Gemstones as Ethnomathematical Object in E-LKPD which is Used in Analyzing the Ability to Solve Story Questions

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Article Info	Abstract
Gamestones *Ethnomathematics* *E-LKPD* *Story Questions*	This study aims to describe the ability to solve story questions on e-LKPD based on gamestones ethnomathematics on mixed arithmetic operations for fourth grade elementary school students. This study uses a quantitative descriptive approach. The research was carried out in the even semester of the 2020/2021 academic year on the research subject, namely the fourth grade students of SDN 3 Sukodono as many as 14 students. The data collection procedure was carried out by giving e-LKPD questions based on gamestones ethnomathematics to students and interviews. Data analysis using the percentage technique based on the stages of problem solving. The results of this study indicate that the average value at stage 1 (determining what is known in the problem) is in the high category, stage 2 (determining what is asked in the problem) is in the high category, stage 3 (compiling mathematical models/mathematical sentences) with a high category, and stage 4 (computing / calculating and interpreting the model's answers to the initial problem) is in the high category too. Overall the average value of students in one class is 82.95 which is included in the high category. Based on these results, e-LKPD can be used as an alternative teaching material during distance learning, can be used to improve students' ability to solve story questions, as well as bring students closer to local culture. **Keywords: Gamestones, Ethnomathematics, E-LKPD, Story Questions**

Introduction

Education is one of the sectors most affected by the pandemic. UNESCO states that the Covid-19 pandemic threatens students and pre-primary to high school education and students from universities around the world (Siahaan, 2020). The impact of students on the world of education, among others, has to do online learning, where this can pose a threat of dropping out of school, violence against children and external risks, as well as affecting learning achievement gaps (Kemdikbud, 2020).

Online learning is learning where all activities use the internet network and electronic teaching materials (Mishra et al., 2020). Online learning is an educational innovation that involves elements of information technology in learning (Fitriyani et al., 2020). However, online learning has strengths, challenges, and obstacles (Jamaluddin et al., 2020). In addition, in online learning, every element of education is required to be able to facilitate learning so that it remains active (Setyorini, 2020). Therefore, to meet the needs of online learning, teaching materials are needed that can be delivered via the internet network with online learning media, one of which is e-LKPD (Electronic Student Worksheet).

E-LKPD basically has the same concept as LKPD (Student Worksheet), only e-LKPD is in electronic form. LKPD is a teaching material used by educators/teachers to increase student involvement or activity in the teaching and learning process (Setiana et al., 2021). The benefits of using LKPD include making it easier for educators to manage the learning process, helping educators direct their students to find concepts through their activities, developing process skills and developing scientific attitudes, and helping educators monitor the success achieved by their students in achieving learning goals (Salirawati, 2004). So it can be concluded that e-LKPD can increase student activity and help find concepts in learning materials, especially mathematics learning (Purwoko et al., 2019).

Another challenge besides student activity in online learning is moral degradation and cultural degradation (Ibrahim et al., 2020). In the implementation of online learning or learning from home, students become more

focused on the virtual world, they have a dependence on technology so they pay less attention to the surrounding environment, especially the local culture in their area. Teachers are expected to be able to bridge and direct the influence of foreign cultures that enter through technological advances. However, in this case the teacher has difficulties due to the lack of support and guidance from the parents of the students during learning done from home (Baswedan, 2019).

To answer the challenges of online learning as moral degradation and cultural degradation, an innovation in learning, especially mathematics, is needed that brings students closer to the surrounding culture. Because basically culture is very close to everyday life and culture is inseparable from mathematics.

Mathematics is a product of culture. Each culture and subculture develops its own mathematics. Mathematics that developed in this culture is known as ethnomathematics. Ethnomathematics is a field that studies the ways in which people from different cultures understand, pronounce and use concepts from their culture related to mathematics. So that in ethnomathematics it can be studied how people understand, express and use cultural concepts that are described mathematically (Hariastuti, 2017). According to the opinion above, it can be seen that ethnomathematics is an integration of culture and mathematics, therefore the teachers at the school are in the form of teaching mathematics with the local culture so that it is very easy for students to feel the existence of mathematics in everyday life and it is hoped that through learning mathematics, cultural degradation students can be resolved.

In previous research, the development of e-LKPD has been carried out on story questions based on gamestones ethnomathematics. The compiled E-LKPD contains story questions on mixed arithmetic operations material. The thing that underlies the selection of story questions is that one of the obstacles faced by elementary school students in learning mathematics is working on story questions (Laili & Tristiana, 2016). In addition, story questions play a very important role in students' daily lives, because story questions put forward real problems that are in accordance with everyday life so that they are very appropriate to use to bring students closer to the local culture around them (Purwoko et al., 2019). The local culture in Sukodono Village, Donorojo District, Pacitan Regency, East Java Province referred to in this study is gamestones craft.

