Development of Student Worksheets based on the Discovery Learning Model on Magnetic Materials in Class VI Elementary School

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ABSTRACT

This research was motivated by the observations of researchers with the findings of a lack of the student worksheet (LKPD) teaching materials in learning in Elementary School theme 5 Entrepreneurship, the subject matter of Magnets to improve scientific literacy at the elementary level. The purpose of the research is to produce LKPD based on Discovery Learning to improve students' scientific literacy on magnetic material in class VI. The development model chosen in this research is the development of the ADDIE model with the stages of Analysis, Design, Development, Implementation, and Evaluation. The results of the Validation Test stated that the LKPD of the Discovery learning model to improve Science Literacy was very valid to be used at 3.58 or 89.5%. Meanwhile, in the Practicality test, which is seen from the responses of teachers and students, it is stated that practical learning media is used with a percentage of 90.1%. 13 students like learning media or 92.8%. To test the effectiveness of the LKPD it affects the activities and learning outcomes of students before and after use. The use of LKPD also succeeded in increasing students' scientific literacy with 5 indicator competencies referring to PISA from 45.17% to 97.14%. Based on the results of the study, it was concluded that LKPD Discovery Learning can improve students' scientific literacy and is very valid, practical, and effective in the learning process in class VI theme 5 Entrepreneurship.

Keywords: LKPD, Discovery Learning, Science Literacy, Magnet

INTRODUCTION

Natural Sciences is the study of natural phenomena and everything that exists in the universe. Rajagukguk (2020) explained that Natural Science is a lesson related to how to find out about nature systematically so that Natural Science is not only the mastery of a collection of knowledge in the form of facts, concepts, or principles. but also a process of discovery. Science learning must involve students to actively solve scientific problems. Meanwhile, Setiawan (2019) states that Natural Science is a systematic set of theories, and its application is generally limited to natural phenomena, born and developed through scientific methods such as observation and experimentation, and demands scientific attitudes such as curiosity, openness, honesty, and so on.

Based on some of the views above, it can be interpreted that the science learning process must be oriented to students so that students have direct experience it grows an understanding of the natural surroundings in students naturally. To be able to achieve educational goals according to the demands of the 2013 curriculum, science learning in elementary schools must focus on the process and requires a learning model that fosters creativity and creates innovation in the learning process to achieve optimal learning outcomes. According to Maharani & Hardini (2017), many components affect learning

success, one of which is the LKPD used by the teacher in the classroom. Teachers must be able to choose the right learning worksheets according to the learning material to be taught so that they will be able to attract the attention of students to be active in participating in the learning process and trying to explore various information and develop their potential to achieve optimal learning goals. But in reality, most teachers in the learning process use a lot of lecture methods, question and answer, and LKPD which are not by the 21st-century learning approach so learning outcomes are less than optimal.

Based on the observations made by the author on the sixth-grade teacher at Elementary School 05 Batu Bulek, information was obtained that thematic learning carried out by the teacher had emphasized the concepts contained in the book, LKPD transferred information or theory and provided opportunities for students to observe, investigate and build their knowledge so that it affects students' understanding but has not fully approached the implementation of the 2013 Curriculum. The fourth-grade teacher explained the reasons for using LKPD in the learning process, with the COVID-19 pandemic condition, media and means were needed to bridge the tasks involved. given to students. COVID-19 creates momentum in the use of technology in the learning process. Where the teacher's understanding and ability are needed to use technology such as teleconference media. In addition, the supporting facilities are also decisive. The availability of tools and the limited ability of teachers to use technology, the unstable network due to the geographical location of the Lintau Buo North sub-district which consists of mountains, causes the online learning process cannot to be carried out. So one of the strategic solutions in the learning process is the use of LKPD. It takes an LKPD with a Discovery Learning model. Discovery Learning is a model that directs students to find concepts through various information or data obtained through observation or experimentation. Ariani & Meutiawati (2020) explains that in the development of LKPD based on Discovery Learning, participants are not given initial information first so that students who find the information are based on the instructions contained in the LKPD, which aims to find an answer to a problem they do not know. The next finding was that the LKPD which was applied at the Elementary School 05 Batu Bulek had not yet applied the concept of Science Literacy. According (to Angraini, 2014) states that scientific literacy is the ability of students to use scientific knowledge to identify questions, acquire new knowledge, and explain scientific phenomena. Based on this opinion, LKPDs have not applied the concept of Scientific Literacy. The cause of the low scientific literacy of students is the habit of learning science which is still conventional with the lecture learning method, accompanied by books and worksheets that do not have elements of scientific literacy. This is the background of the need for an LKPD to improve Science Literacy by using the Discovery Learning model.

