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Development Of Discovery Learning-Based Learning Devices To Improve Mathematical Problem Solving Abilities

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Abstrak

Penelitian ini merupakan penelitian pengembangan yang menggunakan model Plomp. Penelitian awal terdiri dari analisis kebutuhan, analisis kurikulum, analisis konsep, dan analisis karakteristik siswa. Proses pengembangan atau prototyping terdiri dari evaluasi individu, evaluasi kelompok kecil, dan evaluasi ahli. Selain itu, tahap evaluasi terdiri dari pengujian efektivitas yang menguji kemampuan pemecahan masalah matematika. Hasil penelitian menunjukkan validasi modul ajar yang diberikan dosen matematika menerima skor rata-rata 3,75 sangat valid untuk aspek validasi modul ajar. Berdasarkan uji kepraktisan modul ajar yang dilakukan oleh seorang guru dan peserta didik menunjukkan bahwa modul ajar mendapatkan skor rata-rata 88,81% atau kriteria sangat praktis dengan guru 89,58% dan 88,05% respon peserta didik dan berdasarkan uji efektivitasnya dengan memberikan soal pemecahan masalah matematika, 90% peserta didik memenuhi ketuntasan, menunjukkan bahwa modul ajar matematika sangat valid, praktis, dan efektif dalam meningkatkan kemampuan pemecahan masalah matematika siswa di SMP Negeri 1 Tapanuli Tengah. Rekomendasi dan saran dari penelitian ini diharapkan dapat membantu guru dalam menggunakan kurikulum mandiri untuk kegiatan belajar mengajar agar dapat memilih model pembelajaran yang tepat untuk memicu semangat siswa dan kegiatan belajar mengajar, seperti penerapan model Discovery Learning yang dapat menciptakan suasana belajar bergairah.

Kata Kunci: *Pengembangan, Discovery Learning, Modul Ajar*

Abstract

This research is a development research that uses the Plomp model. The initial research consists of needs analysis, curriculum analysis, concept analysis, and student characteristics analysis. The development or prototyping process consists of individual evaluation, small group evaluation, and expert evaluation. In addition, the evaluation stage consists of effectiveness testing that tests mathematical problem solving ability. The results showed that the teaching module validation provided by mathematics lecturers received an average score of 3.75 very valid for teaching module validation aspects. Based on the practicality test of the teaching module conducted by a teacher and students, it shows that the teaching module gets an average score of 88.81% or very practical criteria with 89.58% teacher and 88.05% student responses and based on the effectiveness test by giving mathematical problem solving questions, 90% of students meet the completeness, indicating that the mathematics teaching module is very valid, practical, and effective in improving students' mathematical problem solving skills at SMP Negeri 1 Tapanuli Tengah. The recommendations and suggestions from this research are expected to help teachers in using the independent curriculum for teaching and learning activities to choose the right learning model to trigger students' enthusiasm and learning activities, such as the application of the Discovery Learning model which can create a passionate learning atmosphere.

***Keywords**: Development, Teaching Modules, Discovery Learning*

A. Introduction

Mathematics is one of the subjects that plays a very important role in education, because it can develop logical, rational, and critical reasoning and provide them with skills to be able to use mathematics and reasoning in solving various problems in everyday life or in studying other sciences (Destania, Y., & Riwayati, 2021). Mathematical problem-solving ability is the ability of students to solve mathematical problems by paying attention to the process of finding answers based on problem-solving steps, namely understanding the problem, making a plan, solving the problem, carrying out a solution plan and re-checking the results of solving a given mathematical problem (Mustika M, 2024). Problem-solving ability is a skill that must be learned by someone in the world of education to solve a problem given in various ways in order to draw a conclusion (Agnesia, Rahmy, dan Caswita, 2019).

