Student’s Worksheet Practically by Using Discovery Learning Model to the Ability of Understanding Concept and Mathematics Problem Solving at Grade VII Grade of SMPN 38 Padang

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Abstract

The ability of understanding mathematical concept and problem-solving mathematics is one of aims of mathematic subject it is expected to develop in mathematics learning. Based on the observation that was doing by students of VII grade SMPN 38 Padang in 2019/2020 academic years, this research obtain that the students got difficulty in doing story problem that related in real life situation without illustration’s picture. It causes, mathematics learning still focused on text book and LKPD. LKPD that SMPN 38 Padang has still less variation and there is no step to find out and construct by their own learning concept. One of learning models that can be developed is discovery learning. Discovery learning is a learning model that can be informed by discovering process. The aims of this research are to obtain and develop LKPD by using discovery learning that is practicable. The type of the research use development research with formative evaluation type that according to Tesmer view. Practicality of LKPD is limited on field test step which giving practical questionnaire to students and teachers. The result of practicality of LKPD from teacher is 85% with very practical category and from the student is 85.30% with very practical category.

Keywords: Discovery Learning Model, Practicality, LKPD.

1. Introduction

Mathematics is a universal science that is useful for human life and also underlies the development of modern technology, and has an important role in various disciplines and advances human thinking (Gravemejer et al., 2017; Balim, 2009; Planas et al., 2018; Laurens et al., 2017). The rapid development of information and communication technology today is based on the development of mathematics in the field of number theory, algebra, analysis, probability theory, and discrete mathematics. To master and create technology in the future, strong mastery and understanding of mathematics is required from an early age (Bray and Tangney, 2017; Stoet and Geary, 2018; Lo et al., 2017).

Based on observation on student VII class of SMP N 38 Padang in the 2019/2020 academic year, it was found that students were often difficult to solve story questions or questions related to daily life without illustrations. It happened because mathematics learning still tended focus on textbooks and student worksheet (LKPD). Based on LKPD observations showed that the LKPD which was used in the school didn’t fulfil the predetermined characteristics and did not refer to the scientific approach. LKPD only presented the material very concisely so that made students didn’t see the process of finding the concept (Lia, 2018; Pepin et al., 2017; Lestari and Surya, 2017).

One of the models that can be used to solve the problem is the Discovery Learning model. Discovery learning is learning where ideas or ideas are conveyed through the discovery process (Putri et al., 2020; Zakaria and Syamaun, 2017). The learning process begins with providing stimulation, identifying problems, collecting data, processing and interpreting data, proving and drawing conclusions. Discovery learning is a method that encourages students to arrive at a conclusion based upon their own activities and observations. Inclusion of activities based on discovery learning in science teaching in Turkey is important for meaningful and lifelong learning. The activities in science teaching Eğitim Araştırmaları 3 raise the curiosity of students and drive them to inquire their priorities and perceive the natural phenomena from different aspects. Such activities help to correct the conceptual errors of students (Kaptan and
Korkmaz, 2000). The development of LKPD with Discovery Learning is expected to make it easier for students to understand learning materials, especially on materials that are quite difficult to understand so that students are able to solve problems related to these questions. The development of LKPD with the Discovery Learning model on mathematics material is expected to help students to understand the material well, so as to produce LKPD with a practical Discovery Learning model.

LKPD is defined as a printed teaching material in the form of sheets of paper containing material, summaries, and instructions for implementing learning tasks that must be done by students with reference to Basic Competencies (KD) that must be achieved (Putriana, 2020).

2. Background Theory

The type of research developed in the development of learning tools in the form of LKPD with discovery learning model is a formative evaluation type with development research model according to Tessmer's view (Plomp et al., 2007). The purpose of this research is to see the product practicality. According to Tessmer (Plomp et al., 2007) there are 4 stages of development, namely:

2.1. Self-Evaluation

The design stage is the stage where an analysis of student characteristics is carried out for determining the research classes, and as a reference and consideration in making learning tools in LKPD that are suitable according to the characteristics of the research class students.

b. Design

The design stage is designing learning tools in the LKPD. Designing LKPD is based on thoughts and adapted to the Discovery Learning model. This stage can be seen in the first LKPD prototype (self-evaluation results) and the second prototype (revision of the expert review).