Scientific literacy is defined as a person's ability to use scientific knowledge and scientific process skills to understand and make decisions about the natural environment. Scientific literacy is an individual's scientific ability to use their knowledge in the process of identifying problems, knowledge, scientific phenomena, and drawing conclusions based on evidence related to scientific issues (Wulandari, 2016). Low scientific literacy and teachers using conventional learning models resulted in low student learning outcomes on magnetic material at Elementary School 05 Batu Bulek. In the academic year 2020/2021, the same material for KD 3.5 Identifying magnetic properties in everyday life and KD 4.5 Reporting experimental results on magnetic properties and their application in everyday life is relatively low. The average learning outcome below the KKM is 60.5. As for the average KD 4.5 assessment, it is at 70.5. Based on the value of learning outcomes, an LKPD is needed that can improve students' scientific literacy skills by using learning models that are by the 2013 Curriculum, one of which is the Discovery Learning model.

Based on the above background, a Discovery Learning model is needed to develop LKPD based on Science Literacy to improve students' understanding and scientific literacy skills, because in the learning process students are faced with authentic real-world problems, can provide convenience for students to conduct investigations, independently or in groups, better known as the student-centered learning system.

METHODS

The development model used in this research is the ADDIE development model. The concept of Analysis, Design, Development, and Implementation (ADDIE) is used to describe a systematic approach. All elements of the model have a relationship with one another starting from analysis, design, development, implementation, and assessment. Information sources in this study consist of populations and samples. The population is all class VI in the limited-scale test and the field-scale test. While the samples in this study were students who were in class VI of the State Elementary School 05 Batu Bulek, Lintau Buo North sub-district, Tanah Datar Regency, totaling 14 people, and the field scale test at Elementary School 27 Batu Bulek was 12 people. Then other sources of information are teachers as observers and as interviewees in obtaining data and data to be processed in this study. Then there are validators in three aspects of developing LKPD materials, namely material, content (content), and graphic/language validators.

RESULTS

LKPD specifically discusses science material with the topic of magnetism using discovery learning syntax in learning as follows: 1) Giving stimulation; 2) Statement/problem identification; 3) Data collection; 4) Processing data; 5) Evidence (verification); and 6) Conclude/generalizations. LKPD also tests students' scientific literacy using 5 indicators based on PISA (modification by Zahro, 2022). The use of LKPD has expected students to be active in learning and make it easier for students to understand the magnetic concepts presented by the teacher with the syntax of discovery learning models.

The designed LKPD is then validated by the validator. Validation was carried out by three expert validators from universities. In this activity, experts are asked to assess the Student Worksheets that have been made. The assessment includes material (content), design, and language. Validators are asked to provide assessments and suggestions for improvement of the LKPD that has been designed.

3.1 LKPD Validity

LKPD validation is carried out on several aspects which include aspects of material feasibility, design, and language. The results of the LKPD validation assessed by experts based on the table above show that the average value of the validation results as a whole is 3.53 with a very valid category. The description of the average validation for each aspect includes material feasibility at 3.56, design at 3.58, and language at 3.46. The assessment of the practitioner validator shows the average value of the LKPD validation results is 3.70 which belongs to the very valid category. From each aspect, it can be seen that the feasibility of the material is 3.83, the design is 3.75 and the language is 3.53. Based on the

explanation of the two assessments above, it can be concluded that the LKPD based on Discovery Learning to improve scientific literacy is hereby valid. Thus, the LKPD that has been developed can be tested. In general, the results of LKPD validation from expert validators and practitioner validators can be seen in the following Table 1 below.

Table 1. LKPD Validation Results by Expert Validators

No	Aspects Assessed	Validation Value pre revision	Category	Validation Post Revision	Category
1	Material	3,30	Valid	3,56	Very Valid
2	Design	3,20	Valid	3,58	Very Valid
3	Language	3,30	Valid	3,60	Very Valid
	Average	3,26	Valid (with revision)	3,58	Very Valid

3.2 LKPD Effectiveness

The effectiveness of the LKPD seen from the data on student learning outcomes in this study includes 3 learning domains, namely the cognitive, affective, and psychomotor domains. Cognitive Assessment Data (Knowledge) Data on cognitive aspects of learning outcomes were obtained from the pretest and posttest scores during the implementation of the research on the theme 5 Entrepreneurship Magnet material. Before using the learning worksheet, the researcher gave pretest questions to students. After knowing the initial abilities of students, then the application of Discovery Learning LKPD for Science Literacy is carried out, and then the posttest. The results of the pretest and posttest scores can be seen in Table 2 below.

