



Fourth Grade Elementary School Mathematics Learning Online Test

Sakin Sabila^{1*}, I Made Suarjana², Made Sumantri³

^{1,2,3}Program Studi Pendidikan Guru Sekolah Dasar, Universitas Pendidikan Ganesha, Indonesia

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ABSTRAK

Guru mengalami kesulitan memeriksa pekerjaan siswa, hal ini disebabkan semua proses pembelajaran dilakukan menggunakan media HP. Selain itu, dalam proses pembelajaran pada masa Covid-19 ini guru melakukan evaluasi atau memberikan tugas-tugas lainnya hanya lewat via Whatsapp saja. Penelitian ini bertujuan untuk menciptakan tes online pembelajaran matematika kelas IV sekolah dasar. Jenis penelitian yang digunakan dalam penelitian ini yaitu penelitian pengembangan (Research and Development). Model yang digunakan pada penelitian ini yaitu menggunakan model ADDIE. Subjek penelitian yaitu 2 ahli/pakar dalam bidang pembelajaran matematika dan uji coba dilakukan kepada 28 siswa di SD. Metode yang digunakan untuk mengumpulkan data dalam penelitian ini menggunakan metode wawancara dan tes online. Teknik analisis data yang digunakan adalah validitas, reliabilitas, daya beda, tingkat kesukaran, kualitas pengecoh, respon praktisi dan respon siswa. Instrumen yang telah dirancang untuk mengumpulkan data selanjutnya diuji coba terlebih dahulu agar mengetahui kevalidan instrumen. Hasil penelitian adalah analisis uji validitas isi dan butir soal berada pada kriteria sangat tinggi. Hasil uji reliabilitas, instrumen yang diuji memiliki konsistensi yang sangat tinggi. Pada analisis respon praktisi dan respon mahasiswa kategori sangat baik. Maka, instrument tes online pembelajaran matematika siswa kelas empat sekolah dasar valid dan layak digunakan sebagai instrumen penilaian hasil belajar siswa. Implikasi penelitian ini yaitu instrumen tes online yang dikembangkan ini dapat digunakan oleh guru untuk mengukur pemahaman siswa selama mengikuti proses pembelajaran

ABSTRACT

Teachers have difficulty checking student work. This is because all learning processes are carried out using HP media. In addition, in the learning process during the Covid-19 period, the teacher evaluates or provides other tasks only via Whatsapp. This study aims to create an online test for fourth-grade elementary school mathematics learning. The type of research used in this research is research and development. The model used in this study is using the ADDIE model. The research subjects were 2 experts in learning mathematics, and the experiment was conducted on 28 students in elementary school. The method used to collect data in this study used interviews and online tests. The data analysis techniques used are validity, reliability, discriminating power, difficulty level, quality of distractors, practitioner responses, and student responses. Instruments that have been designed to collect data are then tested first in order to find out the validity of the instrument. The result of the research is the analysis of the content validity test, and the items are at very high criteria. The results of the reliability test, the instrument tested has a very high consistency. In the analysis of practitioner responses and student responses, the category is outstanding. So, the online test instrument for learning mathematics for fourth-grade elementary school students is valid and feasible to be used as an instrument for assessing student learning outcomes. This research implies that teachers can use the developed online test instrument to measure students' understanding during the learning process.

1. INTRODUCTION

Mathematics lessons are structural components of subjects that have an essential role in primary education (Indriani, 2018; Mislal & Mawardi, 2020). Mathematics for elementary students helps them live in their environment, develop their mindset, and study later sciences (Çinar et al., 2016; Setiyani et al.,

2020). *Mathematics learning* is a science learning activity using reason and a structured plan involving thoughts and activities in developing problem-solving abilities and conveying information or ideas (Misla & Mawardi, 2020). Mathematics learning is related to abstract ideas and symbols arranged hierarchically and deductive reasoning (Crismono, 2017; Hussin et al., 2018). In learning mathematics, a relatively high mental activity is required. Therefore, students must always actively participate in learning. Teachers hold important roles and positions in carrying out the educational process and are required to master and develop methods for the learning process that are adapted to the characteristics of the subjects so that learning objectives can be achieved effectively (Afifah et al., 2019; Pantiwati, 2016). Therefore, teachers need to provide an evaluation.

