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Development of ethnomathematics-based learning tools to achieve mathematical literacy skills of junior high school students

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Abstract

The purpose of this research is to develop an ethnomathematics-based learning tool to achieve mathematical literacy skills of junior high school students with valid, practical, and effective qualifications on polyhedron subjects. This research used mixed research method with ADDIE research development procedures. This study involved the eighth graders of SMP Negeri in Wonosobo Regency, Centra1 Java as the research objects. The research instruments were validation sheets, student response questionnaires, observation sheets of learning implementation, and test questions of mathematical literacy skill. The results showed that: 1.) The learning tool was declared valid, indicated by the result of the lesson plan assessment obtaining a score of 120, which was classified in the very good criteria, and the results of the student worksheet assessment obtaining a score of 159, which was included in the very good criteria; 2.) The learning tool was declared practical as indicated by the score on the student response questionnaire of 65,13, which was included in the good criteria. The percentage of learning implementation was of 89%, included in the very good criteria; and 3.) The learning tool was declared effective as indicated by an increase in students' pretest and posttest score, from 64,22 to 83,67, and the 84% of students' completeness on the posttest, having met the minimum criteria of good.

Keywords: *Etnomathematics, learning tool, mathematical literacy skill*

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INTRODUCTION

Mathematics has greatly contributed to other sciences because many scientific fields adopt mathematical concepts to be widely used in everyday life (Isrok'atun et al., 2020). In the world of education, mathematics can help students organize and improve their reasoning abilities, train students' communication skills using numbers and mathematical symbols, developing students' logical, critical, creative, objective, rational, and careful thinking, as well as developing disciplined and structured clear concept (Jufri, 2015). As a compulsory subject for school students, mathematics is expected to help students properly develop their mindsets to help solve the problems they face.

A survey by the international institution Program for International Students Assessment (PISA) revealed that the mathematical literacy skills of Indonesian students are still below average. In 2018, it was noted that Indonesia only ranked 72nd out of 79 participating countries in mathematics with an average score of 379, while the OECD average score was 489. Most Indonesian students still find it difficult to work on mathematical literacy questions similar to the PISA questions. One of the factors to contribute to students' lack of interest in working on mathematical literacy questions is because the mathematics learning process is never associated with daily contexts and real life problems (Putra & Vebrian, 2019).

Mathematical literacy is an individual's capacity to formulate, use, and interpret mathematics in various contexts. It also includes mathematical reasoning and the use of mathematical concepts, procedures, facts, and tools to describe, explain, and predict events. This requires individuals to understand the role of mathematics in life and to make appropriate judgments in decision making. Based on this understanding, mathematical literacy not only concerns on acquiring the material but also on the use of reasoning, concepts, procedures, facts and mathematical tools in an effort to solve every day real life problems (Organisation for Economic Co-operation and Development, 2013). Departement of Basic Education Republic of South Africa (2011) added that the competencies developed in mathematical literacy are the ability to reason, to make decisions, to solve problems, to manage resources, to interpret information, to organize activities, and to use, and apply technology. Seven basic mathematical skills are needed as a subject in the mathematical literacy process including, communication, mathematization, representation, reasoning and argument, designing strategies to solve problems, using symbols, formal and technical language, and using operations, as well as using mathematical tools (Gunardi, 2017).

Efforts to improve students' mathematical literacy skills need to be continued. Thus, the role of the teacher as an educational facilitator is needed to sustain this effort, because the teacher controls the ongoing learning process. Sopian (2016) articulated that the primary task of teachers in the learning process is to educate, teach, and train students. Educating refers to the process of passing on and developing the values of life. Teaching is defined as the attempt to sustain and develop science and technology, while training refers to developing students' skills. Therefore, teachers are required to provide learning facilities for students, including various learning tools. Learning tools refer to a collection of learning resources arranged in a way to facilitate students and teachers in the learning activities by referring to these sources (Tanjung & Nababan, 2018).

Sudjana (in Sugihartono, 2015) defined learning as an intentional efforts by teachers to facilitate students to carry out learning activities. To ensure an interactive learning process as a way to challenge, and to motivate students to participate actively, as well as to provide sufficient room for students to develop themselves according to their interests and talents, teachers need to prepare complete and systematic learning tools. Some helpful learning tools to be developed are lesson plans and Student Worksheets. Regulation of the Ministry of Education and Culture of the Republic of Indonesia Number 22 of 2016 defined Lesson Plan (RPP) as a face-to-face learning activity plan for one or more meetings. Student Worksheet (LKS) is defined as an activity sheet that contains instructions and steps to complete a task that must be done by students (Ministry of National Education of the Republic of Indonesia, 2008). To prepare high quality Student Worksheet, teachers need to meet certain requirements, including didactic requirements, construction requirements, and technical requirements (Kaligis & Darmodjo, 1992).