Table 2. Pretest and Posttest results for class VI Elementary School 05 Batu Bulek

Type of Test	Number of students	Mean	Standar Deviation	Maximun	Minimum
Pretest	14	74,46	10,85	88	50
Postest	14	90,76	5,64	98	80

Based on Table 2 above, it can be seen that there are differences in the average pretest and posttest learning outcomes. Before the implementation of the learning LKPD, the average learning outcome was 74.46, while after the Discovery Learning LKPD was applied to Science Literacy, the average learning outcome was 90.76. While the standard deviation before LKPD was applied was 10.85 after being applied 5.64. The maximum value of the pretest was 88 and after the LKPD was applied 98. Based on the application of the Discovery of Learning LKPD, it could be concluded that there were differences in learning outcomes before and after the learning, LKPD was applied. The effective assessment of participants is carried out during the implementation of the Learning LKPD. The attitude assessment was observed by two observers using the attitude observation sheet instrument in the discovery learning model. Observational data are presented.

3.1 LKPD Practicality

During the learning process, the teacher plays a very important role. Teachers must be involved in presenting learning materials and be able to help develop them. The results of the questionnaire analysis of the teacher's response to the thematic companion LKPD based on the Discovery Learning model are very suitable for use in the learning process, obtaining an average of 93.05% in the practical category. This means that the developed LKPD can assist teachers in providing explanations so that it is easy to learn until it is

concluded that the developed LKPD is practical. The impact of using the Discovery Learning model LKPD by teachers is to facilitate the work of teachers in managing the time of the learning process. This means that the availability of thematic companion LKPD based on the Discovery Learning model is one of the factors that can support the learning process to run well and can improve the quality of education. This is the opinion of Sanjaya & Ratnasari (2011) that LKPD provides convenience and can assist teachers in preparing and implementing the learning process in the classroom.

After the learning process with the Discovery Learning LKPD model, the sixth-grade students of Elementary School 05 Batu Bulek, Tanah Datar Regency gave a very good response. The results of the questionnaire analysis of student responses to the practicality of the developed worksheets show that students are interested in studying thematic companion books based on the Discovery Learning model with an average response rate of 91.5% with a very practical category, this is because the worksheets have an attractive appearance. The use of LKPD encourages student activity in learning. Based on the description of the results of the student responses above, it is concluded that the Discovery Learning model worksheet developed is very practical. This means that apart from being able to be used by pilot schools, the developed LKPD can also be used by students in other schools.

3.2 Science Literacy Skills

In this study, scientific literacy ability can be explained as the ability or skill of students in understanding and mastering the science concepts that they have learned and then apply them in daily life and how to grow students' love for science. To measure students' scientific literacy skills, several questions from PISA can be used. PISA defines three major dimensions of scientific literacy in its measurement, namely the scientific process, the content of science, and the context of the application of science. literate students will have knowledge and understanding of scientific concepts, skills in conducting scientific inquiry processes, and applying knowledge, understanding these skills in various scientific literacy abilities can be measured by test instruments in the form of multiple choice questions based on scientific literacy with 4 answer options or with Essay Questions.

The scientific literacy questions were developed to refer to the scientific literacy indicators and scientific literacy questions issued by PISA. Making a good scientific literacy assessment measuring tool must refer to basic competencies and scientific competencies. Based on several studies from various sources above, the instrument used to measure scientific literacy skills in this research is in the form of test questions that begin with reading text containing the context in the form of related phenomena/articles then followed by questions followed by content. The developed test is in the form of a description. The scientific literacy aspect used is the context aspect: it includes entrepreneurship and magnet material. Aspects of scientific competence include: explaining scientific phenomena, evaluating and designing scientific investigations, interpreting scientific evidence and data, and converting data from one form to another. Content aspects include earth and space systems, technology systems, living systems, and earth systems. The attitude aspect includes an interest in science issues, support for inquiry activities, and response to natural resources and the environment.

The technique for collecting data on scientific literacy skills in the cognitive aspect is to use questions in the form of Essays. The essay question consists of 5 items concerning 5 aspects of scientific literacy skills (Zahro, 2022). Essay questions are given to students when the learning process has been carried out with as many as 3 Sub-themes and 6 Learning 9 (PB). For more details, the indicators tested can be seen in Table 2 below.

Table 2. Scientific Literacy Indicators on Theme 5 Entrepreneurship

No	Themes	Indicator	Scientific Literacy Indicators
1		Students remember and apply scientific knowledge that is appropriate to certain situations, namely the notion of magnetism	Explaining Scientific Phenomena about the definition / understanding of magnets (I1)
2	Entrepreneurship	Students propose a certain scientific way to distinguish magnetic and non-magnetic objects	evaluate and design scientific investigations on the difference between magnetic and non-magnetic objects (I2)
3		Students give reasons that support or reject a formulation of conclusions about things that can lose the magnetic properties of an object	Interpret scientific evidence and data about the loss of magnetic properties of an object(I3)
4		Students can identify important elements in scientific investigations (what things to compare, variables, work procedures, additional information), namely about park selection school.	Evaluate and design scientific investigations on the manufacture of a magnet(I4)
5		Students have an interest in science	Interest in science issues(I5)

Source: Zahro, 2022.

