Teacher Needs Analysis in Developing Android Learning Apps to Improve Elementary Students' Numeracy Literacy Skills

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ABSTRACT

The purpose of this research is to identify problems and analyze needs in the development of android learning applications to improve numeracy literacy skills of elementary school students in Kudus Regency. The research used descriptive method with qualitative descriptive technique. The research subjects in this study were grade IV students and teachers in eight elementary schools in Kudus Regency. The results showed that schools are still accustomed to conducting teacher-oriented learning with teaching media based on printed books from the government or printed LKS which are boring and do not attract students' interest. The manual-based learning media does not keep up with the times so it is necessary to develop learning media that is interactive, up to date with the times, innovative and creative and students or teachers can use it easily anytime and anywhere. The results showed that 1) schools need android-based learning media and 2) schools need learning resources to improve students' numeracy literacy skills. The suggestions from the research activities are: 1) Teachers need the design of digital-based learning activities as an alternative media for learning mathematics in elementary schools; 2) Teachers need interactive learning activity designs using various interactive learning models and strategies; 3) The learning media needed include android-based media; 4) teacher competence and skills are needed in designing learning resources in the form of mathematics materials that can improve student numeracy literacy; and 5) Teachers need to make student books to facilitate digital-based mathematics learning activities.

Keywords: *android, application, literacy, numeracy*

1. INTRODUCTION

The advancement of science and technology in the current digital era is needed by various parties including in the field of education [1]–[4]. The existence of technological advances is utilized in the field of education, one of which is as an alternative learning media to be able to increase students' interest and attractiveness in learning content in various fields of science. Material content in digital-based learning can be through android-based software where students can easily access it on laptops, PCs and smartphones. Material content in android-based learning media applications can be filled with various material content according to the chosen field of science using a digital format so that users can access it anytime and anywhere. The use of android-based learning media helps teachers in delivering material as a whole because the reality in the field shows that teachers often experience time constraints or limited number of lesson hours for several subjects. In addition, the condition of the class, the character of the students, the ability of the students also varies so that the students' capacity to learn the content of one field between one field and another is different.

The development of technology that is currently almost utilized by all levels of society is the use of mobile phones or smartphones in everyday life. The presence of this media is very helpful for the community in conducting efficient long-distance communication, information facilities, data storage, entertainment media, and others. However, not all Indonesians can utilize mobile phones or smartphones wisely. In the field of education, for example, not a few students are engrossed

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in playing cellphones or smartphones when the teaching and learning process takes place in class. They casually and fondly use their gadgets to access social media, the internet and play games. Their cellphones or smartphones are more often used for fun activities than as a medium of learning information. The advancement of science and technology that is not utilized properly can be a terrible thing and a threat in the field of education. Thus, it is necessary to utilize gadgets properly so that the use of information media can support learning activities.

Based on interviews with elementary school teachers in Kudus Regency, it shows that currently schools cannot use mobile phones or smartphones as learning media because schools do not have applications or software specifically used to study certain subject matter, for example in the field of mathematics. The existence of search engines on students' mobile phones or smartphones does not help teachers in the learning process because when students are asked to search for mathematics learning materials on the internet through their mobile phones or smartphones, they instead use them for other things that are not in accordance with the context of classroom lessons. In fact, the current independent curriculum requires students to have the character of the Pancasila learner profile where one of the profiles is to become an independent and creative superior generation [5], [6] where they should be able to utilize their cellphones or smartphones to study certain field materials so that the teacher's role as a facilitator in the classroom can work optimally. The independent curriculum also requires students to be able to think critically when students are asked to solve problems in the material they are studying[7], [8]. Based on these rights, digital-based learning media innovations are needed, one of which is an android-based learning application used by elementary school students in mathematics subjects.

From observations of primary school teachers in Kudus Regency, most of them still conduct mathematics learning in a manual way, namely lectures by utilizing printed books from the government and LKS purchased from a number of publishers. They use these learning media as the main source of learning as well as a source for giving assignments or practicing math problems. The learning process becomes less fun and students' interest in learning math is lacking. Moreover, the concept of mathematics, which is actually an abstract concept, makes students lazy and afraid to learn math. This makes the education report card in a number of schools in Kudus Regency in the aspect of numeracy literacy low and there is no maximum improvement from 2022. In fact, numeracy literacy is very important in mathematics because through this ability students can analyze information related to numbers or mathematical calculations then they formulate problems, analyze them and find solutions to these problems [9], [10]. This ability is not only related to formulas but also related to students' logical thinking skills when solving a problem so that students can understand the meaning of learning mathematics in everyday life.