The had-hitting Covid-19 pandemic in Indonesia since March 2020 has had a major impact in various walks of life, and education is no exception to this condition. Responding to the government's call to implement social distancing, the Minister of Education and Culture of the Republic of Indonesia (Mendikbud RI), issued a Circular Letter Number 3 of 2020 regarding the prevention of Covid-19 in education units. The circular contains instructions to take steps to prevent the development and spread of the virus within the education unit. However, the escalation of Covid-19 transmission was getting unbearable, and thus the Indonesian Minister of Education and Culture issued Circular Letter Number 4 of 2020 regarding the implementation of education policies in the emergency period of the outbreak of Covid-19. The circular contains, among which, an order to carry out the teaching and learning process from home or through online learning. In practice, distance or online learning does not bring together teachers and students physically in the same room but virtually. This type of learning is obviously different from the regular learning pattern prior to the Covid-19 pandemic. Therefore, it is necessary to develop more flexible learning tools that are applicable for both classroom learning and online learning as a way to properly achieve the expected learning outcomes.

The scope of mathematics at Junior High School based on Ministry of Education and Culture Regulation Number 58 of 2014 about the 2013 Curriculum for Junior High School covers aspects of numbers, algebra, geometry, measurement, statistics and probability. Therefore, geometry is one aspect that every student needs to master. To help students understand and learn geometry, teachers

need to link the mathematical concepts with real-life examples. One way to connect mathematics learning with real life examples is by relating it to culture. Indonesia has an exceptional cultural diversity. The current learning program at school only introduce students to cultural aspects through some subjects, such as social science, arts and culture and skills, as well as history. In fact, it is possible to learn culture through mathematics. Toward this end, teachers need to bridge between mathematics learning and culture through ethnomathematics-based learning.

Ethnomathematics was first introduced by D'Ambrosio (1985), a Brazilian mathematician, in 1977. She labeled ethnomathematics as a fashion style, and technique of explaining, understanding and dealing with the natural and cultural environment in different cultural systems (Yulianti, 2016). Ethnomathematics is a form of mathematics that is associated with or based on culture (Wahyuni et al., 2013). The provision of ethnomathematics-based learning at school is expected to improve students' ability to understand mathematics and their respective culture.

The idea of ethnomathematics can add to existing mathematical knowledge, and thus ethnomathematical experts argue that, in principle, the development of mathematics is inseparable from the predominating culture and values in society (Tandililing, 2013). Ethnomathematics-based learning at school should be in harmony with the nature of school mathematics and in line with the nature of students mathematics learning (Marsigit et al., 2018). This study concerns with ethnomathematics for geometrical concept. Ethnomathematics in geometry covers the explanation of buildings of cultural objects in Indonesia, such as temples which are composed of several basic forms of three-dimensional structure. Another relevant example is some motif on batik cloth, constituted of basic two-dimensional figures.

The fact that there have not been many ethnomathematics-based learning tools developed, in addition to the relatively low mathematical literacy ability of junior high school students in Indonesia make it necessary to develop ethnomathematics-based learning tools. Such tools are expected to help students learn mathematics in a real context, more specifically by relating mathematical concepts to culture to develop their mathematical literacy skills. Therefore, this study aims to develop learning tools in the form of ethnomathematics-based Lesson Plan and Student Worksheet to improve the mathematical literacy skills of the eight grade of junior high school students, especially on the topic of geometry to acquire valid, practical, and effective qualifications for both direct and indirect learning online.

METHOD

This research was conducted using mixed methods by way of combining quantitative and qualitative methods. It applied research and development procedure with the ADDIE development model. This research aims to produce ethnomathematics-based Lesson Plan and Student Worksheets on two-dimensional figure materials to improve the mathematical literacy skills of junior high school students with valid, practical, and effective qualifications. It was conducted from April to May 2021 at one of the public junior high schools in Kertek District, Wonosobo Regency. This school is one of the favorite schools in the district. The research subjects of the research and development was learning tool of ethnomathematics-based lesson plan and student worksheet on two-dimensional geometrical materials oriented to improve the mathematical literacy skills of the eight graders of Public Junior High School in Wonosobo Regency, Central Java Province.

