



Development of Learning Media Pansirbongpas for the Operation of Fraction Numbers for Grade 4 Elementary School

*Arnelia Dwi Yasa¹, I Ketut Suastika², Nur Vita Wahyu Ningtyas³

^{1,2,3} Program Studi Pendidikan Guru Sekolah Dasar, Universitas Kanjuruhan Malang, Malang, Indonesia

ARTICLE INFO

Article history:

1 Mei 2020 Received in revised form
11 Juni 2020
Accepted 10 Juli 2020
Available online 25 Agustus 2020

Kata Kunci:

Pengembangan, matematika, pansirbongpas, pecahan

Keywords:

Development; pansirbongpas learning media.

ABSTRAK

Hasil analisis proses pembelajaran menunjukkan bahwa guru tidak menggunakan media pembelajaran yang menarik dan siswa tidak memperhatikan guru pada saat pembelajaran. Hal ini mengakibatkan siswa sering mengalami miskonsepsi terhadap materi penjumlahan pecahan, maka perlu adanya pengembangan media pembelajaran berupa papan arsir bongkar pasang yang dapat menunjang proses pembelajaran. Tujuan dari penelitian ini untuk mengetahui kevalidan, kepraktisan, dan keefektifan. Metode penelitian ini merupakan penelitian pengembangan dengan mengadaptasi model ADDIE dengan 5 tahapan yakni : Analysis, Design, Development, Implementation, dan Evaluation. Subjek uji coba dalam penelitian ini adalah dosen ahli media, dosen ahli materi, guru dan siswa kelas IV SDN Ngembul 03 Kabupaten Blitar. Teknik analisis data menggunakan deskriptif kualitatif dan kuantitatif. Instrumen pengumpulan data yang digunakan dalam penelitian ini adalah angket/kuesioner. Papan arsir bongkar pasang berdasarkan

hasil validasi materi memperoleh skor 79,15% dengan kategori layak, hasil validasi media memperoleh 75% dengan kategori layak. Hasil validasi kepraktisan guru memperoleh 83,65% dengan kategori sangat baik, Hasil kepraktisan siswa memperoleh 86,66% dengan kategori sangat baik dan hasil keefektifan siswa memperoleh 81% dengan kategori sangat baik. Papan arsir bongkar pasang dapat digunakan guru dalam proses pembelajaran agar lebih menarik dan menyenangkan. Memberikan referensi bagi peneliti lain dalam mengembangkan media pembelajaran papan arsir bongkar pasang yang menarik dan menyenangkan.

ABSTRACT

The results of the analysis of the learning process show that the teacher does not use attractive learning media and students do not pay attention to the teacher during the lesson. This result in students often experiencing misconceptions about the material of adding fractions, so there is a need for the development of learning media in the form of unloading shading boards that can support the learning process. The purpose of this study was to determine the validity, practicality, and effectiveness. This research method was a development research by adapting the ADDIE model with 5 stages, namely: Analysis, Design, Development, Implementation, and Evaluation. The test subjects in this study were media expert lecturers, material expert lecturers, teachers and fourth grade students of SDN Ngembul 03, Blitar Regency. The data analysis technique used descriptive qualitative and quantitative. The data collection instrument used in this study was a questionnaire. The loading and unloading shading board based on the results of material validation obtained a score of 79.15% in the feasible category, the results of media validation obtained 75% with the feasible category. The results of the validation of the teacher's practicality got 83.65% in the very good category, the results of the student's practicality got 86.66% with the very good category and the results of the student's effectiveness got 81% with the very good category. The unloading shading board can be used by the teacher in the learning process to make it more interesting and fun. Provide a reference for other

researchers in developing interesting and fun learning media for loading and unloading shading boards.

1. Introduction

Learning media have an important role in learning in conveying messages from teachers to students. Media are people, materials or events that build conditions that enable students to acquire knowledge, skills or attitudes (Pertiwi et al., 2017; Sari, 2015). In this sense, it means that the media comes from various sources that can make students gain experience and broader knowledge through the learning process.