The importance of problem-solving ability is also supported by the opinion of (NCTM, 2000) stating that "problem solving" refers to mathematical tasks that have the potential to provide intellectual challenges to improve students' understanding and development of mathematics. The reality in the field shows that students' problem-solving skills, especially in mathematics, are at a low level (Rizqiani, A. S., Sridana, N., Junaidi, J., & Kurniati, 2023). The results of a study by (Hasani & Wardani, 2023) stated that the problem-solving abilities of students in the medium and low categories still have difficulty in solving problem-solving questions, because students are less able to carry out the problem-solving stage of understanding information, are less able to create mathematical models and are less careful in solving problems. Based on the results of the 2022 Program for International Student Assessment (PISA) Indonesia study, it showed that student scores had decreased from 2018. In mathematics skills which are the main topic in PISA 2022, Indonesia's average score fell 13 points to 366, from the score in the previous edition which was 379. This figure is also 106 points away from the global average score. The PISA 2022 mathematical framework defines the theoretical basis of PISA mathematics assessment based on the basic concept of mathematical literacy, connecting mathematical reasoning and three problem-solving cycle processes (Atikah, H. F., Sarifah, I., & Yudha, 20024).

The use of the Discovery Learning learning model can enable students to learn to identify a problem, find a solution to the problem, find relevant information, develop various solutions to the problem, implement the chosen solution (Arifudin, 2020). Discovery Learning is a learning process that can build students' knowledge and understanding in depth about the main concepts so that students are directly and actively involved in the learning process. According to Bickel-Holmes & Hoffman in (Hayati, F., Rahman, A. A., Nasryah, 2021). Discovery Learning has three main characteristics, namely (1) discovery learning is one of the most important. Through the active role of students to create, integrate and generalize knowledge; (2) Discovery Learning

encourages students to learn at their own pace and contributes to motivating students to learn; (3) discovery learning is based on the principle of using existing knowledge in students as a basis for building new knowledge.

Efforts made to improve students' problem-solving abilities are to use the Discovery Learning model because learning using the Discovery Learning model is better than students using expository learning as well as students' motivation to learn mathematics with Discovery Learning is better than students with expository learning (Julaeha, J., Rosli, R., & Hendrastuti, 2022). This is in line with the results of research by (Yanty Putri Nasution, E., Emjasmin, A., Rusliah, 2021) showing that the mathematical problem-solving abilities of students who use learning devices with the Discovery Learning model have increased. In research (Rahman, L. L., Rusyana, A., & Yulisma, 2021)et al, 2024) it is stated that learning using Discovery Learning can improve students' problem-solving abilities. Likewise, the results of research (Khairani, D., Permana, D., Fauzan, A., & Musdi, 2024) which state that the development of devices using the Discovery Learning learning model can improve students' problem-solving abilities.

The results of Juju (Julaeha, J., Rosli, R., & Hendrastuti, 2022) The improvement of students' mathematical problem-solving abilities with Discovery Learning is better than students with expository learning, as well as the motivation to learn mathematics of students with Discovery Learning is better than students with expository learning. There is a relationship between the motivation to learn mathematics and the achievement of students' mathematical problem-solving abilities which is very strong, where the level of learning motivation of students who use Discovery Learning is better than students who use expository. So that it can accelerate students to understand students' mathematical problem-solving abilities. In addition, the results of the study by (Rosnawati, 2013) revealed that learning devices using the Discovery Learning model can also improve students' mathematical abilities obtained, namely from good qualifications to very good qualifications.

So the use of the Discovery Learning model is expected to improve students' mathematical abilities. Based on the background of the problem above, the author is interested in conducting research with the title: "Development of Discovery Learning-Based Learning Devices to Improve Mathematical Problem-Solving Abilities of Class VII Junior High School Students.

B. Research Method

Research and development (R&D) is the sort of research that is being carried out. Development research is another method. In order to enhance the mathematical problem-solving abilities of students at SMP Negeri 1, the product that was developed as a result of this study is a mathematics learning device that takes the shape of a discovery learning-based teaching module. Under the Plomp model, the development process is broken down into three distinct phases: the preliminary research phase, the development or prototype phase, and the

evaluation phase (Sugiyono, 2018). The central region of Tapanuli. Refer to Figure 1 for more information.

