Journal Of Teaching And Learning In Elementary Education
Vol. 8, No.1, February 2025, pp. 1 - 10
DOI: http://dx.doi.org/10.33578/jtlee0801
ISSN : 2615-4528 (Print) 2622-3023 (Online)

Developing Integrated Student Worksheet with 3D Geometry Media to Improve Second Grade Students' Learning Achievements

Yeni Rachmawati
Magister Pendidikan Dasar, Universitas Terbuka, Malang, Indonesia

Article Info

Article history:

Received: 15 August 2024
Revised: 24 September 2024
Accepted 11 October 2024

Keywords:

Three-Dimensional Media
Geometry
Student Worksheets
Learning achievement

ABSTRACT

The purpose of the study is to develop of a three-dimensional media of pop-up book worksheet as learning media on geometry. The method of this study is Research and Development (R&D). The validity test was carried out by media and material experts using questionnaires. The effectiveness of learning media was measured based on the N-Gain value indicator from the pre and post-test results, as well as the teacher and student response questionnaire scores. Student learning interest is measured based on the questionnaire score of student learning interest. The test of the effectiveness of learning media was carried out at a public elementary school in Batu City. The results showed that the validation score of the media expert reached 96.66%, while the validation score of the material expert validation reached 90.76% with an average of 93.71%, which means that the learning media could be classified valid. The results of the analysis of the effectiveness of the media based on the N-Gain value of 0.009 (sig value <0.05), it can be concluded that there is a significant difference in the gain score, which means that the increase in the pre to post-test could be classified as high criteria. The scores for the questionnaire responses from teachers and students were 92.50% and 86.46%, both of which were very effective. The percentage of interest in learning reached 90.09% with very good criteria. Based on these indicators, it can be concluded that the Pop Up Book as a Learning Media and student's worksheet is declared valid by media and material experts, is effectively used in learning and is able to generate interest in learning in the very good category.

Corresponding Author:

Yeni Rachmawati
Magister Pendidikan Dasar, Universitas Terbuka, Malang, Indonesia
Email: yenirachma21@gmail.com

INTRODUCTION

The importance of teaching mathematics in elementary school is to acquire the ability to think logically, analytically, systematically, critically, creatively and innovatively. This is also clearly stated in the curriculum guidelines. Mathematics is one of the academic disciplines that forms the basis of other sciences because it requires the ability to calculate and think logically. Geometry is

Vol. 8, No.1, February 2025, pp. 1 - 10
DOI: http://dx.doi.org/10.33578/jtlee0801
ISSN : 2615-4528 (Print) 2622-3023 (Online)

a branch or field of mathematics with a high degree of abstraction. Compared to other fields of mathematics, geometry is a branch of mathematics that is difficult for elementary school students to understand (Gokkurt, 2017).

Geometry is one of the areas of mathematics that receives relatively little attention from primary school students. Geometric materials represent many abstractions of visual and spatial experience, such as planes, patterns, measurements, and mapping. The purpose of learning geometry is to help students convert their memories of concrete objects into abstract objects. One of the criteria for delivering geometry in schools is to enable students to solve problems using visualization, spatial reasoning skills, and geometric modeling (NTCM, 2000). Geometry teaching starts when the children see, know and understand the world around them and it continues by the development of attaining geometric thinking skills. In the elementary school level, planar shapes and spatial shapes such as cubes, beam, prisms and pyramids were taught to the students from second grade. But, many of the still have the difficulties mastering spatial materials.