The student learning process in understanding mathematics needs steps such as (a) manipulated objects, (b) image representations, (c) manipulation (Nuraini et al., 2016; Rahmasantika & Prahmana, 2018). The concepts in the 2013 curriculum used in elementary schools are oriented towards three competencies, namely: attitude competence, skills, and knowledge, besides that the quality of education and learning must be improved to produce quality human resources (Yasa et al., 2020). In elementary school education, the media is a tool that is easy to play so that it can attract students' attention. Media can also make it easier for students to understand the material presented.

In understanding mathematical addition, approximately 25% of students are able to complete abstract addition questions without any learning media. While the remaining about 75% of students need more special attention and repeated teaching in solving addition problems. The factors that cause student errors in solving fraction questions, one of which is that students do not know the correct algorithm in solving fraction arithmetic operations so that students do not realize that what is done in solving the questions is an error.

Based on the results of the analysis on the mathematics learning process, especially the fraction counting operation at SDN Ngembul 03, there were some students who experienced a misconception in the material for the addition of fractions, for example (1) students also found it difficult to operate fractions, usually adding the denominator and numerator to fractions that had a denominator that the same, (2) students usually add up the numerator with a numerator and denominator with a denominator in fractions with different denominators, (3) besides that students also add up the fractions that have the denominator by reversing the second fraction, namely the numerator becomes the denominator and the denominator becomes a numerator, then immediately adds up denominator with denominator and numerator with numerator. In addition to misconceptions in mathematics learning, students did not master the concept of adding fractions because they were considered too abstract because there was no concrete media. Therefore, while studying mathematics on the matter of adding fractions, students have difficulty in capturing explanations from the class teacher, especially on the material of adding fractions.

By paying attention to these problems, the researcher developed a learning media in the form of a pair of unloading shading boards to attract attention and made it easier for students to understand the material that was able to help students add ordinary fractions without having to multiply the denominator by the numerator first, but simply adding up the shading on the media. This media used the concept of shading as the main material; it is because shading is closely related to fractions. The use of concrete media can improve students' memory in understanding basic concepts, especially in the matter of adding fractions. With the loading and unloading shading board media, students became easier to operate fractions. Students do not add up the denominator and numerator in the same denominator, do not add the numerator with a numerator and denominator with different denominators, and do not add fractions by reversing the fractions. By using this unloading shading board media, students find it easier to learn and understand the concept of adding fractions so that there are no misconceptions in learning.

The learning media for the unloading shading board has several advantages including it can help students to add regular fractions without having to multiply the denominator by the numerator first, but simply by adding up the shading contained in the media, each pair of fraction values in mica shading can be exchanged for other fraction values. without having a fixed value, the value of the fraction in mica paper is divided into 2 pairs which are given a shading line according to the value in the fraction using a colorful permanent marker, when using mica the shading is rotated to the right 90 degrees so that it looks together and looks for overlapping shading, for the result of the value of the fraction that has been determined for the overlapping shading to be the numerator and the overlapping shading or not the denominator.

Research on the development of unloading shading boards that have been carried out by (Pujianingtias et al., 2019) showed that in this media development students are invited to be active in

exploring information. In addition, through this media, the evaluation system is carried out, namely students are invited to work in groups by forming groups. This aims to train students' communication skills and train cognitive, and affective and psychomotor aspects. Further research results (Indriani, 2018) stated that media development is packaged with a number of questions that vary from the material of multiplication and division of fractions. The evaluation system carried out in this study used questions by giving students the opportunity to get used to remembering the material that has been received in a short time in the form of a competition. In the previous research, only students were invited to be more active in understanding the questions given in a relatively short time. The evaluation system available in this media is only through a competition that requires students to be more active in accepting the information presented, so that there is no variation and development that instills a concept first so that there are no misconceptions in the information presented. Other research results (Azizah & Fitriawanawati, 2020), stated that the development of this media is related to the visual media in the form of a board which was chosen because of the nature of the game which is challenging, addictive and fun. Furthermore, the results of other studies (Math, 2018), stated that the development of this media embodies students in practicing affective values such as a sense of responsibility, sportsmanship, honesty and a sense of never giving up. The game evaluation system in this media requires participants to get the highest score