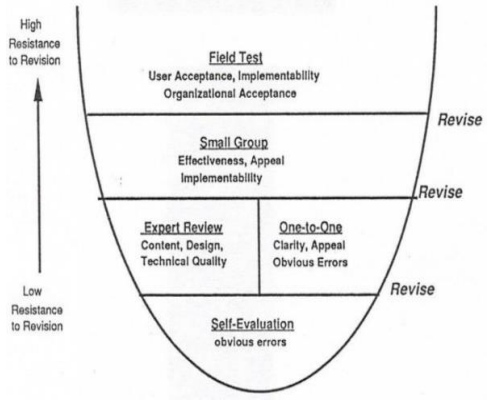

Figure 1 Research Procedure

1. Preliminary Research Phase

This phase consists of several stages, namely: a) needs analysis, student analysis, b) curriculum analysis, c) concept analysis.

2. Development phase (Development ot Prototyping Phase)

This phase consists of 3 stages, namely prototype 1, prototype 2 and prototype 3. Prototype 1 is used to design learning devices that will be developed and assessed by experts or validators. In prototype 2, a one-to-one evaluation was carried out consisting of 3 students with different abilities. In prototype 3, a small group evaluation was carried out consisting of 6 students with different abilities.

3. Assessment Phase

In this assessment phase, a field test was carried out. The test subjects in the one-to-one evaluation and small group evaluation stages were different students from the field test stage. The subject matter is flat shapes. The collection instrument used was a questionnaire sheet of teacher and student educator responses to see how far this learning device is practical to use in learning. Data collection was carried out through interviews to find out the obstacles and difficulties of educators and students in learning by asking questions that had been provided, observations to see the responses, interests and interests of participants in learning mathematics. The data analysis techniques applied were validity, practicality and effectiveness data. Validation was carried out by two validators who assessed the learning device. The validation results were determined through the scores shared by the validators, the response questionnaire was analyzed to see the practicality of the learning device and a mathematical problem-solving ability test to see the effectiveness of the learning device

C. Result and Discussion

Development using the Plomp model has three phases, namely preliminary research, development or prototyping phase, and assessment phase:

Preliminary Research

The initial investigation phase was carried out to identify or analyze the things needed to develop discovery learning-based learning devices in the form of teaching modules. Activities in the preliminary analysis began with needs analysis, curriculum analysis, concept analysis, and student analysis.

a. Analysis of the needs of learning activities carried out in class showed that student activities were still not active and only a few students actively asked questions, opinions, or suggestions during class lessons
b. The results of the Curriculum Analysis showed that teachers had used independent curriculum learning devices but did not fully know how to implement the independent curriculum because the independent curriculum was still relatively new.
c. Concept analysis After adjusting the flat shape material, the material based on the curriculum analysis carried out was that learning began by determining the mathematical model of the problem presented, then finding the concept of solving flat shapes by describing the circumference and area formulas independently.
d. The results of the analysis of student characteristics, The results of interviews conducted by three people with students, it has been known that mathematics is one of the most difficult subjects for students to understand. The survey results show that most students do not like mathematics, so that the value of the subject is considered low. In addition, it was found that students prefer to study in groups. This shows that students prefer to do activities together, so that interest in learning can be greater.

Prototyping Phase

The design of a discovery learning-based teaching module is designed to improve problem-solving skills. This learning tool is adjusted to the curriculum and characteristics of students. The teaching module is designed by considering the steps and principles of discovery learning for the components in the teaching module arranged based on the (Permendikbud, 2016).