Students need to have the interest, imagination, and curiosity sparked to keep their attention in the classroom because they have lots of physical energy and are easily distracted. To overcome the above learning difficulties of students, teachers can use learning media to help students understand the content taught. In order to achieve learning goals, teachers need to guide the students towards problem solving and individuals or groups of students, present the results of work and analysis, and evaluate problem-solving processes, structured learning media can be used. According to Muhsetyo (2008), media is a learning aid that is deliberately prepared or provided by teachers to present and/or explain the teaching material, and is used by students to be actively involved in mathematics learning. Therefore, there is a need to find a suitable solution that allows students to easily understand geometric concepts by developing student worksheets in the form of pop-up books integrated with three-dimensional (3D) media. The initial observations from SDN Ngaglik 01 Kota Batu at second grade mathematics classes show that students are bored because learning tends to be monotonous and there is nothing new to pique their interest. Teachers provide students with students' worksheet-related materials and a student book containing study materials, sample questions, and practice questions. Although various media and teaching materials are used, they still fail to maximize students' interest in learning. Student worksheets are unsightly and include little visual or color content, so there is little student interest in learning. For this reason, students need something realistic to study mathematics that looks abstract, especially in geometric materials, and is also supported by a realistic approach. Students need something interesting and lively to make learning more enjoyable.

Student worksheets integrated with 3D media in the form of added pop-up books can also serve as a learning medium. The utilization of pop-up books in learning has been widely developed, including by Baiduri, Taufik, & Elfiani (2019) in developing audio-based pop-up book learning media for quadrilateral material in junior high school, Marlina (2018) in developing pop-up book media for story problem material on addition and subtraction for first-grade elementary students, Mahayani et al. (2018) in developing problem-solving-based pop-up boxes on light and optical instruments. In addition, Fahrizar and Oktaviana (2019) have studied the needs analysis for CTL-based pop-up book media for problem-solving skills, with the result that students and teachers of SMP Negeri 12 Pontianak need learning media in the form of pop-up books to overcome the limitations of teaching materials owned by the school. Based on the student needs analysis, the researcher would like to develop teaching materials that complement and support existing student worksheets in the form of her three-dimensional media that will be integrated into the student worksheets. So that, this study investigates the feasibility, adequacy, practicality, and effectiveness

Vol. 8, No.1, February 2025, pp. 1 - 10
DOI: http://dx.doi.org/10.33578/jtlee0801
ISSN : 2615-4528 (Print) 2622-3023 (Online)

of student worksheets for improving second grade students' learning outcomes regarding geometry materials focused. Therefore, the title of this study is "Development of student worksheets integrated with 3D geometry media to improve second grade learning outcomes".

LITERATURE REVIEW

Student Worksheets Integrated 3D Geometric Media

The definition of a worksheet by Susilana & Riyana (2009) is a program package organized in the form of a specific unit and tailored to the interests and learning needs of the students. Most student worksheets used in schools are created by teachers or classroom teachers. The worksheets used include activities, summaries of material, and exercises to help students learn. The 3D Geometry Media Integration Student Worksheet is a student worksheet arranged in three-dimensional shapes to create real-world effects of planar and spatial shapes presented in Semester I Class II Geometry materials.

Planar and Spatial Shape Materials

A planar shape is a part of a plane bounded by straight lines or closed curves (Imam Roji, 1997). Geometric shapes are abstract concepts both on a plane and in space. This means that these shapes are not something you can actually see or touch. Similar to the concept of geometric shapes, these shapes are abstract shapes, but the concrete shapes that we usually see and hold are concrete objects with geometric shapes. For example, the concept of a rectangle is an abstract concept whose features are identified on a folded sheet of paper. Geometric shapes, on the other hand, are three-dimensional geometric shapes that have certain characteristics: sides, edges, and vertices.

Feasibility (Relevance) Student Worksheet

The KBBI (2008) definition of value means appropriate, suitable, and appropriate. Feasibility is a question of appropriate (right, right), appropriate, appropriate. Whether the learning media is appropriate (effective) can be determined based on the results of the verifier's evaluation based on the identified media and material aspects. Therefore, the term feasibility is interchangeable with the term plausibility. Additionally, the feasibility or effectiveness of this medium has been determined based on the results of limited testing and field testing.