From several previous studies that have been done, it can be concluded that there are significant differences in the learning process. The dismantling shading board is proven to be able to increase knowledge related to the basic concept of adding fraction count operations through a logical and clear-thinking process. The evaluation needed by this media can be used in groups by making a scoring for each team so that it can trigger competition between groups. Based on the differences between the unloading shading boards in previous studies and current needs, it is important to research and develop the unloading shading boards.

Based on this explanation, the purpose of this research was to describe the process of development, feasibility, practicality, and effectiveness of the loading and unloading shading board media on the operational material for calculating the addition of ordinary fractions for grade IV elementary schools.

2. Methodology

This research on the development of unloading shading boards was carried out by using a product-oriented type of development research aimed at developing a media for unloading shading boards for students. Elementary school is in accordance with the stages of the ADDIE model, namely Analysis, Design, Development, Implementation, and Evaluation (Amirulloh et al., 2019; Azizah & Fitriawanawati, 2020). The following is a description of the implementation stage of the ADDIE model development: (1) Analysis Phase. The analysis stage was carried out by researchers by conducting interviews with class IV homerooms. (2) Design (Design / Design). The design of the panggungbongpas, namely compiling a plan for the manufacture of media began with compiling a frame for making the media for loading and unloading shading boards, validating the design of the media for loading and unloading shading boards carried out by media experts and material experts. (3) Development (Development). Researchers combined materials that have been collected in accordance with the manufacture of media, make product validation questionnaires for media experts and material experts, questionnaires for teacher and student responses. (4) Implementation (Implementation). The implementation stage was carried out in class IV SDN Ngembul 03 as many as 10 students. In addition, students were also given a response questionnaire regarding to the use of learning media for loading and unloading shading boards. (5) Evaluation. Evaluation is a process for analyzing the media at the implementation stage whether it is still lacking and weakness or not. The types of data in this research and development were quantitative and qualitative data. Quantitative data is data in the form of numbers as a result of observations or measurements. Qualitative data is data that shows the quality or quality of both conditions, processes, events, events and others expressed in the form of statements in the form of words (Indrayanti, 2016). Quantitative data is obtained from the results of the assessment in the form of scores by experts. Material, and media experts on the feasibility and practicality assessment sheet of the dismantling shading board media.

The subject of this research and development involved 3 trial subjects, namely media experts, material experts, and users. Media experts and material experts were the lecturers in the appropriate fields. Meanwhile, the users were 3 grade teachers of SDN Ngembul 03 Blitar and the fourth-grade students of SDN Ngembul 03 Blitar. The population in this study was all fourth-grade students of SDN Ngembul 03 Blitar, while the research sample is the fourth-grade students of SDN Ngembul 03 Blitar, totaling 10 students.

The instrument in this study used questionnaire. Questionnaire is a data collection technique that is done by giving a set of questions or written questions to the respondent (Sugiyono, 2010). The

questionnaire used in this development research was using a Likert scale with the criteria (1) not very good, (2) not good, (3) good, (4) very good. The components measured include:

Table 1. Material Expert Validation Questionnaire Grid

No.	Rated Aspect	Indicator	Total	Number
1.	Content Eligibility	1. Suitability of material with KD	1	1
		2. The indicators used are in accordance with the material	1	2
		3. Completeness of the material	1	3
		4. The breadth of the material	1	4
		5. The correctness of the concept	1	5
		6. Exercise questions can be used to determine student understanding	1	6
		7. Interest in the contents of the book	1	7
		8. Display text and pictures	1	8
		9. Fill in the related text on every study	1	9
2.	Kelayakan Penyajian	10. The consistency of the presentation system	1	10
		11. Conceptual order	1	11
		12. The clarity of the table of contents	1	12
		13. Clarity of practice questions	1	13
		14. The clarity of the answer key	1	14