Evaluation needs to be done to improve the quality of learning, and subsequently, there will be an increase in the quality of education because the success of learning programs is always seen from the aspect of learning outcomes achieved (Czarnecki et al., 2021; Suastika & Rahmawati, 2019; Virgiawan et al., 2018). Educational assessment is a process of collecting and processing information to measure student learning outcomes (Chen et al., 2018; Salim Nahdi & Cahyaningsih, 2018; Subagia & Wiratma, 2016). The learning process assessment must be carried out to obtain valuable data to improve its quality (Mashud, 2020; Nurliawaty et al., 2017). With the evaluation, students can find out how far the success has been achieved while attending education. Evaluation can encourage students to be more active in learning continuously and also encourage teachers to improve the quality of the learning process further and encourage schools to improve further the facilities and quality of student learning (Fonda & Sumargiyani, 2018; Hewi & Shaleh, 2020; Kim & Sihyun Park, 2021). In conditions where students get satisfactory grades, it will have an impact in the form of a stimulus, a motivator to further improve achievement. In conditions where the results are not satisfactory, students will try to improve learning activities. However, it is necessary to provide positive stimulus from the teacher so that students do not despair.

Along with the problems being hit by the world, Indonesia is no exception. Currently, education is carried out remotely or online (Hutauruk & Sidabutar, 2020; Khurriyati et al., 2021; Safithri et al., 2021). Learning is not carried out face to face. Students and teachers carry out the process of learning activities through telecommunication tools such as cellphones and laptops. All learning processes are carried out using HP or Laptop media, including assignments and evaluations (Ibad et al., 2020; Pajarianto et al., 2020). Usually, students are given questions by the teacher, who then the answers must be made by students in their respective notebooks, then photographed and sent back to the teacher. In this condition, many problems were found. Both in terms of the quality of the images sent or regarding the students' writings that were not clear, making it difficult to read through photos. Based on the results of interviews with fourth-grade elementary school teachers, it is known that in the learning process during the Covid-19 period, teachers evaluate or provide other tasks only via Whatsapp. Semester tests are given by distributing question sheets that students must take in turn to school. Then the answers will be sent back after all the subjects have been completed. While the daily evaluation is usually given through the Whatsapp Group, and answers will be sent to the same group. The answers sent are in the form of photos of student work written in student books. This evaluation process can provide opportunities for students to work together with their friends. In addition, the answers in the form of photos and the like make it difficult for teachers to check students' work. Not all of the answers sent photos to have good image quality so that the teacher's performance in checking assignments is not optimal. Currently, almost 60% of students in grade 4 already have their cellphone. It is known that students often work together on assignments or tests given. Students often share answers via Whatsapp. After answering, students will not know the correct answer and the number of errors.

Solutions to deal with obstacles in learning process activities, especially in implementing evaluations during this pandemic. One that can be used to deal with this problem is an online test using Google Forms. Google Form is one application that is often used in online learning (Anwar et al., 2020; Permata & Bhakti, 2020). This application is expected to be of proper format and easy to use. Moreover, at this time, teachers are required to follow the development of science and technology in learning in the Industrial Revolution Era 4.0 in accessing learning information through technology and ethics (W. I. Lestari & Putra, 2020; Pranatawijaya et al., 2019). Learning cannot be limited by space and time, and learning can be done anywhere and anytime (Kaban et al., 2021; Rahma & Pujiastuti, 2021). The development of educational technology that is very useful and easy to obtain is an effort to solve problems. For the success of a teaching and learning process, teachers must also be responsive to existing technological advances. The use of Google Forms in learning evaluation activities has a good impact in terms of effectiveness, efficiency, attractiveness, and display design.