Effectiveness of the media

Student Worksheet The word effective means effective (and therefore influential), able to achieve a result, and successful. The student worksheets developed in this study can be considered effective if they have a positive impact on improving students' interest, motivation, and learning outcomes, especially in their emotional and cognitive domains.

METHOD

This study is categorized as research and development (R&D) aimed at producing a developed product in the form of student worksheets integrated with 3D media for geometry material in grade II elementary school. Educational research and development is a process used to develop and validate educational products, as defined by Borg and Gall (1989), who stated that educational research and development is a process aimed at developing and validating educational products. Additionally, Sugiyono (2011) also defines this research as a method used to produce a specific product and test its effectiveness.

Journal Of Teaching And Learning In Elementary Education
Vol. 8, No.1, February 2025, pp. 1 - 10
DOI: http://dx.doi.org/10.33578/jtlee0801
ISSN : 2615-4528 (Print) 2622-3023 (Online)

In this study, the stages of the development research process are adjusted to six steps because the research is conducted on a small scale and does not require the dissemination of the product to the public. The following is the stages use in this research : Research and Information Collecting, Planning, Develop Preliminary Form of Product, Preliminary Field Testing and Validation, Main Product Revision, and Main Field Testing.

The final stage involves field testing the main product with 30 students divided into two groups. This trial aims to evaluate the achievement of the product trial results, which are then compared with the control group using an experimental research design. The student learning outcomes are analyzed through post-test results.

The data collection tool used in this study is observation, which aims to directly know various things related to the implementation of learning. Observations will be written on the observation sheet and can be taken into account when creating the student's worksheet. In addition, the researcher used interviews in the initial stage of the study (definition stage), that is, to find out the different problems that need to be analysed as material for creating worksheets for the students.

Another instrument used in this study was a questionnaire. The type of survey used is a checklist-style closed her survey in which respondents answer questions by checking the specified alternative answers (√). The questionnaire for this study was distributed to respondents consisting of material experts and media experts.

The validation instrument used in this research is a validation sheet which aims to determine whether or not this research learning media is valid. Validation instruments were given to material experts, media experts, and teacher.. Data validity results will be analyzed in all its aspects which are presented in table form using a Likert scale. Based on the validation sheet, the scoring for each category can be seen in Table 1.

Table 1. Criteria for Scoring the Validity of 3D Worksheets

No	Criteria	Score
1	Very good	5
2	Good	4
3	Enough	3
4	Not enough	2
5	Very less	1

Results learning media validation analysis is then converted with the following validity criteria (Table 2).

Table 2. Product Validity Criteria

No	Category	Range
1	Very valid	> 3,25 to 4,00
2	Valid	> 2,50 to 3,25
3	Valid Enough	> 1,75 to 2,50
4	Invalid	1,00 to 1,75

Pre-tests and post-tests are conducted with the purpose of evaluating students' learning outcomes. A pretest-posttest control group design (two pretest-posttest groups) was used to measure the effectiveness of the product being developed. In this design, two groups are randomly

Journal Of Teaching And Learning In Elementary Education
Vol. 8, No.1, February 2025, pp. 1 - 10
DOI: http://dx.doi.org/10.33578/jtlee0801
ISSN : 2615-4528 (Print) 2622-3023 (Online)

selected and pretested to determine differences in initial conditions. If there are no significant differences in the results, this will be a good pretest result. Next, we use the N-gain test according to Hake (1998) to analyze the pre-test and post-test results to determine the significance of the increase in student learning outcomes.

RESULTS

Media Validity Test testing the validity of the student worksheets is done by giving an assessment on the validation sheet for the learning media that has been developed. Media validation data was obtained from a media expert, namely Mr. Dr. Abadyo, M.Si as a lecturer in Magister Primary Educational at UNM. Material Validity Test Testing the validity of the material is done by giving an assessment on the validation sheet for the learning media that has been developed. Media validation data was obtained from a material expert, namely Mr. Prof. Dr. Sugilar, M.Pd as a lecturer in Magister Primary Educational at Universitas Terbuka.