(BSNP,2016)

Table 2. Media Expert Validation Questionnaire Grid

No.	Rated Aspect	Indicator	Total	Number
1.	Graphic Feasibility	1. Match the media size	1	1
		2. The attractiveness of media design	1	2
		3. The color combination used	1	3
		4. The quality of the materials used	1	4
		5. Media content display design	1	5
2.	Language Eligibility	6. The sentences used are simple and easy to understand	1	6
		7. The sentence used does not have a double meaning	1	7
		8. Conformity with language rules	1	8
		9. Accuracy of sentence structure and spelling	1	9
		10. Using standard Indonesian	1	10
		11. Conformity with the development of students	1	11
		12. Clarity of instructions for use	1	12

(BSNP,2016)

Table 3. The clues of teacher practicality questionnaire

No.	Rated Aspect	Indicator	Total	Number
1.	Media Display	1. The attractiveness of the media appearance	1	1
		2. The attractiveness of the display of media content	1	2
		3. The attractiveness of the color composition used	1	3
		4. The attractiveness of media design	1	4

2.	Serving components	5. The consistency of the presentation system	1	5
		6. Suitability of material with KD	1	6
		7. Suitability of indicators with material	1	7
		8. Presentation of practice questions Penyajian latihan soal	1	8
3.	Language and Readability	9. Clarity of answer keys	1	9
		10. Sentences and instructions for use are simple and straightforward	1	10
		11. The sentence used does not create a double meaning	1	11
		12. Writing instructions using Standard Indonesian	1	12

(BSNP, 2016)

Table 4. The clues of student practicality questionnaire

No.	Rated Aspect	Indicator	Total	Number
1.	Media Display	1. The attractiveness of media design	1	1
		2. The attractiveness of the appearance of media forms	1	2
		3. The attractiveness of media content	1	3
		4. The attractive color combinations and images used	1	4
		5. The attractiveness of the images used	1	4
		6. The attractive combination of colors and images	1	6
		7. Clarity of size and form of writing	1	7
		8. Ease of use of media	1	8
2.	Serving Components	9. Presentation of sections of the media	1	9
		10. Clarity of instructions for using media	1	10
		11. Accurate use of media	1	11
		12. The sentences used are simple and easy to understand	1	12

(BSNP, 2016)

Data analysis at this stage included qualitative data analysis techniques and quantitative data. Qualitative data analysis in the form of suggestions for improving learning media shading board by media experts, material experts, learning practitioners, and students as potential users who have been filled in on the questionnaire sheet. Quantitative data in the form of validation results with the media feasibility percentage calculation technique.

3. Results and Discussion

The product that was produced in this development research was the learning media for loading and unloading shading boards (PANSIRBONGPAS). This media is tested to obtain product validation for media experts and material experts, as well as to analyze the responses of teachers and students to the developed media. The following displays the loading and unloading learning media board can be seen in Figure 1.



Figure 1. Shading Board Media Unloading

The results of product testing discussed the validation of learning media for shading boards for the operation of fractions through the feasibility instrument. This feasibility instrument is given to media experts and material experts. The validator provides ratings, comments and suggestions on the validation sheet which is prepared based on the data needed by the researcher to develop the product. The results of the assessment of each validator are used as a reference in improving the media that has been developed. The results of the assessment of each validator are presented in Table 5.

Table 5. Feasibility Results of Learning Media Shading Board Unloading

Information	Percentage
Media Expert	75%
Material Expert	83,3%

The validation of learning media shading board for shading operation materials from media experts aims to determine the feasibility and opinions of experts who are experienced in learning media. There are several aspects to the learning media for the unloading of the shading board, including the feasibility of graphics and language feasibility. It is known that the learning media for the loading and unloading board of the fraction operation material on average from all aspects gets 75%. Expert validation of learning media material, the shading board of shading operation materials from material experts aimed to determine the opinion of material experts as a basis for improving the material presented in the learning media.