The components of the teaching module can be seen in the image below:

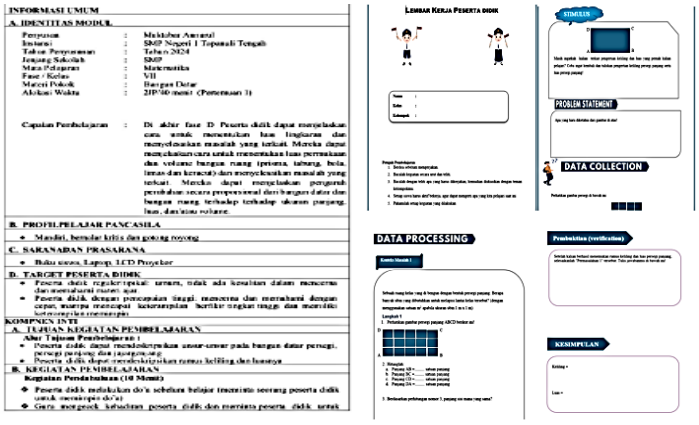

Figure 1. Teaching Module

Device Validation Results

Self Evaluation

The researcher made corrections in prototype one with colleagues from the same department. The first step taken was to re-check with colleagues the discovery learning module created by the researcher himself before being validated by experts. Discovery learning-based learning devices often experience typos, punctuation, and incorrect word usage.

Validation by Experts (Expert Reviews)

The revised learning device based on the results of its own evaluation was then validated by 2 experts, namely two lecturers of mathematics education. The results of the validation of the Discovery Learning-based learning device are described below in table 1

Table 1. Results of the Validity of the Teaching Module

No	Rated aspect	Validity index	Category
1	Identity of Teaching Module	4	Very Valid
2	Completeness of Core Components	4	Very Valid
3	Completeness of Attachment Components	4	Very Valid
4	Completeness of Module Information	4	Very Valid
5	Time Allocation	3,5	Very Valid
6	Selection of Pancasila Profile	3,5	Very Valid
7	Selection of Learning Model	3,5	Very Valid
8	Learning Objectives	3,75	Very Valid
9	Learning Activities	3,5	Very Valid
10	Assessment	3,5	Very Valid
11	Student Worksheets	3,75	Very Valid
12	Language and Writing	4	Very Valid
Total average		3,75	Very Valid

Based on Table 1 above, it can be concluded that the Discovery Learning-Based Learning Module is valid. After the validation process through the self-evaluation stage and the expert review stage is complete. The revised result of prototype 1 is called prototype 2. Furthermore, on prototype 2, a practicality test of the Discovery Learning-based learning device was carried out.

One-to-one Evaluation

Development of a Discovery Learning-based teaching module that was tested on three students of SMP 1 Tapanuli Tengah class VII, students selected in class VII from the level of knowledge, namely students who have high, medium and low knowledge. The three students

were experimented with. Individual assessment has the purpose of reviewing a problem in prototype two such as language structure that is not understood or incorrect spelling in sentences and inappropriate use of punctuation.

Small Group Evaluation

Small group testing was conducted on six students. Students were selected based on their abilities: two students with high potential, two students with medium abilities, and two students with low abilities. The teacher appointed students based on the teacher's evaluation of students' mathematics learning. Students who participated in group learning have a view of individual learning. The observer in the small group process is the teacher who uses the learning stages arranged in the discovery learning-based teaching module. The teacher assists the observer in the small group process. where the teacher is responsible for evaluating how learning activities run with Discovery Learning-based learning devices. Then it can be seen in table 2.

Table 2. Results of Observations on the Implementation of Teaching Modules (Small Group)

Assessed Aspects	Validity Index	Practical bag (%)	Category
Preliminary Activities	3,5	85	Very Practical
Core Activities	3,65	82,78	Practical
Closing	4	82	Practical
Average Total	3,71	83,26	Practical

Table 2 shows that the Discovery Learning-based Teaching Module's small group assessment stage is realistic for each component. The Appendix shows the computation of Teaching Module implementation observations at the small group assessment stage. At the small group assessment stage, the observation sheet for open module implementation is 83% practical. Teachers and students answered a questionnaire about their answers to the Discovery Learning-based teaching module after meeting 5. The following is a recapitulation of the average results of the teacher and student response questionnaire at the small group evaluation stage for the discovery learning-based teaching module, which can be seen in Table 3.