Table 3. Validity Test Results

No	Validator	Aspect		Average
		Material	Learning	
1	Material Expert	3,83	3,81	3,82
2	Media Expert	3,61	3,73	3,69
Total Average Score		3,72	3,77	3,75
Category		Very Valid	Very Valid	Very Valid

Material Validity Test Testing the validity of the material is done by giving an assessment on the validation sheet for the learning media that has been developed. Media validation data was obtained from a material expert, namely Mr. Dr. Sugilar, M.Pd as a lecturer in Magister Primary Educational at Universitas Terbuka.

Both the Media Expert and the Material Expert rated the 3D integrated Geometry worksheet as 'very suitable'. The Media Expert gave an overall rating of 3.75, while the Material Expert gave a rating of 3.82. These ratings were based on evaluations of both the material content and the worksheet's suitability for learning. The high scores from both experts indicate that the worksheet is well-designed and meets the required criteria.

The suitability of the 3D Integrated Geometry Worksheet was validated by Ms. Umi Khasanah, S.Pd., a second-grade teacher. The worksheet received a very high rating, with an average score of 3.81. The respondent found the worksheet to be highly effective, aligning well with the curriculum and engaging students in learning about plane and solid shapes. The worksheet was also deemed highly interactive, efficient, and creative, demonstrating its overall suitability for classroom use. Initial student performance data (pre-test) was obtained without using the 3D Geometry Media Integrated Student Worksheet with a total of 15 student respondents. Below is a list of distribution tables for student initial learning performance data (pre-test).

Journal Of Teaching And Learning In Elementary Education
Vol. 8, No.1, February 2025, pp. 1 - 10
DOI: http://dx.doi.org/10.33578/jtlee0801
ISSN : 2615-4528 (Print) 2622-3023 (Online)

Table 4. Distribution of initial performance data (Pre-test)

Interval	Frequency	Percentage
60-65	12	80.00
66-70	2	13.33
71-75	0	0.00
76-80	1	6.67
81-85	0	0.00
86-90	0	0.00
91-95	0	0.00
96-100	0	0.00
Sum	15	100%

The results of the descriptive analysis are as follows. The initial academic performance of the students was mean 54.67, the median is 50, mode is 60, and standard deviation (SD) 12.46. The score is 40.00, and maximum 80.00. The frequency distribution of initial successes for the 12 students was primarily within the 60-65 range. The final performance data for the experimental class was collected from 15 students in the experimental class. Below is a list of distribution tables for post-test performance data.

Table 5. Distribution of post-test performance data

Interval	Frequency	Percentage
60-65	0	0.00%
66-70	0	0.00%
71-75	0	0.00%
76-80	4	18.18%
81-85	3	13.64%
86-90	10	45.45%
91-95	2	9.09%
96-100	3	13.64%
Sum	22	100%

Based on the table above, we can see that the results of the descriptive analysis are as follows: the average student's final learning success rate is 81.33 points and the median is 80.00 points, the mode is 70.0, the standard deviation (SD) is 10.60.

The minimum value is 70.00 and the maximum value is 100.00. The frequency distribution of the final grades mainly ranged from 66.00 to 70.00 and from 76.00 to 80.00 for the five students.

Journal Of Teaching And Learning In Elementary Education
Vol. 8, No.1, February 2025, pp. 1 - 10
DOI: http://dx.doi.org/10.33578/jtlee0801
ISSN : 2615-4528 (Print) 2622-3023 (Online)

Table 6. Testing differences in student learning outcomes

Treatment	Variabel	Average	Stdev	*Gain Score*
Test	Pre	54,67	12,46	0,62
	Post	81,33	10,60	

The summary of the table above shows that students treated with 3D-integrated student worksheets achieved significantly higher average grades compared to their previous learning outcomes. The incremental value of student learning performance is 0.62 (medium). The percentage of students based on gain category is shown in table below.