There are several aspects to the learning media for the unloading of the shading board, including the feasibility of content and presentation feasibility. It is known that the learning media for loading and unloading shading boards of fraction operation material on average from all aspects received 83.3% with the "feasible" category. This is supported by research by (Fais et al., 2019) with the title "Papin and Kojas Media Development (Smart Board and Magic Box) as a Mathematics Learning Media" scored 82.6%, the media was in the very good category, and the media was suitable for use in mathematics learning.

The results of validity for practicality measurements were also carried out by teachers and students using a questionnaire. The results of the aspects are presented in Table 6 below.

Table 6. Assessment of student responses using learning media shading boards for fraction operations materials

Information	Percentage
Student Practicality	86,66%
Teacher Practicality	83,65%

Based on the results in table 6, it can be seen that to measure the practicality of students getting a percentage of 86.6% and practicality for teachers to get a percentage of 83.6%, which means that students and teachers are easy to use the unloading shading board media that can make it easier and feasible for students to use in learning material fractional number operations in mathematics. Based on the description of the criteria for the analysis of practicality, the learning media for the shading board for the fraction operation material was declared "Practical". In line with previous research conducted (Ahmad, 2020) with the title "Ludo Math Media Development in Simple Fraction Material for Class III Elementary

School Students" shows that the test results in the small group trial stage were 96.25% while the large group trial stage was 98.75%.

Assessment of test results for students. Individual final learning outcomes are said to be complete if the student meets the Minimum Completeness Criteria (KKM), which is 75 as determined by SDN Ngembul 03. The percentage of the overall average value of the student learning test results after evaluating learning using learning media shading board of fraction operation materials is 81%. Thus, students are able to learn to use the shading board learning media for fraction operation material with a value exceeding the KKM and the development of learning media for the unloading shading board for fraction operation material can be said to be successful. Based on the results of this assessment, the level of effectiveness obtained is categorized as "effective". In line with previous research conducted by (Dwijayani, 2017) with the title "ICARE Learning Media Development" shows that the results of the problem solving test obtained a score of 79.13%.

From several validations and trials that have been carried out, it can be concluded that the learning media for the shading board for fraction operation material that has been developed has met the valid, practical, and effective criteria that can be used in learning mathematics for fraction operations for grade IV elementary school students. In terms of practicality, this finding is in line with research which states that the criteria for practicality are measured from the results of teacher appreciation and student appreciation shown in the product trial process (Rohati et al., 2018). In addition, the findings in this development are supported by other research which states that the selection of media quality is able to clarify the material using the quick count method and as a variation of the verbal explanation of the material presented (Arima & Indrawati, 2018).

The development of learning media for loading and unloading shading boards for this fraction operation material has the potential to make learning interesting and teachers can also make scoring for each team so that it can trigger competition between groups. Learning that uses media is also able to help students in the process of visualizing concepts, as well as learning tools developed using real phenomena and problems that occur in students' daily lives (Arindiono et al., 2013; Nurrita, 2018). The concept of learning while playing in mathematics learning about fraction operations using PANSIRBONGPAS media has the potential for the success of learning objectives.

This research is relevant to previous research, first research conducted by (Rahayu, 2018) which shows that the results of the development of learning innovations show that the percentage of student learning outcomes has increased by 10% in trial 1 and 12.24% in trial 2. Second, research conducted by (Hamdani et al., 2019) who obtained that interactive whiteboard media were declared feasible to use. Third, research conducted by (Pujianingtias et al., 2019) who obtained the result that MAJAMAT media is suitable for use as a medium for learning mathematics in elementary schools.