Table 3. Results of the Practicality Questionnaire for Teaching Modules (Small Group)

No	Assessed Aspects	Average (%)	Score	Category
1	Teacher practicality test	89,58		Very Practical
2	Student practicality test	88,05		Very Practical
Average		88,81		Very Practical

From table 3 above, it can be concluded that the questionnaire and interview sheets show that the Discovery Learning-based teaching module learning device in the small group evaluation process is categorized as very practical. When the small group stage has been completed, the next step is prototype 4, namely the Field Test.

Field Test

The field test is the next stage of the small group evaluation that has undergone changes from the results of the small group. The field test was conducted in class VII with 30 students. The implementation of the trial was aimed at increasing the effectiveness of the teaching module. The implementation of learning by students who applied the Discovery Learning-based teaching module in the field test was carried out by the teacher in the mathematics learning of class VII of junior high school itself, while the researcher at that time as an observer, the researcher was also accompanied by the class VII mathematics teacher.

Asesment Phase

Practicality Test

Every time the learning activity is finished, students are asked to fill out a questionnaire sheet in each meeting, then the questionnaire is used to review the achievement in use which includes ease of use, presentation, readability and time. The following are the results of the practicality questionnaire of student responses in the field test in table 4.

Table 4. Results of the Practicality Questionnaire for Student Teaching Modules (Field Test)

No	Aspects Assessed	Average Score (%)	Category
1	Ease of Use	96,67	Very Practical
2	Presentation	92,57	Very Practical
3	Readability	94,6	Very Practical
4	Time	92,5	Very Practical
Average		94	Very Practical

Table 4 shows that each feature tested in the Discovery Learning open module is extremely practical. Discovery Learning open modules average 94% practicality, including a highly practical category. Student answers to the questionnaire and interview findings on the feasibility of the Discovery Learning-based teaching module are in the Appendix. The questionnaire and interviews show that the Discovery Learning mathematics learning gadget in the field test stage is practical. To evaluate the Discovery Learning-based learning gadget, a mathematics problem-solving exam was given at the final meeting. All five exam questions include problem-solving indicators.

Table 5. Results of Observations on the Implementation of Teaching Modules (Small Group)

Assessed Aspects	Practicality Value (%)	Category
Preliminary Activities	96,67	Very Practical
Core Activities	93,89	Very Practical
Closing	93	Very Practical
Average Total	94,52	Very Practical

Based on Table 5, it can be seen that the practicality of the Discovery Learning-based Teaching Module at the small group evaluation stage for each aspect is in the very practical category.

Effectiveness Test of Teaching Modules

The effectiveness test in the use of teaching modules based on Discovery Learning has been carried out. It can be seen that each instrument in the teaching module can help students in achieving mathematics learning objectives. The evaluation carried out aims to review students' learning achievements in problem solving. From the trial carried out, it was aimed at determining students' understanding in solving problems, which obtained 27 out of 30 students who were categorized as complete. This shows that there are 90% of students who have completed it and 10% of students who have not completed it. So it can be concluded that the mathematics teaching module based on Discovery Learning is effective.

The results of the analysis of the mathematical problem-solving ability test of students obtained can be concluded that the learning device based on discovery learning can be declared effective. In (Yadi, H. F. Y., & Nirwana, 2022) it is stated that learning with the Discovery Learning model also improves students' mathematical problem-solving abilities. In addition, the results of the study (Ilfa, M. K., Ardianti, S. D., & Kuryanto, 2023) stated that through learning with the help of the Discovery Learning learning model, students' abilities in solving mathematical problems can be improved.