Tabel 7. Students' Gain Score percentage

Group	Criteria	Frequency	Percentage
Pre Test	Low	8	53.33
	Medium	6	40.00
	High	1	6.67
Post Test	Low	1	6.67
	Medium	10	66.67
	High	3	20.00

Based on Table 6, it shows that 46.67% of students in the pre-test had Gain scores in the medium and high criteria, while in the experimental group students had Gain scores. The increase in student cognitive learning outcomes from the Pretest and Posttest using medium and high criteria was 86.67%. This shows that the student worksheets integrated with 3-dimensional media are effective. However, to see whether the effectiveness was different statistically, different tests were carried out.

Before the research hypothesis is implemented, the analysis prerequisites are first tested which includes a normality test with Kolmogorov Smirnov. If the sig value of the normality test is >0.05, then the difference test is carried out using the independent t test, if it is not met then the Mann Whitney test is carried out. The results of the normality test are presented in the following table:

Table 8. Normality Test Results

Variabel	*Kolmogorov Smirnov*	N	Sig	Explanation
Gain Score Pre Test	0.222	15	0.045	Abnormal
Gain Score Post Test	0.145	15	0.200	Normal

Based on the table of normality test results for research variables above, it can be seen that the pre-test Gain score has a significance value of less than 0.05 at ($p<0.05$). This shows that the variable is not normally distributed. Meanwhile, the post test Gain score has a significance value of more than 0.05 ($p> 0.05$), this variable meets the normality assumption). The test carried out was the Mann Whitney test.

This research aims to determine the influence of student worksheets integrated with 3-dimensional media on student learning achievement at SDN Ngaglik 01 Batu. Based on the gain

Journal Of Teaching And Learning In Elementary Education
Vol. 8, No.1, February 2025, pp. 1 - 10
DOI: http://dx.doi.org/10.33578/jtlee0801
ISSN : 2615-4528 (Print) 2622-3023 (Online)

score. Data analysis carried out for hypothesis testing in this research was the Mann Whitney-U test. The results of the Mann Whitney test in this study are shown in the following table:

Tabel 9. Mann Whitney Difference Test of Student Learning Achievement

Variabel	Average Gain score	Sig
Pretest	0,30	0,009
Posttest	0,62	

The results of hypothesis testing, significant based on statistical analysis. These statistical results confirm the stated hypothesis, that is, the significance value of 0.009 is less than 0.05 (significance value). So, we can conclude that there is a significant difference in the gain scores. This proves that students' worksheets integrated with three-dimensional media are effective in improving students' learning performance in SDN Ngaglik 01 Batu.

DISCUSSION

This study aims to determine the feasibility of the student worksheet integrated with 3D geometry media are valid, practice, and effective. The development of this product was also increased student's spatial intelligent of the students. Based on the results of the hypothesis test, the statistical results support the hypothesis that was made, as there being a significant difference in the Gain score. This proves that the student worksheet integrated with 3D media is effective in improving student learning achievement at SDN Ngaglik 01 Batu.

The results of the validation by media experts and material experts obtained Very Suitable category. Meanwhile, the results of the validation by Field Experts (Teachers) also show that the average value of the product's suitability and effectiveness validation in the category of Very Suitable. In the other hand, the student responses to the product fall into the Very Suitable category and this proves that the developed product has good material content and learning quality.

Based on the data above, it shows that the use of student worksheets integrated with 3D Geometry media is able to improve students' ability to understand and complete tasks in learning, so that the existence of this method provides a significant increase. Significant increases were obtained from tests based on the results of pre-tests and post-tests as indicators for student learning outcomes in the cognitive aspect and have an impact on improving student learning outcomes.

Riyana (2009) stated that student worksheets are a package of programs arranged in certain units and designed in such a way as to meet the learning needs of students. The above definition explains that student worksheets are indeed designed to meet the needs of teachers and students in the teaching and learning process. In line with this, this study has found that worksheets integrated with 3-dimensional media can be effectively applied to second-grade students to improve student learning achievement.