Based on the relevant research, the novelty value of PANSIRBONGPAS media raises: 1) this media is more used to introduce the concept of addition in ordinary fractions, 2) equipped with shading micas formed according to the value of the fraction to be added, 3) each pair of values The fractions in shading mica can be exchanged with other fractional values without having to be fixed values, 4) the value of the fraction in mica paper is divided into 2 pairs which are given a shading line according to the value in the fraction using a colorful permanent marker, 5) at the time of use The shading mics are rotated to the right 90 degrees so that they appear together and look for overlapping shading, 6) for the result of the value of the fraction that has been determined for the overlapping shading into the numerator and the overlapping shading or not being the denominator. In addition, PANSIRBONGPAS media can be used in mathematics learning because it meets the criteria of being feasible, practical, and effective. For this reason, PANSIRBONGPAS media can be an alternative learning media that can be used in mathematics learning.

4. Conclusion

Learning media shading board for fraction operation material is a product that has been developed based on the steps of the ADDIE development research model. The PANSIRBONGPAS media produced met the Eligible criteria, with an average percentage acquisition of 79.15% by media experts and 75% each by material experts. Practical, the result shows that the average percentage of the teacher practicality questionnaire is 83.65% and the student practicality questionnaire is 86.66%. Effective, the result of an average percentage of learning outcomes is 81%. Based on these results, PANSIRBONGPAS media can be used in mathematics learning because it meets the criteria of being feasible, practical, and effective. For this reason, PANSIRBONGPAS media can be an alternative learning media that can be used in learning mathematics in class.