Procedure

This research was developed by referring to the ADDIE development model proposed by Dick and Carry (in Mulyatiningsih & Nuryanto, 2014). The ADDIE development model consists of five stages, namely: Analysis, Design, Development, Implementation, and Evaluation. In the analysis stage, the researcher analyzed the need for the development of learning tools and the feasibility of the development requirements. This analysis stage consisted of three activities, namely needs analysis, curriculum analysis, and analysis of student characteristics. Needs analysis was done by making observations to find out the kind of learning tools needed by students. Curriculum analysis was done by examining various achievement competencies in the currently applied curriculum, while

student characteristics were analyzed to find out the appropriate learning tools to help them in the learning process.

At the design stage, the learning tool was designed in accordance with the results of the foregoing analysis at the analysis stage. This learning tool was designed as an ethnomathematics-based lesson plan and student worksheet. In addition, researchers also designed research instruments. At the development stage, the learning tools and research instruments were developed to obtain the initial product development. After the product was consulted with the supervisor to obtain suggestions for improvement, the next step was product validation by a lecturer from the Department of Mathematics Education, Faculty of Mathematics and Natural Sciences, Yogyakarta State University. The assessment at this stage generated some input and suggestions from the validator. Then, the results of the assessment were analyzed to measure the level of validity of the learning tool. The validation aims to determine the quality of the product and to revise the product for product improvement and refinement.

After the learning tool was declared valid and revised based on input and suggestions from the validator, the following stage was implementation. The product was piloted to pre-determined schools. The learning process in the classroom referred to the developed lesson plans. Learning activities were carried out online because it was impossible to carry out face-to-face learning activities due to the outbreak of Covid-19. Some preparations were carried out before online learning, including the creation of a WhatsApp Group specifically for the eight grade for mathematics learning as the research object, preparation of learning materials and videos to support the learning process (learning video links are available in the developed Student Worksheet), discussion, and delivery of material to students. The learning activities were carried out in five meetings, with details of three meetings for learning and two other meetings for the implementation of the pretest and posttest. Details of the implementation schedule for the implementation of the developed learning tools are presented in Table 1.

Table 1. Schedule of Learning tool Implementation

No.	Date and Time	Activity
1.	Friday, April 16, 2021	Pretest of the mathematical literacy ability
2.	Friday, April 23, 2021	Online Learning for Student Worksheet 1 and Student Worksheet 2
3.	Friday, April 30, 2021	Online Learning for Student Worksheet 3 and Student Worksheet 4
4.	Friday, May 7, 2021	Online Learning for Student Worksheet 5 and Student Worksheet 6
5.	Friday, May 7, 2021 (night)	Posttest of mathematical literacy skills and filling out student response questionnaires

In practice, online learning activities were carried out through WhatsApp Groups using the previously developed Student Worksheet. The steps in online learning were adjusted to the previously prepared online lesson plans. Online learning activities contain three activities, namely preliminary activities, core activities, and closing activities. Preliminary activities include greetings by the teacher, conditioning students, delivering learning material for discussion, presentation of learning videos, delivering learning objectives, distribution of online worksheets, and apperception activities. In the core activity, students were given the opportunity to discuss with the teacher or with other students via WhatsApp Group. In addition, students were also required to work on ethnomathematics-based worksheets with a Realistic Mathematics Education (RME) approach, by providing ethnomathematical contexts, problem solving, translation of results, and interactivity. In the closing activity, students were provided the opportunity to conclude the previously studied material.

The last stage was evaluation. At the evaluation stage, the researcher analyzed the spotted errors during the research process and then corrected them. In addition, researchers also measured the quality of the generated products by analyzing the practicality and effectiveness of the developed learning tools.

Data and Instruments

Two kinds of data were used in this research, namely qualitative and quantitative data. Qualitative data refer to descriptive data collected during the development process. Qualitative data were obtained in the form of input, criticism, feedback, and suggestions from experts, teachers, and students on the developed learning tools. Quantitative data refer to data on the feasibility of developed product in terms of validity, practicality, and effectiveness. Four types of instruments were used in this study, namely assessment sheets for learning tool, response questionnaires, observation sheets for learning implementation, and questions about mathematical literacy skills.