The findings of previous research stated that a reasonable assessment could positively affect learning outcomes (Friantary & Martina, 2018; P. N. Wicaksono et al., 2020). assessment instruments in the form of tests can measure students' understanding and abilities (Ndiung & Jediut, 2020; Utami & Wardani, 2020). During the covid-19 pandemic, using google forms is more effective to implement (Anwar et al., 2020; Imania & Bariah, 2019; W. I. Lestari & Putra, 2020). The difference between this study and previous research is that previous research only developed learning outcomes instruments for face-to-face learning,

while this study developed an online test for learning mathematics using google form. There is no in-depth study of online mathematics learning tests using google Forms. The difference in previous research is that the instrument is designed to measure students' high-level abilities and strategies. At the same time, the development of this instrument focuses more on measuring students' abilities through online tests. Based on previous research, there has been no development related to online mathematics learning test instruments. This study aims to create an online test for fourth-grade elementary school mathematics learning. The existence of online math learning tests using Google Forms can help teachers and students learn during the Covid-19 pandemic.

2. METHOD

The type of research used in this research is research and development. The development model used as a benchmark in this research is the ADDIE model (analyze, design, development, implementation, evaluation) (Lesmono et al., 2018; Riani et al., 2019). The ADDIE model has evaluation activities for development activities at each stage. This development model has several stages, which include the analysis stage. The analysis is carried out to find information related to learning needs and identify problems in students and the learning process in schools. The design stage of developing an evaluation instrument for learning mathematics outcomes for grade 4 elementary school students starts from analyzing essential competencies, determining indicators, determining appropriate material, compiling an assessment instrument grid, and then consulting the supervisor regarding the design. Research that has been made in order to be able to design an objective assessment instrument grid in the form of multiple choices that is feasible to be developed into a product of student learning outcomes assessment instruments. After the design or instrument grid has been approved and improved, proceed to the next stage, namely the development stage.

In the development stage, the design or instrument grid that has been approved is continued to produce questions. After making the items completed by the planning made, guidance is carried out again with the supervisor to get input for improvement. After the repair is completed and approved, it is continued with implementing an expert test on the assessment instrument to determine the feasibility and effectiveness of the assessment instrument that has been made. The expert test was carried out by giving the mathematics content research sheet to lecturers and teachers to test the feasibility of the validity of the instrument that had been made. From the results of the tests that have been carried out, then the data is analyzed to determine the extent of the validity of the instrument made. From the expert test carried out, you will get some input and improvements from the mathematician. The implementation stage is the stage of implementing the feasibility and effectiveness test of the instrument to 4th grade elementary school students who have previously been declared valid and suitable for use by expert advice. The evaluation stage is the final stage of this research to find out how the influence of the assessment instrument in the form of a multiple choice test developed using Google Form on the problems found in the mathematics learning of 4th grade elementary school students. These stages are used in this research process.

The subject of the research is the instrument for assessing mathematics learning outcomes in grade IV, which was proposed to 2 experts in mathematics learning, and the trial was conducted on 28 students at SD Negeri 3 Banjar Tengah Negara. The method used to collect data in this study used interviews and online tests. The test given is a summative test in the form of an objective test in multiple choices. Through multiple-choice tests, the data collected is the result of data on the validity of the online. The data collection instrument used in this study was designed to measure the object to be observed. The instrument used in this research is a written test instrument in an online system (online). The method of data analysis is an essential component for generating conclusions in decision making and knowing the feasibility of the instrument used as an evaluation tool. An instrument can be said to be suitable by knowing the validity and reliability instrument. Based on this, the method used in data analysis in this study uses test validity, test reliability, level of difficulty, discriminatory power, and quality of distractors.