Based on the Scientific Literacy indicators that have been validated by the content validation team, a trial was conducted on students at Elementary School 05 Batu Bulek and 27 Batu Bulek on a limited-scale test and field-scale test. The application of science literacy has been included in the learning process at the time of cognitive, affective, and psychomotor testing. For data collection, pre-test and post-test were carried out on students with validated questions. Then this question is used as material for the pre-test exam questions. The result, as previously written, is that there is an increase before and after the implementation of the LKPD. For more details, see Fig 1 below.
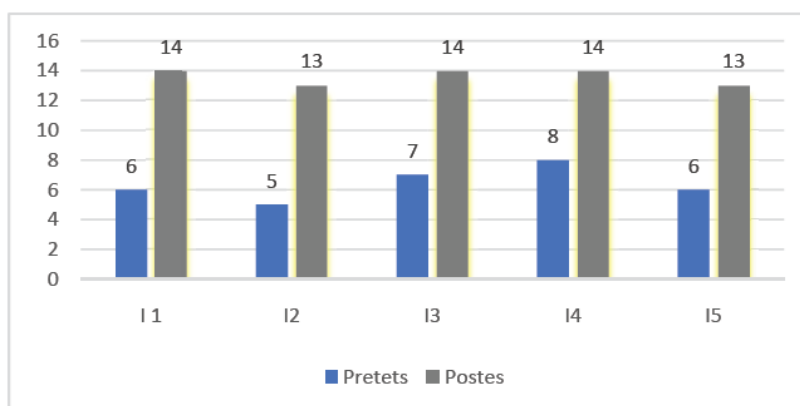

Figure 1. Limited-Scale Test Science Literacy Skills

Figure 2. Science Literacy Skills Field Test

Based on the data above, it can be concluded that there is an increase in students' scientific literacy skills from the number for indicator 1 before the LKPD was applied, which was at number 6 indicator 2 as many as 5 people, indicator 3 as many as 7 people, indicator 4 as many as 8 people and indicator 5 as many as 6 people. After applying discovery learning-based LKPD, 14 students (100%) completed indicator 1, while indicator 2 was 13 people (92%), indicator 3 was 14 people (100%), indicator 4 was 14 people (100%), indicator 5 was as many as 13 people (98%). It can be concluded that learning outcomes are an activity measuring students' abilities to determine the achievement of learning indicators. Learning outcomes are measured through 3 aspects, namely: knowledge, attitudes, and skills. At the trial stage of class VI Elementary School 05 Batu Bulek, Tanah Datar Regency, the knowledge aspect obtained an average of 90.76 in the very good category, while the affective aspect was 3.96 and the skill aspect obtained an average of 3.32 with the very good category. When the field scale test was distributed, the same thing was done at Elementary School 27 Batu Bulek, and good learning outcomes were obtained for knowledge, attitude, and psychomotor. In the aspect of knowledge, an average of 90.00 was obtained in the very good category, the attitude aspect was at 3.90, while in the skill aspect, an average of 3.30 was obtained in the very good category.

The development of LKPD also has limitations because getting perfect results is not easy even though the LKPD has been made based on models and procedures that are by the type of research. The limitations of the research include filling out observation sheets during the learning process. The views of each observer are certainly not entirely on each student even though the indicators observed are the same, also when filling out student response questionnaires, students' views and students' seriousness in filling out the questionnaire cannot be predicted whether students are serious in filling out the questionnaire or not. Furthermore, at the deployment stage in development research, it should be carried out on a larger scale. However, due to time, energy, and cost constraints, the distribution was limited, namely in grade VI in a different Elementary School where the LKPD was tested at the development stage. Research on LKPD development based on the Discovery learning model to improve scientific literacy on theme 5 Entrepreneurship. As a result, this product cannot be generalized to all schools in the entire Tanah Datar Regency.

CONCLUSIONS

Based on the application of the LKPD Discovery Learning in improving Science Literacy, it can be concluded that the validation results of the LKPD Discovery Learning

Science Literacy to test the validity of the LKPD material are in the very valid category, which is at an average of 3.56 and if converted is at a percentage of 89%. As for the validation test of the learning LKPD design, the score is 3.58 or 90%. For linguistic validation, the score is 3.60 or 90%. The application of the Science Literacy LKPD is effective in learning the theme 5 Entrepreneurship Material Magnets in Subthemes 1, 2, and 3. The activities of students and teachers in the learning process are on average at the average value of 90.76. Practical result data based on the results of interviews with teachers stated that LKPD learning Science Literacy made students active and creative in the learning process. The application of the Scientific Literacy LKPD affects the activities and learning outcomes of students. The average learning outcomes before and after using the LKPD Box averaged 77.43 to 86.97.

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