2.2. Expert Review and One-to-one

The design's result of the first prototype that developed based on self-evaluation is given to the experts (experts review) and two students (one-to-one) to observe, comment on, and provide suggestions.

a. Expert Test (Expert Judgment)

In the expert test stage, the design of LKPD was examined, assessed and evaluated by panelists. The panelists consisted of three people in the education field. Panelists reviewed the contents, constructs and language of each prototype. Panelist’s / validator’s suggestions were used to revise the LKPD.

b. One-to-one

In the one-to-one stage, using two people as testers and being asked to observe, comment on the design of LKPD’s learning materials. The comments and suggestions were used as a basis for revising the design of LKPD. Expert judgment and one-to-one obtained the basis for revising the LKPD design (first prototype). The revise from the expert judgment and one-to-one generated a second prototype.

c. Small Group

The second prototype was tested on five students who were not as the research subject. The students were asked to complete and comment on the revised of LKPD based on input from expert judgment and one-to-one (second prototype). The result of the small group test was used as the basis for revising the second prototype LKPD. The result of the revision was called the third prototype (product).

d. Field Test
In this stage, the third prototype (product) was tested on the research subject, the VII grade students of SMP N 38 Padang. This stage was aimed to look the practicality of the product. The practicality referred in this research was to know how easy the product to be used (understand) by users, in this case teachers and students.

The stage of developing LKPD with the Discovery Learning model was only until the Field Test stage as to see the practicality of the LKPD. The research subjects consisted of 32 students of VII grade SMP N 38 Padang. The research instruments in this study were the teacher's and student's questionnaires response on the LKPD. Analysis of student and teacher responses were arranged in the form of a Likert scale with four alternative answers, Strongly Agree (SS), Agree (S), Disagree (TS) and Strongly Disagree (STS). Analysis techniques of Practicality questionnaire data used a formula.

\[ P = \frac{\text{score of item obtained}}{\text{maximum score}} \times 100\% \]

Categorizing the value of the respondent's achievement is used by the classification in Table 1.

### Table 1. Practicality Category

| Achievement Level (%) | Category          |
|-----------------------|-------------------|
| 81-100                | Very Practical    |
| 61-80                 | Practical         |
| 41-60                 | Less Practical    |
| 21-40                 | Not Practical     |
| 0-20                  | Very Impractical  |

Based on Table 1, LKPD using the Discovery Learning model developed in this study, it is state that the category practical it is if the level is ≥ 60% and it is declared impractical if it has a level of ≤ 60%, then the LKPD will be revise again and carried out a practicality test.

### 3. Result and Discussion

#### 3.1. Result

#### 3.1.1. Analysis of the Practicality Questionnaire Result by the Teacher

This practicality questionnaire was given to the VII grade mathematics teacher at SMPN 38 Padang after the learning process was completed. The results of the teacher’s practicality questionnaire can be seen in Table 1 below:

### Table 1. Results of the Practicality Questionnaire by the Teacher

| No | Rated Aspect                                                                 | Percentage | Category       |
|----|-----------------------------------------------------------------------------|------------|----------------|
| 1  | LKPD makes it easy for teachers to present learning material                 | 100        | Very Practical |
|    | LKPD improves students' ability to understand the concept of problem solving |            |                |
|    | mathematical                                                                |            |                |
| 2  | LKPD contains statements - questions that make it easier for students to solve | 75         | Practical      |
|    | mathematics problem                                                          |            |                |
| 3  | The use of LKPD to fluently of learning                                     | 100        | Very Practical |
|    | Students are interested in learning LKPD                                      |            |                |
| 4  | because it deals with problems that are in                                   | 100        | Very Practical |
|    | according with everyday life                                                 |            |                |
| 5  | Using LKPD can make it easier for students to share ideas with each other      |            |                |
|    | about the subject matter                                                     | 75         | Practical      |
| 6  | LKPD can assist students in identifying questions of understanding concepts and | 75         | Practical      |
solving mathematic problems
The use of LKPD can help students make plans for solving mathematical problems 75 Practical
LKPD trains students to solve mathematic problem solving problems 75 Practical
The use of LKPD can make students actively ask questions, respond to make conclusions. 100 Very Practical