To measure the level of validity of the developed learning tools, a learning tool assessment sheet was used. The assessment sheet of this learning tool was addressed to validators, namely expert lecturers in the field of mathematics education with proven experience in ethnomathematics. The assessment written on this sheet aims to determine the feasibility of the learning tool to be tested without revision, with revision, or not feasible for testing.

Two kinds of assessment sheets of learning tool were applied, namely Lesson Plan and Student Worksheet. Lesson plan aims to assess identity, formulation of objectives/indicators, materials, learning approaches and methods, learning activities, learning media/sources, assessment of learning outcomes, and language. Lesson plan aims to assess, among others, the suitability of the material/content, the suitability of the Student Worksheet with didactic requirements, the suitability of the Student Worksheet with the construction requirements, the suitability of the Student Worksheet with the technical requirements, the suitability of the ethnomathematic-based Student Worksheet with the RME approach, and the suitability of the Student Worksheet for training skills of mathematical literacy.

To measure the practicality of the learning tools developed, student response questionnaires and learning implementation observation sheets were used. At the end of the meeting, students were given a student response questionnaire to measure student responses and reactions related to the practicality of the currently developed and applied learning tools in the learning process. The practicality of learning tools is viewed from its function and usefulness for students during the learning process. The student response questionnaire includes the following components: the use of language, content, presentation, graphics, and the use of ethnomathematical elements. The observation sheet of learning implementation is used to assess the implementation of the activity steps in the learning process.

To measure the effectiveness of the currently developed learning tools, mathematical literacy test questions were applied as a pretest at the beginning of the meeting and posttest at the end of the meeting. This test was aimed at measuring students' mathematical literacy skills after using the currently developed learning tools based on indicators of the basic competencies to achieve. Three indicators of mathematical literacy were applied in this test, namely identifying facts and formulating problems mathematically, using concepts, strategies and mathematical reasoning to find mathematical solutions, and interpreting, applying and evaluating the mathematical problem solving.

In this study, data were analyzed to determine the quality of learning tools in terms of validity, practicality, and effectiveness. This study focused on two types of data analyzes, namely: 1.) Validity and practicality analysis; and 2.) Effectiveness analysis.

Analysis of Validity and Practicality

The validity analysis of the developed learning tools was conducted based on data generated from the assessment of learning tools. The expert rating scale referred to the Likert Scale. The results of the validation sheet were analyzed with the following steps: 1.) Tabulating data from the validator; 2.) Calculating the percentage of the Total Empirical Score (TSE) to the maximum score; and 3.) Analyzing the validity of the learning tool.

Product validity was determined by calculating the total score and its percentage. Thenceforth, the results of these calculations were analyzed referring to the assessment criteria presented in Table 2 (Akbar, 2013). The learning tools are valid if the minimum qualification level of validity is "good enough". The student response questionnaire and the observation sheet of learning implementation were used in the practical analysis. The student responses to learning tools

can be seen from the results of student response questionnaires, while the observation sheet of learning implementation was utilized to re-check the learning process using the developed learning tools.

The student response was rate based on positive and negative responses. The result of their responses were analyzed in several steps: 1.) Tabulating data from students; 2.) Calculating the Total Empirical Score (TSE); and 3.) Analyzing the practicality of learning tools. Meanwhile, the data from the observation of the learning implementation were analyzed with the following steps: 1.) Tabulating data from the observation scores by scoring 1 for "Yes" and scorring 0 for "No"; 2.) Calculating the percentage of learning implementation; and 3.) Analyzing the practicality of learning tools.

The practicality of learning tools was determined by calculating the percentage of learning implementation. Afterwards, the results of these calculations were analyzed referring to the applied assessment criteria (Akbar, 2013). The currently developed learning tools are considered valid and practical if the minimum qualification of the scoring results is "good enough" with 70.01% - 85%.

Effectiveness Analysis

To determine the effectiveness of developed learning tools, an effectiveness analysis was carried out. Effectiveness data were resulted from the pretest and posttest of mathematical literacy skills. The test instrument for students' mathematical literacy skills was in the form of descriptive questions. Students' mathematical literacy test results were analyzed through the following steps: 1.) Tabulating data on mathematical literacy test results; 2.) Calculating the percentage of students' completeness; 3.) Students who completed the questions were score with a minimum score of 74 by referring to the applicable KKM (Minimum Completeness Criteria) at school; and 4.) Converting the data from the test results of mathematical literacy skill according to the applicable assessment criteria (Akbar, 2013). Learning tools are said effective if there is an increasing score from the pretest to posttest, and if the percentage of student completeness in the posttest meets the minimum criteria of "Good Enough".