Discussion

The learning aids serve flat geometry learning goals. Students start learning by creating mathematical models using LKPD contextual issues in the open module. The activities follow (Mustafa, 2020) 's discovery learning principles, which encourage students to investigate for themselves, find and build on past experiences and knowledge, use intuition, imagination, and creativity, and seek new information to find new facts, correlations, and truths. Validity testing follows learning tool development. Self-evaluation, expert validation, and practicality and efficacy define the learning tools' validity. The three legitimate, practical, and successful learning tools are described here. This validation evaluates the Discovery Learning-based product's appropriateness. Development research validity is measured by content (relevance) and construct (consistency). This agrees with (Nieveen, 2013), who said validity can be seen in two ways: (1) whether the curriculum or learning model is based on current knowledge (content validity); and (2) whether the learning device's components are consistently related. Validity aligns the product with the material, whereas construct validity aligns it with the technique.

The adoption of Discovery Learning-based learning devices, convenience of use by instructors and students, and adequate time for device usage are used to evaluate the feasibility of building this device. This device's practicality is assessed by surveying mathematics instructors and students. According to (Nieveen, 2013), a learning technology is practical if

instructors and students can utilize it effortlessly. Analysis of students' mathematical problem-solving ability assessments shows Discovery Learning-based learning gadgets are successful. According to (Yadi, H. F. Y., & Nirwana, 2022), Discovery Learning increases pupils' mathematical problem-solving skills. (Ilfa, M. K., Ardianti, S. D., & Kuryanto, 2023) found that the Discovery Learning learning approach improves students' mathematics problem-solving skills. According to (Adinia, A. F., & Simanjorang, 2024), Discovery Learning improves students' problem-solving skills. (Khairani, D., Permana, D., Fauzan, A., & Musdi, 2024) found that Discovery Learning devices boost students' problem-solving skills. Discovery Learning gadgets help increase pupils' mathematical problem-solving skills.

D. Consclusion

This study is a development research that provides a mathematics learning device based on Discovery Learning in the form of a Teaching Module. Study findings led to the following conclusions: 1. The Discovery Learning-based flat form learning gadget for grade VII junior high school is valid. A legitimate learning gadget meets all indications in content, presentation, language, and visuals. 2. The Discovery Learning-based flat shape learning equipment for grade VII junior high school is practical. The ease of students and teachers in understanding and using the developed product, the clarity of the Teaching Module instructions, the attractive appearance, and the suitability of the time required to implement learning activities for each meeting demonstrate this. 3. The Discovery Learning-based autonomous learning gadget in trial improves students' mathematics problem-solving skills. This is shown by kids' rising mathematical problem-solving exam scores. The created product's Discovery Learning-based autonomous curriculum device is designed to enable math instructors and students study broadly. The study shows that advantages inspire pupils to learn mathematics in the classroom. Students may also mention any subject-related issues. To accomplish assignments, students learn to identify data gathering items. Students study the data and generalize the results at the conclusion of the learning process. Teachers who can make learning more creative and establish an environment where students may offer comments and interact with peers will help students attain optimum learning results.

References

Adinia, A. F., & Simanjorang, M. M. (2024). Pengembangan E-Modul Berbasis Discovery Learning untuk Meningkatkan Kemampuan Pemecahan masalah Matematika Siswa SMP. *PHI: Jurnal Pendidikan Matematika*, *8(2)*, 210-219.

Agnesia, Rahmy, dan Caswita, W. (2019). Efektivitas Model Pembelajaran Think Talk Write Ditinjau dari Kemampuan Representasi Matematis Siswa. *Jurnal Pendidikan Matematika*, *7 No 3*, 412–422.

Arifudin, O. (2020). *Psikologi Pendidikan (Tinjauan Teori Dan Praktis).* Widina Bhakti Persada.

Atikah, H. F., Sarifah, I., & Yudha, C. B. (20024). Analisis Kemampuan Literasi Matematika Dalam Pandangan PISA 2022. . . *Literasi: Jurnal Ilmu Pendidikan, 15(2),* 152-161.

Destania, Y., & Riwayati, S. (2021). Pengembangan lembar kerja siswa untuk menumbuhkan kemampuan pemecahan masalah matematis pada materi teorema pythagoras. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, *5(2)*, 949-962.