Every study has its strengths and weaknesses. The identified shortcomings should be addressed in future research. Future researchers can further explore and develop studies on 3D geometry integrated student worksheets in relation to learning outcomes. They can also expand the research by increasing the number of subjects and varying their characteristics to strengthen statistical tests for generalization. Additionally, future research could focus on specific subjects to determine if there are differences in learning outcomes across subjects.

Vol. 8, No.1, February 2025, pp. 1 - 10
DOI: http://dx.doi.org/10.33578/jtlee0801
ISSN : 2615-4528 (Print) 2622-3023 (Online)

CONCLUSION

This study demonstrates the effectiveness of 3D worksheets in enhancing students' learning outcomes in geometry. By providing visual representations of abstract concepts, 3D worksheets facilitate better understanding and engagement for students of SDN Ngaglik 01 Batu. The findings suggest that 3D worksheets can be a valuable tool for teachers to address the challenges of teaching geometry. By incorporating 3D elements, these worksheets can make learning more engaging and effective.

To maximize the benefits of 3D worksheets, teachers should be provided with adequate training and resources. This study underscores the importance of using innovative instructional materials to improve student achievement in mathematics.

Further research is recommended to investigate the long-term effects of using 3D worksheets on students' conceptual understanding of geometry, to compare the effectiveness of 3D worksheets with other instructional media, and to develop more integrated instructional models that incorporate 3D worksheets.

REFERENCES

Abdurrahman, M. (2010). *Pendidikan Bagi Anak Berkesulitan Belajar*. Jakarta: Rineka Cipta

Asis, M, et al. (2015). Profil Kemampuan Spasial dalam Menyelesaikan Masalah Geometri Siswa yang Memiliki Kecerdasan Logis Matematis Tinggi Ditinjau dari Perbedaan Gender. *Jurnal Daya Matematis. Departemen Pendidikan dan Kebudayaan, 3*(1),78-87.

Black, P. & Wiliam, D. 1998. Assessment and Classroom Learning. *Assessment in Education: Principles, Policy & Practice*, 5(1),7-74.

Fahrizar & Oktaviana, D. (2019). Analisis Kebutuhan dan Kelayakan Media Pembelajaran Pop-Up Book Berbasis Contextual Teaching and Learning. *Prosiding Seminar Nasional Pendidikan: Peningkatan Mutu Pendidikan MIPA dan Teknologi di Era Revolusi Industri 4.0*, 313-320. Fakultas Pendidikan MIPA dan Teknologi IKIP PGRI Pontianak.

Fitria, D. (2017). Penerapan Pendidikan Matematika Realistik indonesia (PMRI) dalam Pembelajaran Matematika. *Jurnal Scientia*, 6(2), 217-223.

Gökkurt Özdemir, B., Basir, R., Balbay, A., Meredova, P., & Çağlar, K. (2021). Digital Games designed by prospective teachers in the scratch program through the eyes of mathematics teachers. *International Journal on Lifelong Education and Leadership*, *7*(2), 37–58. https://doi.org/10.25233/ijlel.994301.

Hadiana, D. (2015). Penilaian Hasil Belajar untuk Siswa Sekolah Dasar. *Jurnal Pendidikan Dan Kebudayaan, 21*(1), 15-26. https://doi.org/10.24832/jpnk.v21i1.173

Hiebert, H. (2014). *Playing with pop-ups: The art of dimensional, moving paper design*. America: Quarry Books

Lalan, I. Y.M., et al. (2015). Penggunaan Alat Peraga Polydron Frameworks pada Materi Geometri untuk Meningkatkan Kemampuan Spasial Matematis Siswa SMP Kelas VIII. Jurnal Pendidikan Matematika. 1(2): 43-52.

Mahayani, S., et al. (2018). Kotak Pop-up Berbasis Problem Solving: Pengembangan Media Pembelajaran pada Materi Cahaya dan Alat-Alat Optik untuk Kelas VIII SMP. *Jurnal Pendidikan Matematika dan IPA, 9*(2), 98-108.