Reference

- Ahmad, U. (2020). Pengembangan Media Ludo Math Pada Materi Pecahan Sederhana Bagi Peserta Didik Kelas III Sekolah Dasar. *Alfiatun Nur Azizah Dan Meita Fitriawanawati Info Artikel Abstrak*.
- Amirulloh, T. R. A., Risnasari, M., & Ningsih, P. R. (2019). Pengembangan Game Edukasi Matematika (Operasi Bilangan Pecahan) Berbasis Android Untuk Sekolah Dasar. *Jurnal Ilmiah Edutic*, 5(2), 115–123. <https://doi.org/https://doi.org/10.21107/edutic.v5i2.5355>
- Arima, N., & Indrawati, D. (2018). Pengembangan Media Pembelajaran Multiplication Stick Box Pada Materi Operasi Hitung Perkalian Kelas III Sekolah Dasar. *Jurnal Penelitian Pendidikan Guru Sekolah Dasar*, 06(07), 1242–1251. <https://jurnalmahasiswa.unesa.ac.id/index.php/jurnal-penelitian-pgsd/article/view/24024>
- Arindiono, R., Arindiono, R. J., & Ramadhani, N. (2013). Perancangan Media Pembelajaran Interaktif Matematika untuk siswa kelas 5 SD. *Jurnal Sains Dan Seni Pomits*, 2(1), F28–F32. <https://doi.org/10.12962/j23373520.v2i1.2856>
- Azizah, A. N., & Fitriawanawati, M. (2020). Pengembangan Media Ludo Math Pada Materi Pecahan Sederhana Bagi Peserta Didik Kelas III Sekolah Dasar. *WASIS: Jurnal Ilmiah Pendidikan*, 1(1), 28–35. <https://doi.org/https://doi.org/10.24176/wasis.v1i1.4709>
- Dwijayani, N. M. (2017). Pengembangan Media Pembelajaran ICARE. *Jurnal Matematika Kreatif-Inovatif*, 8(2), 126–132. <https://doi.org/https://doi.org/10.15294/kreano.v8i2.10014>
- Fais, M. Z., Listyarini, I., & Tsalatsa, A. N. (2019). Pengembangan Media Papin dan Koja (Papan Pintar dan Kotak Ajaib) Sebagai Media Pembelajaran Matematika. *Jurnal Penelitian Dan Pengembangan Pendidikan*, 3(1), 26–30. <https://doi.org/10.23887/jppp.v3i1.17097>
- Hamdani, A. T., Widihastrini, F., & Samadhy, U. (2019). Pengembangan Media Papan Tulis Interaktif Berbasis Graphical User Interface. *Joyful Learning Journal*, 6(4), 263–269. <https://doi.org/10.15294/jlj.v6i4.30477>
- Indrayanti, R. D. (2016). *Pengembangan lembar kerja siswa berbasis pendidikan matematika realistik untuk topik matriks di smk kelas x*.
- Indriani, A. (2018). Penggunaan Blok Pecahan Pada Materi Pecahan Sekolah Dasar. *Jurnal Ilmiah Pendidikan Matematika Volume*, 3(1), 11–16. <https://doi.org/10.26877/jipmat.v3i1.2418>
- Math, D. B. (2018). *Development Of Dart Board Math Learning Media For 7 Th Junior*. 4(1), 21–33.
- Nuraini, N. L. S., Suhartono, S., & Yuniawantika, Y. (2016). Kesalahan Siswa Pada Operasi Penjumlahan Dan Pengurangan Pecahan Di Kelas Vi Sekolah Dasar. *Sekolah Dasar: Kajian Teori Dan Praktik Pendidikan*, 25(2), 168–175. <https://doi.org/10.17977/um009v25i22016p168>
- Nurrita, T. (2018). Pengembangan Media Pembelajaran Untuk Meningkatkan Hasil Belajar Siswa. *Misykat*, 03(01), 171–187. <https://doi.org/10.1088/1742-6596/1321/2/022099>
- Pertiwi, K. R., Zulkardi, Z., & Darmawijoyo, D. (2017). Pembelajaran Pecahan dengan Menggunakan Manik Susun. *Jurnal Review Pembelajaran Matematika*, 2(2), 153–166. <https://doi.org/https://doi.org/10.15642/jrpm.2017.2.2.153-166>
- Pujianingtias, E. N., Saputra, H. J., & Muhajir. (2019). Pengembangan Media Majamat pada Materi Pecahan Pada Mata Pelajaran Matematika. *Jurnal Penelitian Dan Pengembangan Pendidikan*, 3(3), 257–263. <https://doi.org/http://dx.doi.org/10.23887/jppp.v3i3.19261>
- Rahayu, Y. (2018). *Pengembangan Alat Peraga Papan Pelangi Developing Rainbow Board Media On Fraction*. 2(2), 37–53.
- Rahmasantika, D., & Prahmana, R. C. I. (2018). Analisis Kesalahan Siswa Pada Operasi Hitung Pecahan Berdasarkan Tingkat Kecerdasan Siswa. *Journal of Honai Math*, 1(2), 81–92. <https://doi.org/10.30862/jhm.v1i2.1041>
- Rohati, Winarni, S., & Hidayat, R. (2018). Pengembangan Media Pembelajaran Komik Matematika Berbasis Problem Based Learning dengan Manga Studio V05 dan Geogebra Development of Mathematics Comics Media Based on Problem Based Learning with Manga Studio V05 and Geogebra. *Edumatica*, 08(02), 81–91. <https://doi.org/https://doi.org/10.22437/edumatica.v8i2.5486>

- Sari, D. I. (2015). Keefektivan Model Pembelajaran Kooperatif Dengan Menggunakan Media Pohon Matematika Pada Materi Pecahan Di Kelas V SD Negeri Pejagan 5 Bangkalan. *STKIP PGRI Bangkalan*, November. <https://doi.org/http://dx.doi.org/10.30734/jpe.v3i1.27>
- Sugiyono. (2010). *Metode Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif, dan R & D*. Bandung : Alfabeta.
- Yasa, A. D., Suastika, K., & Zubaidah, R. S. A. N. (2020). Pengembangan E-Evaluation Berbasis Aplikasi Hot Potatoes Untuk Siswa Kelas V Sekolah Dasar. *Jurnal Ilmiah Sekolah Dasar*, 4(1), 26–32. <https://doi.org/10.23887/jisd.v4i1.23987>