Average Percentage practicality 85 Very Practical

Based on Table 1, it can be seen that the average practicality questionnaire test results by the teacher were in the range 3 and 4 (practical and very practical category). The average practicality of LKPD was 85% with very practical criteria. Thus, it can be concluded that students think LKPD using discovery learning model is practically used for learning mathematics class VII SMP N 38 Padang.

3.1.2. Analysis of the Practicality Questionnaire Results by Students

The practicality questionnaire was given to 32 students of VII grade of SMPN 38 Padang, who had finished studying by using discovery learning LKPD. The data analysis result of student questionnaire can be seen in Table 2.

Table 2. Results of Student Response Questionnaire Analysis

| No | Rated Aspect                                                                 | Amount | Percentage | Category        |
|----|-----------------------------------------------------------------------------|--------|------------|-----------------|
| 1  | The LKPD that has make me interested in doing it                             | 115    | 89.84      | Very Practical  |
| 2  | LKPD words and sentences are easy for me to understand                       | 110    | 85.94      | Very practical  |
| 3  | The activities at LKPD are easy for me to understand                         | 110    | 85.94      | Very practical  |
| 4  | LKPD makes it easy for me to understand the material                         | 113    | 82.29      | Very practical  |
| 5  | Using LKPD makes me happy and excited about learning                         | 110    | 88.28      | Very practical  |
| 6  | The use of LKPD make me to understanding the concepts that were being studied| 109    | 85.15      | Very practical  |
| 7  | Using LKPD helps me to identify solve mathematics problem                    | 115    | 89.84      | Very practical  |
| 8  | LKPD has been to help me in planning math problem solving                    | 106    | 82.81      | Very practical  |
| 9  | I am happy to be able t problem solving in LKPD                              | 107    | 82.29      | Very practical  |
| 10 | LKP make me accustomed to solving questions systematically in solving questions according to my answers | 106  | 83.59      | Very practical  |
| 11 | The spend time that working on LKPD                                         | 107    | 82.29      | Very practical  |

Average Percentage practicality 85.30 Very practical

Based on Table 2, it can be seen that the average percentage of practicality of LKPD using discovery learning model by VII grade students of SMPN 38 Padang was 85.30% with the very practical category. Thus, it can be concluded that students think LKPD using discovery learning model is used practicality for learning mathematic in VII grade SMPN 38 Padang.

3.2. Discussion

The practicality of LKPD using discovery learning model was obtained from the practicality questionnaire of teachers and students. This practicality test involved one mathematics teacher and 32 students of SMPN 38 Padang. From the practicality questionnaire analysis by the teacher of LKPD, the percentage was 85% with the very practical category.
While the results of the practicality questionnaire by students obtained a percentage of 85.30% with the very practical category. So, it can be concluded the development of student worksheet tools using discovery learning models can improve and maximize students' ability to understanding concepts and mathematical problem solving through student activities on stimulation, problem statements, data collection, data processing, verification, and generalization. So as to provide opportunities for students to actively discover the concept of the material being studied individually.

In this case, the ease of LKPD according to the teachers and students the average percentage of practicality of LKPD is in the very practical and practical category. It shows that the practicality of the LKPD developed using the discovery learning model has presented simple material in terms of content, language that is easy to understand, the overall content of the LKPD is easy to understand, has a practical measure, followed by discovery learning steps and can improve students' ability to understand concepts and mathematical problem solving. According to BNSP (2013) which states that language standards or readability in teaching materials include good and correct use of Indonesian, clarity of language and ease of reading.

