugroho, H., & Susanti, E. (2020). Identifikasi faktor penyebab rendahnya hasil belajar matematika peserta didik di SMK Negeri 1 Tonjong [Identification of the factors causing the low mathematics learning outcomes of students at the 1 Tonjong State Vocational High School]. *Math Locus: Jurnal Riset dan Inovasi Pendidikan Matematika*, 1(1), 1–6. <https://doi.org/10.31002/mathlocus.v1i1.892>

- Pasangka, I. G., Pahnael, J. R., Putra, G. L., & Sugi, Y. (2020). Belajar aljabar melalui MathMagic dan geometri menggunakan animasi [Learning algebra through MathMagic and geometry by using animations]. *Mattawang: Jurnal Pengabdian Masyarakat*, 1(2), 84–94. <https://doi.org/10.35877/454ri.mattawang228>
- Pickard, A. (2004). Sustaining motivation and fostering excellence education. *International Journal of Arts and Humanities Citation*, 4(7), 24–36.
- Putri, B. B. A., Muslim, A., & Bintaro, T. Y. (2019). Analisis faktor rendahnya minat belajar matematika siswa kelas V di SD Negeri 4 Gumiwang [Factor analysis of the low interest in learning mathematics for fifth grade students at Public Elementary School 4 Gumiwang]. *Jurnal Educatio FKIP UNMA*, 5(2), 68–74. <https://doi.org/10.31949/educatio.v5i2.14>
- Rima, E. W., & Kusuma, S. (2016). *Menjadi guru hebat dengan hypnoteaching [Become a great teacher with hypnoteaching]*. Kata Pena.
- Siregar, N. D., & Surya, E. (2017). Penggunaan MathMagic dalam meningkatkan motivasi belajar siswa [The use of MathMagic in increasing student learning motivation]. *Kreano, Jurnal Matematika Kreatif-Inovatif*, 8(1), 47–52. <https://doi.org/10.15294/kreano.v8i1.7730>
- Wahyunita, M. (2017). *Pengaruh metode MathMagics terhadap kemampuan penalaran matematis di tinjau dari motivasi belajar siswa [The effect of the MathMagics method on mathematical reasoning ability in view of students' learning motivation]* [Ph.D. Thesis, Institut Agama Islam Raden Intan Lampung]. <http://repository.radenintan.ac.id/id/eprint/647>
- Wibowo, N. (2016). Upaya peningkatan keaktifan siswa melalui pembelajaran berdasarkan gaya belajar di SMK Negeri 1 Saptosari [Efforts to increase student activeness through learning based on learning styles at State Vocational High School 1 Saptosari]. *Jurnal Electronics, Informatics, and Vocational Education*, 1(2), 129–139. <https://doi.org/10.21831/elinvo.v1i2.10621>