Marlina, M. (2018). Pengembangan Media Pop-Up Book Materi Soal Cerita Penjumlahan dan Pengurangan Kelas 1 SD. *Jurnal Pendidikan Guru Sekolah Dasar, 37*(7), 3635-3648.

Muhsetyo, G. (2008). *Pembelajaran Matematika SD*. Jakarta: Universitas Terbuka

Vol. 8, No.1, February 2025, pp. 1 - 10
DOI: http://dx.doi.org/10.33578/jtlee0801
ISSN : 2615-4528 (Print) 2622-3023 (Online)

NCTM.(2000). Principles and Standards for School Mathematics. United Stated: The Natoinal Council of Teachers of Mathematics, Inc.

Nizlel & Angel. (2013). Analisis Kesulitan Siswa Berdasarkan Kemampuan Pemahaman dalam Menyelesaikan Soal Cerita pada Materi Kubus dan Balok di Kelas VIII SMPN 30 Muaro Jambi. *Prosiding Semirata FMIPA UNILA : Lampung*.

Putri, J. H., et al. (2019). Pengembangan Media Pembelajaran Berbasis Macromedia Flash dengan Menggunakan Pembelajaran Berbasis Masalah untuk Meningkatkan Kemampuan Spasial dan Motivasi Belajar Siswa. *Paradikma, 12*(2), 10.24114/paradikma.v12i3.22965

Ristontowi, (2013). Kemampuan Spasial Siswa melalui Pendekatan Pendidikan Matematika Realistik Indonesia dengan Media Geogebra. *Seminar Nasional Matematika dan Pendidikan Matematika UNY 2013.*

Rohman, A. N., Karlimah, & Mulyadiprana, A. (2017). Analisis Kemampuan Komunikasi Matematis Siswa Kelas III Sekolah Dasar Tentang Materi Unsur Dan Sifat Bangun Datar Sederhana. *PEDADIDAKTIKA: Jurnal Ilmiah Pendidikan Guru Sekolah Dasar, 4*(2), 106–118.

Sudjana, N. (2005). *Penilaian Hasil Proses Belajar Mengajar*. Bandung: Remaja Rosdakarya.

Sugiyono (2012). *Metode penelitian kuantitatif, kualitatif dan R&D* (16th ed.). Alfabeta.

Susilana, R., & Riyana, C. (2009). *Media pembelajaran*. Bandung: Wacana Prima.

Taufik, A., & Nuranita. (2017). Pengembangan Perangkat Pembelajaran Matematika Berbantuan Alat Peraga Pop Up Book Berbasis Problem Based Learning untuk Meningkatkan Kemampuan Spasial Siswa. *Prosiding SEMNAS Pendidikan Matematika 2017*, 163-174.

Thiagarajan, S., Semmel, D. G., & Semmel, M. I. (1974). Instructional development for training teachers of exceptional children: A sourcebook. *Journal of School Psychology*, *14*(1), 75. https://doi.org/10.1016/0022-4405(76)90066-2

Ukhtinasari, F., et al. (2017). Pop Up sebagai Media Pembelajaran Fisika Materi Alat-Alat Optik untuk Siswa Sekolah Menengah Atas. U*NNES Physics Education Journal (UPEJ), 6*(2), 2-6.

Umayah, et al. (2011). Pengembangann Modul Pop-up untuk Pembelajaran IPA Model Kooperatif dan Metode Diskusi. *UNNES Science Education Journal, 2*(2), 1-6.

Yusrianto, S.I., et al. (2016). Keefektifan Model Pembelajaran Core Berbantuan Alat Peraga Pop Up Book terhadap Kemampuan Siswa Kelas VIII pada Aspek Representasi Matematika.*Unnes Journal of Mathematics Education (UJME), 5*(2), 155-162.