3. RESULT AND DISCUSSION

Result

In this study, the model used is the ADDIE model, consisting of 5 stages: analyze, design, development, implementation, and evaluation. The first is analysis. The analysis stage is to analyze the learning topics and student needs. The analysis phase consists of three parts, namely curriculum analysis, needs analysis, and student characteristics analysis. Curriculum analysis was carried out as a basis for developing the Online Test of Mathematics learning tools relevant and by the student's circumstances. Based on the curriculum analysis that has been done, the KI, KD, and indicators are adjusted to the teacher's

book and the student's book. Based on the results of interviews with fourth-grade elementary school teachers, it is known that in the learning process during the Covid-19 period, teachers evaluate or provide other tasks only via Whatsapp. Semester tests are given by distributing question sheets that students must take in turn to school. Then the answers will be sent back after all the subjects have been completed. While the daily evaluation is usually given through the Whatsapp Group, and answers will be sent to the same group. The answers sent are in the form of photos of student work written in student books. This evaluation process can provide opportunities for students to work together with their friends. In addition, the answers in the form of photos and the like make it difficult for teachers to check students' work. Not all of the answers sent photos to have good image quality so that the teacher's performance in checking assignments is not optimal. Currently, almost 60% of students in grade 4 already have their cellphone. It is known that students often work together on assignments or tests given. Students often share answers via Whatsapp. After answering, students will not know the correct answer and the number of errors. The second stage, followed by the design stage (planning) at this stage, the design of the instrument grid is carried out by KI, KD, and Grade 4 indicators for Semester 2 regarding the Flat Build material. The questions are in the form of multiple choices. The instrument grids that have been prepared have been approved by the supervisors and examiners to be continued to the next stage, namely development. The questionnaire grid is presented in table 1.

Table 1. Grid of Assessment Instruments

Basic competencies	Indicator	Question Form	Cognitive Level					No
			C2	C3	C4	C5	C6	
3.9 Explain and determine the perimeter and area of squares, rectangles, and triangles as well as power relations two with square root	3.8.1 Explain the properties of a regular polygon	Multiple choice	√					1, 2
	3.8.2 Summing up the properties of a regular polygon	Multiple choice			√			3, 4, 20
	3.8.3 Analyzing the properties of a regular polygon	Multiple choice			√			5, 6, 7, 8, 12, 13, 19
	3.8.4 Combining regular polygons	Multiple choice					√	10
3.9 Menjelaskan dan menentukan keliling dan luas persegi, persegi panjang, dan segitiga serta pangkat dua dengan akar pangkat dua	3.9.1 Comparing the perimeters of polygons.	Multiple choice				√		9
	3.9.2 Comparing the area of flat shapes polygon.	Multiple choice				√		11
	3.9.3 Analyze the perimeter of a polygon.	Multiple choice			√			14
	3.9.4 Determine the perimeter of a polygon	Multiple choice		√				16, 18
	3.9.5 Determine the area of a polygon	Multiple choice		√				17
3.12 Menjelaskan dan menentukan ukuran sudut pada bangun datar dalam satuan baku dengan menggunakan busur derajat	3.12.1 Analyzing the size of the angle on a plane shape	Multiple choice				√		15
	TOTAL		2	3	12	2	1	20

Then, in the development stage, the instrument is made according to the planned grid. It begins with the creation of each item that has been adjusted to the predetermined assessment indicators. Each item is made based on the cognitive level of students. The assessment instrument that has been prepared

has gone through the revision stage by the supervisor. Then the instrument has also been tested by experts in the field of mathematics and instruments. In the expert test with 2 lecturers, the data for each item was declared relevant to be tested on 4th-grade elementary school students. Before being tested on students, the instrument made will be entered into the google form. The assessment instrument in this study went through several tests carried out in the development stage. The validity test is done by doing a content validity test and item validity test. The content validity test with two experts in mathematics and instruments obtained a result of 1.00 with a qualification that is "very high."