RESULTS AND DISCUSSION

The currently developed ethnomathematics-based learning tools are oriented to the mathematical literacy skills of junior high school students using the ADDIE development model. This development model consists of the following stages: analysis stage, design stage, development stage, implementation stage, the evaluation stage. The lesson plans developed in this study include the following components: lesson plan identiti, core competencies, basic competencies, Grade Point Average, learning methods, learning materials and resources, learning materials, learning media, learning objectives, learning steps, and assessment techniques. The identity of the lesson plan consists of the name of the school, subject, class/semester, subject matter, and time allocation. The Core Competencies used refer to Regulation of the Ministry of Education and Culture of the Republic of Indonesia Number 37 of 2018.

Table 2. Results of Lesson Plan Assessment

Assessment Aspect	Total Score	Percentage	Criteria
Identity	19	95%	Very Good
Formulas	12	80%	Fair
Learning Materials	12	80%	Fair
Learning methods	8	80%	Fair
Learning Activities	30	86%	Very Good
Learning media/ resources	12	80%	Fair
Assessment of learning outcomes	12	80%	Fair
language	15	100%	Very Good
Total score	120	86%	Very Good

Grade Point Average was resulted from the applicable basic competencies. The applied learning approach was an ethnomathematics-based Realistic Mathematics Education (RME). The learning material was building the plane side of three-dimensional figure for the eight graders, while the learning media were adjusted to the situation of the online learning implementation. The learning steps referred to a combination of scientific learning steps with ethnomathematics-based RME. The quality of the ethnomathematics-based lesson plans in terms of validity is presented in Table 2.

The quality of lesson plans and student worksheets in terms of effectiveness was determined by the score of the mathematical literacy test. The results of the pretest and posttest analysis of mathematical literacy skills is presented in Table 3.

Table 3. Results of the Pretest Analysis of Mathematical Literacy Skill

Mathematical Literacy Indicator	Average Score	Percentage	Criteria
Indicator 1	9,63	80%	Fair
Indicator 2	10,84	68%	Fair
3 indicator	5,22	43%	Poor
Total Score	25,69	64%	Fair
Score	64,22	64%	Fair
Completeness Percentage		34%	
Criteria		Poor	

Table 4. Results of Posttest Analysis of Mathematical Literacy Skill

Mathematical Literacy Indicator	Average Score	Percentage	Criteria
Indicator 1	11,34	95%	Very Good
Indicator 2	13,69	86%	Very Good
3 indicator	8,44	70%	Fair
Total Score	33,47	84%	Fair
Score	83,67	84%	Fair
Completeness Percentage		84%	
Criteria		Fair	

Table 3 and Table 4 illustrate that the percentage of student learning completeness in the posttest meets the minimum criteria of "good" with 84%. In addition, there has been an increase in the comparison between pretest average score and posttest from 64.22 to 83.67. This assessment delineates that the developed learning tools have met the effective criteria. Furthermore, it is clear that there are differences in students' ability in solving the problems given at the pretest and posttest. Examples of differences between the students' pretest and posttest is presented in Figure 1, Figure 2, Figure 3, and Figure 4.

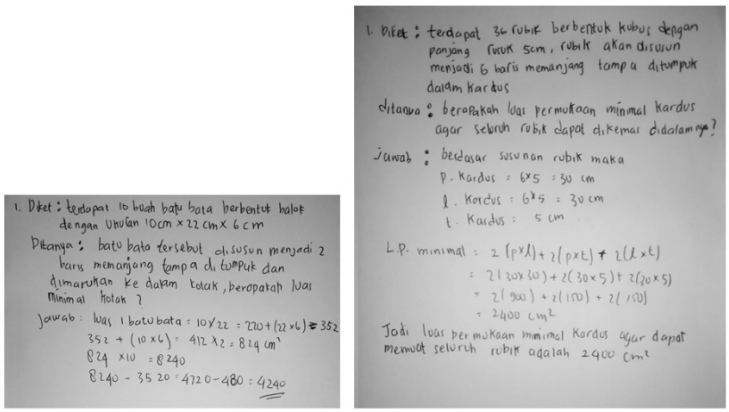

Figure 1. Comparison of Pretest (Left) and Posttest (Right) Answer for Number 1 of a Student Named RDDS

Figure 1 portrays that student's answer to pretest question number 1 has not used the appropriate concepts, strategies, and reasoning in the form of formula-based calculation, and thus resulted in miscalculation. In addition, this student also has not interpreted, applied, and evaluated the problems using mathematical problem solving and conclusion drawing. However, in the posttest, the student has used appropriate concepts, strategies, and reasoning in the form of formula-based calculation and thus resulted in correct calculation. In addition, this student has also interpreted, applied, and evaluated the problems mathematically and drawn conclusions correctly.