Hasani & Wardani. (2023). Analisis Kemampuan Pemecahan Masalah Matematis Siswa Kelas VII Pada Materi Bangun Ruang Segiempat Di MTS Nurul Huda. *Invention: Journal Research and Education Studies*, *3*, 55–66.

Hayati, F., Rahman, A. A., Nasryah, C. E. (2021). Development of Student Worksheet Based on Problem to Improve Student's Mathematics Communication Skills. *Edunesia*, *2 (2):*, 558.

Ilfa, M. K., Ardianti, S. D., & Kuryanto, M. S. (2023). Pengaruh Discovery Learning Berbantuan Media Audiovisual Terhadap Peningkatan Kemampuan Pemecahan Masalah Matematika. *Prismatika: Jurnal Pendidikan Dan Riset Matematika*, *6(1)*, 141-152.

Julaeha, J., Rosli, R., & Hendrastuti, R. A. (2022). Penerapan discovery learning untuk meningkatkan kemampuan pemecahan masalah dan motivasi belajar matematika siswa. *Jurnal Pendidikan Matematika*, *12(2)*, 82-96.

Khairani, D., Permana, D., Fauzan, A., & Musdi, E. (2024). Pengembangan Perangkat Pembelajaran Berbasis Discovery Learning Berbantuan Geogebra Untuk Meningkatkan Kemampuan Pemecahan Masalah Matematis. *Aksioma: Jurnal Program Studi Pendidikan Matematika*, *13(2)*, 379–393.

Mustafa, dkk. (2020). Analisis Kemampuan Berpikir Logis Matematis Siswa Pada Materi Sistem Persamaan Linear Dua Variabel. *Jurnal Pendidikan Matematika (Jumadika), 2(2):*, 81 – 86.

Mustika M, D. E. W. I. (2024). Pengaruh Penggunaan Model Discovery Learning Terhadap Hasil Beajar Peserta Didik Kelas V Materi Diagram Lingkaran Di Sdit Al Madinah Pontianak. *Jurnal Cendekia: Jurnal Pendidikan Matematika*, *3*, 435.

NCTM. (2000). *Principle and Standars for School Mathematics*. NCTM.

Nieveen, N. (2013). *Educational Design Research. Enchede*. Netherlands Institute for curriculum development.

Permendikbud. (2016). *Nomor 22 Tahun 2016 Tentang Standar Penilaian Pendididkan.*

Rahman, L. L., Rusyana, A., & Yulisma, L. (2021). Pengaruh model pembelajaran discovery learning berbasis LKS tipe word square terhadap keterampilan berpikir kritis siswa. *J-KIP (Jurnal Keguruan Dan Ilmu Pendidikan), 2(1)*, 33–38.

Rizqiani, A. S., Sridana, N., Junaidi, J., & Kurniati, N. (2023). Analisis kemampuan pemecahan masalah matematis dalam menyelesaikan soal cerita ditinjau dari kemampuan berpikir kritis siswa. *Jurnal Ilmiah Profesi Pendidikan*, *8(1)*, Analisis kemampuan pemecahan masalah matematis dal.

Rosnawati, R. (2013). Kemampuan Penalaran Matematika Siswa SMP Indonesia pada TIMSS 2011. *Universitas Negeri Yogyakarta, Vol. 2 No.*

Sugiyono. (2018). *Metodologi Penelitian Pendidikan (Pendidikan Kuantitatif, Kualitatif dan R&D)*. Alfabeta.

Yadi, H. F. Y., & Nirwana, H. (2022). Discovery Learning Sebagai Teori Belajar Populer Lanjutan: Array. Eductum. *Jurnal Literasi Pendidikan*, *1(2)*, 234-245.

Yanty Putri Nasution, E., Emjasmin, A., Rusliah, N. (2021). Analisis Metakognitif Siswa Dalam Menyelesaikan Masalah Integral. *Jurnal Ilmiah Pendidikan Matematika ALQALASADI*, *5 (2)*, 141–150.