Furthermore, the second test is to test the validity of the items by testing the instrument with 4th-grade students of SD Negeri 3 Banjar Tengah. The results of the data analysis of the validity of the items obtained 18 items that were declared valid and 2 items were declared invalid, namely items number 7 and 11. Then from the questions that had been declared valid, which amounted to 18 items, were continued to be tested for the level of reliability. Based on the data analysis, the reliability test obtained a result of 0.808230022 with a "very high" qualification in terms of consistency. Of the 20 questions tested, 14 questions have an easy category, and 6 questions are moderate. Then the difference power test measurement was found that from 20 questions, there were 2 negative questions. So 18 questions were declared positive, so the negative questions were discarded or not used. Four questions were declared good, 14 were quite good, and 2 questions were terrible. Furthermore, the distractor quality test was found that 10 questions contained distractors that were not good enough..

The implementation stage is carried out at the stage of implementing the feasibility and effectiveness test of the instrument to 4th-grade elementary school students who have previously been declared relevant and suitable for use by expert advice. In this development research, students can use the implementation stage directly because the instrument provided is by the current conditions and situation, namely online. Students are given a link so they can enter the google form that has been prepared. Students are given a 24-hour opportunity to enter the google form because some students can only work when their parents come home or at home. After answering the question, students will immediately get a score and find out the error of the answer. It will streamline the inspection time. Then the data obtained will be used to determine whether the items are valid or not. Due to the situation, conditions, and time constraints, this research is only implemented.

Discussion

Based on the results of data analysis, the online test of fourth-grade elementary school mathematics learning is valid and feasible to be used as an instrument of mathematics assessment for students. This instrument is valid and feasible to use due to several factors, namely as follows. First, the instrument has met the requirements of a good and correct assessment instrument, so it is feasible to use. An instrument can be said to be good if the instrument meets the requirements such as validity, reliability, level of difficulty, discriminatory power, and distractors so that the instrument is made of quality (Arif, 2016; Gaol et al., 2017; Seibert, 2020; Solihah et al., 2020; Yusup, 2018). The online test instrument has gone through expert testing and made improvements based on suggestions and input from experts so that the online test instrument becomes quality. Second, the online test instrument for learning mathematics is valid and feasible to use because this test can be presented through the Google Form application so that students can access this test easily, anywhere, and anytime. The Google Form application was chosen because it is easier and more efficient to distribute questionnaires via the internet (Anwar et al., 2020; Permata & Bhakti, 2020). In addition, the test aims to measure the understanding of each student during learning (Adjii, 2019; Hidayat et al., 2020; Yusup, 2018). From the discussion and the results obtained, the online mathematics learning test has validity and reliability, in very high criteria so that this online test of mathematics learning is appropriate to be used as an evaluation tool in mathematics learning.

The findings of this study are strengthened by previous research, which states that the assessment instrument is valid and reliable, feasible to use, and can be used to measure students' abilities (Arif, 2016; Solihah et al., 2020; T. P. Wicaksono et al., 2016; Yusup, 2018). Other findings also state that assessment instruments can measure students' understanding (Ndiung & Jediut, 2020; Utami & Wardani, 2020). A good test instrument can measure students' thinking skills (N. Lestari & Harjono, 2021; Umami et al., 2021). Based on the discussion results of online mathematics learning tests, it can be used in the evaluation process of mathematics learning. The instrument created has the advantage of passing the test of validity, reliability, discriminatory power, level of difficulty, and quality of distractors. Mathematics learning online test is given by students using google form. This research implies that teachers can use the developed mathematics learning online test to measure students' understanding during the learning process. this research contributes to teachers in making quality instruments.

4. CONCLUSION

The developed mathematics learning online test is valid from validity and reliability with a very high category. In addition, the responses of teachers and students also showed a good response. With online tests that are more effective and by the Covid-19 pandemic situation, learning will be efficient. Therefore, it is recommended for teachers to try to develop online tests so that students are more interested in the learning process.

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