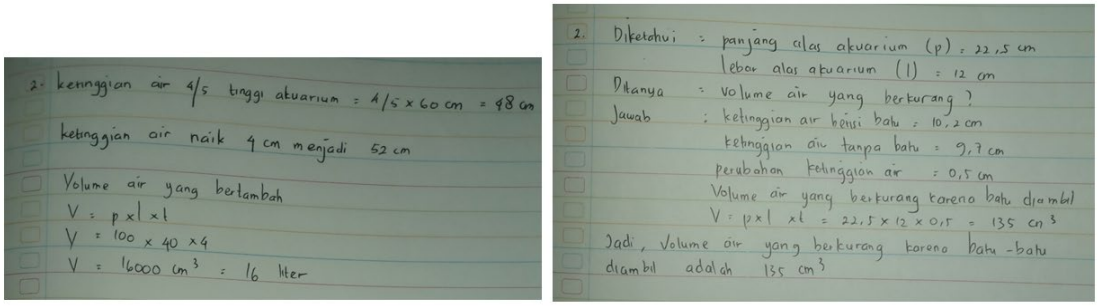

Figure 2. Comparison of Pretest (Left) and Posttest (Right) Answer for Number 2 of a Student Named TDA

Figure 2 indicates that in the answer to number 2 of the pretest, the student has not identified the mathematical facts and formulated the problem mathematically. In addition, this student also has not interpreted, applied, and evaluated the problem mathematically. However, in the posttest, the student has been able to identify mathematical facts and formulate the problem mathematically and correctly. In addition, the student has also interpreted, applied, and evaluated the problem mathematically and drawn conclusions correctly.

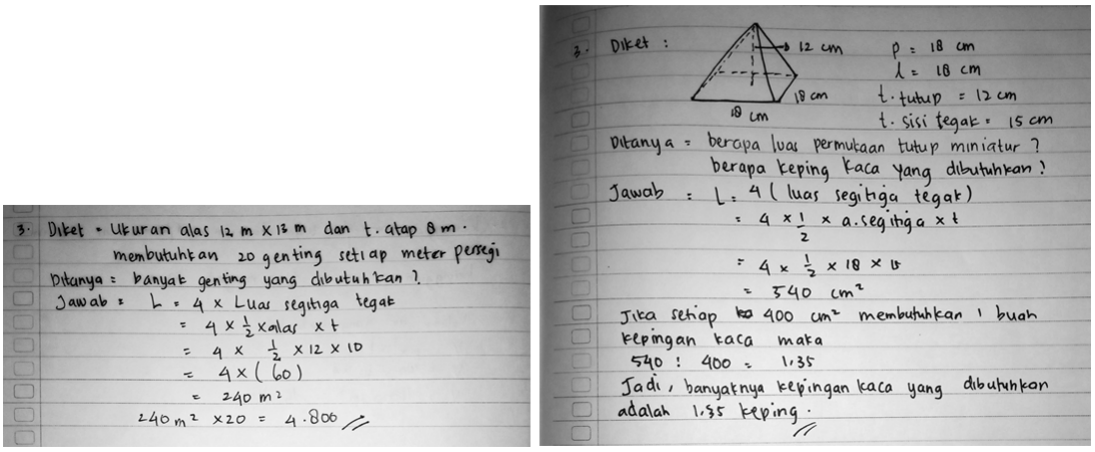

Figure 3. Comparison of Pretest (Left) and Posttest (Right) Answer for Number 3 of a Student Named LY

Figure 3 clearly depicts that in the pretest answer to number 3, the student has not interpreted, applied and evaluated the given problem mathematically. However, in the posttest, the student has interpreted, applied and evaluated the given problem mathematically and drawn conclusions correctly.

Figure 4 delineates that in the pretest answer to number 4, the student has not identified the mathematical facts and formulated the given problem mathematically. The student has used formula-based concepts, strategies, and reasoning, but it is still incorrect. In addition, this student also has not interpreted, applied, and evaluated the given problem mathematically. However, in the posttest answer to number 4, the student has identified mathematical facts and formulated the problem mathematically and correctly. The student has used formula-based concepts, strategies and reasoning, and performed correct calculations. In addition, the student has also interpreted, applied and evaluated the problem mathematically and drawn conclusion correctly.