The use of LKPD learning tools in terms of learning time has a percentage value with a very practical category. It shows that the developed LKPD to help students in allocating time efficiently in learning and students can develop students' ability to understand concepts and solve mathematical problems. The LKPD contains a set of basic activities that students must do to maximize their understanding and ability to solve mathematical problems that are in accordance with the indicators of achievement of the learning percentage. Likewise, with the practicality of LKPD in terms of attractiveness, LKPD has a very practical category value. This shows that the developed LKPD makes students interesting in reading and doing the tasks that are in the LKPD.

4. Conclusion

Based on the practicality test, student’s worksheet practically by using discovery learning model to the ability of understanding concept and mathematics problem solving that was developed it was practical.

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References

Balım, A. G. (2009). The Effects of Discovery Learning on Students' Success and Inquiry Learning Skills. Eurasian Journal of Educational Research (EJER), (35), 1-20.

BNSP. (2013). Kegiatan Penilaian Buku Teks Pelajaran Pendidikan Dasar dan Menengah, Jakarta: Departemen Pendidikan Nasional.

Bray, A., & Tangney, B. (2017). Technology usage in mathematics education research–A systematic review of recent trends. Computers & Education, 114, 255-273.

Laurens, T., Batlolona, F. A., Batlolona, J. R., & Leasa, M. (2017). How does realistic mathematics education (RME) improve students' mathematics cognitive achievement?. Eurasia Journal of Mathematics, Science and Technology Education, 14(2), 569-578.

Lestari, L., & Surya, E. (2017). The effectiveness of realistic mathematics education approach on ability of students' mathematical concept understanding. International Journal of Sciences: Basic and Applied Research (IJSBAR), 34(1), 91-100.

Lia, D. (2018). Effect of Learning Model Discovery of Competence Student Subject Biology Class VIII MTSN Rambah 2014/2015 Academic Year. International Journal of Progressive Sciences and Technologies, 7(1), 1-7.

Lo, C. K., Hew, K. F., & Chen, G. (2017). Toward a set of design principles for mathematics flipped classrooms: A synthesis of research in mathematics education. Educational Research Review, 22, 50-73.

Gravemeijer, K., Stephan, M., Julie, C., Lin, F. L., & Ohtani, M. (2017). What mathematics education may prepare students for the society of the future?. International Journal of Science and Mathematics Education, 15(1), 105-123.
Kaptan, F., & Korkmaz, H. (2000). Yapısalcılık (constructivism) kurami ve fen öğretimi, Çağdas Egitim Dergisi, 265, 22-27.

Pepin, B., Choppin, J., Ruthven, K., & Sinclair, N. (2017). Digital curriculum resources in mathematics education: foundations for change. ZDM, 49(5), 645-661.

Planas, N., Morgan, C., & Schütte, M. (2018). Mathematics education and language: Lessons and directions from two decades of research. Developing research in mathematics education. Twenty years of communication, cooperation and collaboration in Europe, 196-210.

Plomp, T., & Nieven, N. (2007) Educational Design Research. Enshede: Netherlands Institute For Curriculum Development (SLO).

Putriana, A. R., Suryawati, E., Suzanti, F., & Zulfarina, Z. (2020). Socio Scientific Issue (Ssi) Based Lkpd Development In Learning Natural Science Smp Class Vii. Jurnal Pajar (Pendidikan dan Pengajaran), 4(1), 80-89.

Putri, A., Roza, Y., & Maimunah, M. (2020). Development of learning tools with the discovery learning model to improve the critical thinking ability of mathematics. Journal of Educational Sciences, 4(1), 83-92.

Stoet, G., & Geary, D. C. (2018). The gender-equality paradox in science, technology, engineering, and mathematics education. Psychological science, 29(4), 581-593.

Zakaria, E., & Syamaun, M. (2017). The effect of realistic mathematics education approach on students’ achievement and attitudes towards mathematics. Mathematics Education Trends and Research, 1(1), 32-40.