In solving story questions, students are not only required to have skills in counting, but also pay attention to the completion process. It is expected that students will solve story questions step by step so that teachers are able to analyze the abilities they already have. Especially students' understanding of the concepts used in solving the story questions given. However, in reality students often have difficulty understanding what is meant by the question, what is known and asked by the question, continues on how or what method to solve the problem, as well as in communicating the findings/results. The inability of students to understand the problem shows that students are not able to capture the problems outlined in the story questions (Hariana, 2015). If students are not able to understand the problem, of course there will be difficulties in the next stage which includes the ability to plan, complete, and re-examine. This shows the importance of teachers to familiarize students with completing practice questions in the form of story questions.

Method

This study uses a quantitative descriptive approach. The research was carried out in the even semester of the 2020/2021 academic year on the research subject, namely the fourth grade students of SDN 3 Sukodono, Sukodono Village, Donorojo District, Pacitan Regency, East Java Province, as many as 14 students. The data collection procedure was carried out by providing e-LKPD questions based on gamestones ethnomathematics and also interviews. E-LKPD contains story questions on integer arithmetic operations material. Interviews are intended to explore information that has not been found from the analysis of student work. The data analysis technique used in this research is descriptive quantitative method using percentage techniques based on the stages of problem solving. The results of the analysis of solving story questions as a whole are then interpreted based on the following story problem-solving ability categories (Azwar, 2015).

Table 1. Category of Ability to Solve Story questions

Score	Category
$x \geq 66{,}7$	High
$33{,}3 \leq x < 66{,}7$	Medium
$x < 33{,}3$	Low

Results and Discussion

E-LKPD Story Questions Based On Gemstones Ethnomathematics

E-LKPD story questions based on gemstones ethnomathematics is a student worksheet developed through 4D Research and Development procedures developed by Thiagarajan which consists of four stages namely define, design, develop, and disseminate (Thiagarajan, 1974). E-LKPD consists of 34 pages with the following sections: cover, introduction, table of contents, Core Competencies (KI), Basic Competencies (KD), Competency Achievement Indicators (IPK), learning objectives, concept maps, introduction to gemstones, summary materials, practice questions, competency tests, and bibliography.

E-LKPD is intended for even semester fourth grade elementary school learning. The material studied in the e-LKPD is related to mixed arithmetic operations. The mixed arithmetic operation material refers to the grade IV math textbook in the student and teacher books. The story questions are prepared with complete problem-solving stages, including the stages: determining what is known in the problem, determining what is asked in the problem, formulating a problem-solving plan by compiling a mathematical model, solving problems, and writing conclusions. The information about gemstones includes the history of gemstones, pictures of the types of gemstones, subject matter and contextual story questions based on gemstones ethnomathematics.

The ethnomathematical element of gemstones is included in the material and sample questions on the e-LKPD. The summary of the material contains the concept of mixed arithmetic operations, while the sample questions contain practice story questions along with the steps to guide students in solving story problems according to the stages of problem solving. The final part is equipped with a competency test in the form of story questions as a formative test for students after studying mixed arithmetic operations. The design of the several contents of the e-LKPD can be seen in Figure 1.
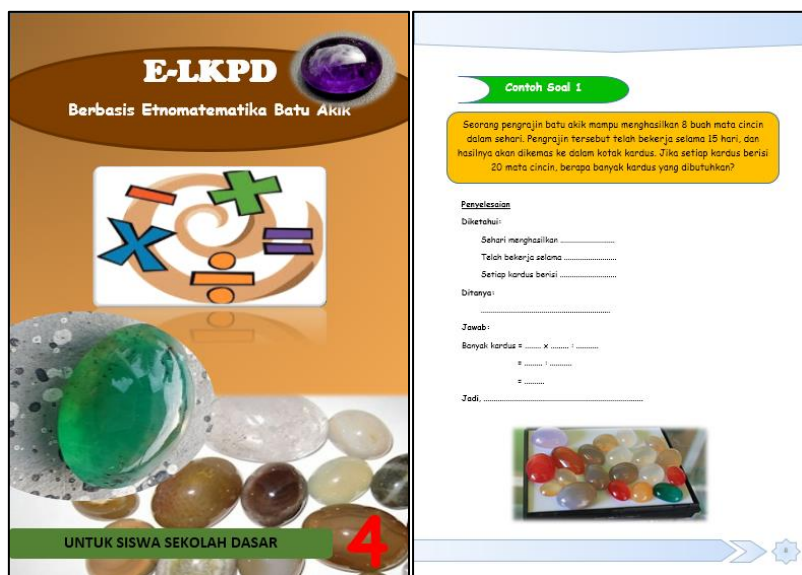