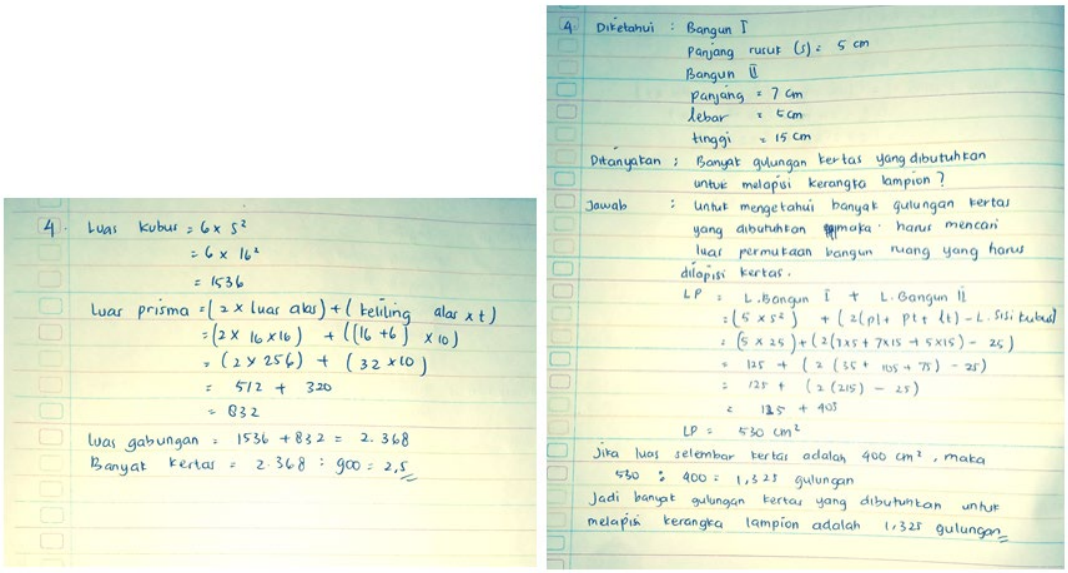

Figure 4. Comparison of Pretest (Left) and Posttest (Right) Answer for Number 4 of a Student Named RSN

The analysis stage consists of needs analysis, curriculum analysis, and analysis of student characteristics. In this study, the needs analysis was carried out by making observations to find out the kind of learning tools that students required. Curriculum analysis was conducted by examining various achievement competencies in the currently applied curriculum. The analysis began by examining the knowledge, skills, and attitudes that students must acquire to achieve the desired learning objectives according to the curriculum. Student characteristics were analyzed by examining students' learning type to find out the appropriate learning tools to help the learning process. Based on the three analyzes, the most appropriate learning tools were ethnomathematics-based lesson plan and student worksheets on two-dimensional figure materials to improve students' mathematical literacy skills.

The design stage comprised several activities, namely the design of the lesson plans, the design of the worksheets, and the design of the learning tool to be used as a measuring tool for the currently developed product quality. The assessment instruments include assessment sheet of lesson plans assessment sheets, assessment sheet of student worksheets, student response questionnaires, observation sheets of learning implementation, and test question of mathematical literacy skill.

The first step taken by researchers in designing the lesson plans was determining the identity of the lesson plans, which include the school identity, subject, class, semester, material, and time allocation. Based on the curriculum analysis, the considered number of hours available in the syllabus, and the considered basic competencies to achieve, the researchers decided to allocate 3 meetings with 9 hour learning duration for the material of two-dimensional figure. Afterwards, the researcher determined the Core Competence, Basic Competence, and described the Grade Point Average. Having determined the Core Competence, Basic Competence, and Grade Point Average, the researcher determined the learning methods and suitable learning approaches for the

ethnomathematics-based lesson plans. The next step was to collect learning materials and resources and to compile learning materials. The learning materials were modified to serve as ethnomathematics-based learning materials. Thenceforth, the researchers determined the learning media, learning objectives, and designed the learning steps. The final step in designing the lesson plans was to determine the assessment technique.

In designing the worksheets, the researchers firstly determined the structure of the worksheets before collecting various references for writing the worksheets. Having collected the references, the researchers designed the Student Worksheet attractively to draw the student's learning interest by taking heed on the composition of colors and images. When designing the assessment instrument, the researcher greatly put an emphasis on the aspects of assessment, while in compiling the assessment sheet of the Lesson Plan, the researcher referred to the basic principles and components of the standard Lesson Plan as regulated in Regulation of the Ministry of Education and Culture of the Republic of Indonesia Number 22 of 2016. To compile the assessment sheet of Student Worksheet, researchers were concerned on the feasibility of the material/content, suitability with didactic requirements, construction requirements, technical requirements, and suitability with the ethnomathematical approach. Likewise, when compiling test questions of mathematical literacy skill, the researcher arranged each item by paying attention to the indicators of basic competence to achieve and indicators of mathematical literacy skills.

At the development stage, the researcher developed a mathematics learning tool on two-dimensional figure geometry material and its assessment instrument in accordance with the initial design. Afterwards, the generated mathematics learning tools and assessment instruments were consulted with the supervisor to obtain some input and suggestions for improvement. The assessment of the Lesson Plan by the validator generated an assessment score of 120 with a maximum score of 140 and a percentage of 86%, which was included in the very good criteria. The average score for the Student Worksheet was 159 with a maximum score of 175 and a percentage of 91%, which was included in the very good criteria. Based on this description, the ethnomathematics-based learning tools oriented to improve the mathematical literacy skills of junior high school students were declared valid.

At the implementation stage, the developed learning tools were tested in the mathematics learning at school. The learning was implemented for the eighth graders of Class A of SMP Negeri 1 Kertek from April 16, 2021 to May 7, 2021. Before the learning process, students were required to complete a pretest of mathematical literacy skill. By the end of the learning process, students were obliged to take a posttest of mathematical literacy skills and fill out student response questionnaires. At the evaluation stage, the developed learning tools were revised. The improvements were made based on the observations during the learning implementation. The evaluation stage also concerned with an analysis of the practicality and effectiveness of the developed learning tools.

The student response questionnaires generated an average score of 65.13 of a maximum score of 80 and a percentage of 81%, which was included in the good criteria. The observations of the learning implementation resulted in an average score of 16 of a maximum score of 18 and a percentage of 89%, which was included in the very good criteria. Therefore, the developed ethnomathematics-based learning tools that are oriented to improve the mathematical literacy skills of junior high school students were declared practical.

The pretest of mathematical literacy skills obtained the average score of 64.22 with a maximum score of 100 and the percentage of student completeness of 34%, which was included in the poor criteria. The posttest rof mathematical literacy skills generated the average score of 83.67 with a student mastery percentage of 84%, which was included in the good criteria. From this description, it is conclusive that the developed learning tools have been able to develop students' mathematical literacy skills, especially in the two-dimensional figure material. The student's mathematical literacy skill test insinuated that the ethnomathematics-based learning tools oriented to achieve the mathematical literacy skills of junior high school students were declared effective.

The abovementioned discussion clearly depicts that the research has resulted in an ethnomathematics-based learning tool oriented to achieve the mathematical literacy skills of junior high school students. In addition, the product has met the required criteria of validity, practicality, and effectiveness.

CONCLUSION

The developed mathematics learning tool using the ADDIE development model produces an ethnomathematics-based lesson plan that includes the lesson plan identity, core competencies, basic competencies, grade point average, appropriate learning methods, learning materials and resources, learning materials, learning media, learning objectives, learning steps, and assessment techniques. In addition, the research and development have been able to produce ethnomathematics-based worksheets on the material for the plane side of three-dimensional figure, consisting of front cover, worksheet identity, introduction, table of contents, basic competencies, general instructions, learning video links, pre-concepts, grade point average, student worksheet 1 to worksheet 6, references, and back cover. To obtain ethnomathematics-based learning tools that are oriented to achieve the mathematical literacy skills of junior high school students that are valid, practical, and effective as done in the current study, the researchers carried out the following stages: 1.) The analysis stage, which included needs analysis, curriculum analysis, and student characteristics analysis; 2.) The design phase, which included the design of the lesson plans, the design of the worksheets, and the design of the assessment instruments; 3.) The development stage, which was done by obtaining the results of the assessment and input from the validator for product revision; 4.) The product trial phase for the classroom learning implementation. At this trial stage, the researchers implemented the learning process according to the generated steps in the lesson plans; and 5.) The evaluation stage, which was carried out by analyzing the spotted errors during the research process for further correction. In addition, the researchers also conducted an analysis of practicality and effectiveness at this stage.

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