Figure 1. Cover of E-LKPD and sample questions page

Ability to Solve Story Questions

Based on the results of the completion of the e-LKPD story questions based on agate ethnomathematics given to students after the implementation of online learning, the following value data were obtained. The first stage of solving story questions is to determine what is known in the question getting an average score of 87.68 in the high category, the stage of determining what is asked in the question to get an average score of 89.71 in the high category, compiling a mathematical model of 78.92 in the high category, the last stage is computing / calculating the final results with an average of 75.49 in the high category. Thus, the overall stages of solving story questions on the e-LKPD are in the high category with an average score of 82.95. These results can be expressed in the following graphic form.
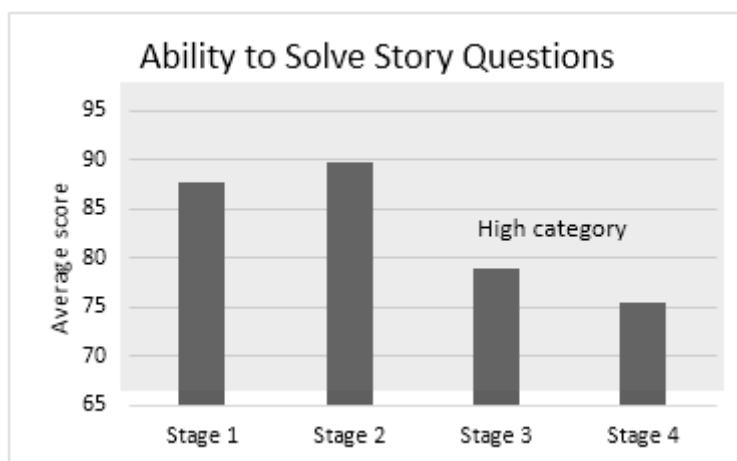
Figure 1. Graph of the ability to solve story questions

Discussion

The stages of determining what is known in the questions are in the high category, this shows that students understand what information is contained in the story questions. Even so, there are still some students who are less accurate or do not even write down the information obtained from the questions (what is known). This is because students are not used to working on story questions using the completion stage. Therefore, students often forget or miss some parts that must be done in a story problem (Kaprinaputri, 2013). The results of interviews with students also show that most students solve problems by following the steps that have been exemplified previously by writing down what they know. However, some students feel that writing down what they know is not so important because they only repeat the information in the questions.

The thing that is asked is the data that is the focus of the problem in terms of story questions (Firmansyah et al., 2017). The stage of determining what is asked in the question is the stage that has the highest average value. This is because the question sentence in the story problem is usually located in the last sentence, so students can easily find the question sentence of the problem they are working on. By knowing what is being asked in the question, it means that students can understand the context of the question or problem that has been given. By understanding the context of the problem in the problem, students will have no trouble making plans for solving and solving problems (Rahmi et al., 2017). The results of interviews with a number of students also corroborate the results of the analysis, where students can easily find out the problems referred to in a question.

The stage of compiling the model is the stage where students must represent the sentences in a story question into mathematical sentences. Although this stage is included in the high category, some students still have difficulty in making mathematical models. This difficulty is because students do not know and are less careful in reading the questions so that many make mistakes in modeling the given story questions (Puspitasari et al., 2018). The results of interviews with students who make mistakes in compiling mathematical sentences are that students actually know what is known and what is the problem in the story, but students do not understand how to arrange the information into a model of completion. So in this case it can be said that students do not understand the mixed arithmetic operation procedure. Figure 2a below shows the ability of students in compiling mathematical models, 2b shows the results of problem solving students who make mistakes in compiling mathematical models.

Figure 2a. Examples of student work   Figure 2b. Examples of student work

The final stage in solving story questions is to count until the final answer is found, then write a conclusion by interpreting the model's answer to the original problem. This stage gets the lowest average score compared to other stages, because this stage depends on the previous stage. Calculations made by students depend on how

students capture information on the question, how students understand the given problem, and how students formulate problem solving plans through mathematical models. Some of the causes of student errors in completing mixed integer arithmetic operations in class IV are the factor of students' ignorance in classifying the level of each operation (addition, subtraction, multiplication, and division), student errors in operating (adding, subtracting, multiplying, and dividing) questions. mathematics, and the irregularity of students' steps in solving math problems (Ugi, 2016). Interviews with students who made mistakes in the computational stage showed that most of the students' errors were caused because the previous stage (composing a mathematical model) was also wrong. In addition, some students make mistakes because they are not careful in doing calculations.

However, the analysis of the overall average score of students who are in the high category shows that in general students have good abilities in solving story questions after carrying out online learning using e-LKPD. This result is in line with Suparman's research (simona lydia & Suparman, 2019) hich developed an e-LKPD with test results proving that e-LKPD can improve student learning outcomes.

Conclusion

The results of this study indicate that the average value at stage 1 (determining what is known in the problem) is in the high category, stage 2 (determining what is asked in the problem) is in the high category, stage 3 (compiling mathematical models/mathematical sentences) with a high category, and stage 4 (computing / calculating and interpreting the model's answers to the initial problem) is in the high category. Overall the average value of students in one class is 82.95 which is included in the high category. Based on these results, e-LKPD can be used as an alternative teaching material during distance learning, can be used to improve students' ability to solve story questions, as well as bring students closer to local culture.

Recommendations

Based on the conclusions above, the suggestions in this study are that teachers should help and train students continuously in developing the ability to solve math story questions consisting of the ability to determine what is known from the problem, the ability to determine what is asked by the question, the ability to make mathematical models, and computing abilities, besides that teachers can also integrate other local cultures to bring students closer to the surrounding culture through ethnomathematics.

Acknowledgements

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