In 2015, the World Economic Forum established numeracy literacy as one of the 21st century competencies required by all citizens of the world, especially students [11]. However, PISA results show that Indonesian students' numeracy literacy skills are low [12]. Currently, Indonesia is ranked 72 out of 79 countries. The average test score is 371 in reading, 379 in math, and 396 in science. These scores are below the average of 79 countries, which is 487 for reading, and 489 for math and science [13]). Thus, numeracy literacy skills must be improved by using appropriate learning strategies [14], [15].

Based on the phenomena and things that have been described above, it is necessary to conduct research activities to analyze the needs of schools in developing android learning applications to improve the numeracy literacy skills of elementary school students in Kudus Regency. Thus, the purpose of this study is to describe the needs of schools in developing android learning applications to improve the numeracy literacy skills of elementary school students in Kudus Regency. The existence of this research activity is considered important as a basis for developing learning media for android learning applications to improve the numeracy literacy skills of elementary school students.

2. METODOLOGHY

The research conducted is descriptive research so that the formulation of hypotheses is not required in this study. Data collection was done by distributing questionnaires to respondents, namely teachers and fourth grade students in eight schools in Kudus Regency. In addition, interviews and observations were also conducted in the research schools. Data analysis conducted in this study is to describe as well as interpret the percentage data from the questionnaire results that have been given to respondents. The qualitative data that was summarized in this study was used to facilitate data processing in combining two or more variables after which qualification was carried out again after the final calculation. The formula used in calculating the percentage is as follows.

$$\text{Persentase} = \frac{\sum x}{SMI}\ x\ 100\%$$

Description:

$\sum x$ = sum of scores

SMI = Ideal maximum score

Meanwhile, to calculate the overall percentage of the subject using the following formula.

$$\text{Persentase} = \frac{F}{N}$$

Description

F = the sum of the percentages of all subjects

N = number of subjects

3. RESULTS AND DISCUSSION

The initial research activities began with the identification of existing problems in eight elementary schools in Kudus Regency related to the need for digital-based learning media and the low numeracy literacy skills of students. The results of observation activities in the eight elementary schools are presented in Table 1 as follows.

Table 1. Results of Observation Activities at Eight Elementary Schools in Kudus Regency

No	Observation Component	Observation Component Identified Problems Student and Teacher	Needs Analysis
1	The math learning process in the classroom	Teachers explain mathematics content using the conventional lecture method where students do not appear to be active in learning because learning is teacher-centered, not student-centered. Six schools are used to using manual learning media, namely printed books from the government as learning media. The other two schools sometimes used educational teaching aids as math learning media. The math assignment is to work on problems on the LKS purchased from several publishers.	Teachers need alternative learning strategies that utilize innovative learning media in learning mathematics so that learning activities are more fun and meaningful.
2	Education report card on students' numeracy literacy aspect	Most schools' report card results on numeracy literacy did not improve significantly	Teachers need strategies to improve students' numeracy literacy.
3	Digital-based learning media	There is no digital-based learning media where students can access math content anytime and anywhere.	Teachers need digital-based learning applications so that students can learn not only at school but anywhere and anytime.
4	Development of student teaching materials for self-study	There are no student teaching materials at school that help them to learn independently.	Students need learning resources to help them learn independently

Based on the data in Table 1, the results show that the mathematics learning content delivered by the teacher during classroom learning is sometimes not fully completed. This sometimes becomes a misconception for students. Whereas mathematics content is hierarchical where the material taught previously becomes prerequisite material for learning the next material. Problems like this if they continue will make it difficult for students to learn mathematics so that their numeracy literacy skills are low. Thus, an effective learning strategy is needed so that students can pursue the material to completion. Thus, learning media is needed by utilizing mobile phones or smartphones where there are learning applications related to mathematics content. Gadget use activities in order to help students learn mathematics can be done anytime and anywhere. The

implementation of mathematics learning activities by utilizing digital-based learning applications in the form of android software becomes an obstacle when teachers are asked to make the software independently. This is because not all teachers have the skills and competence to create the software.

To strengthen the observation results, the next step is to identify problems and analyze the needs of android learning applications to improve numeracy literacy skills by distributing questionnaires to teachers and fourth grade students in eight elementary schools in Kudus Regency. The following Table 2 is the result of the answers from the questionnaire given to teachers related to the problem of students' numeracy literacy skills.

Table 2. Results of Questionnaire to Identify Numeracy Literacy Problems

No	Statement	Answer				
		Strongly Agree	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**
1	Students have difficulty interpreting problems from the real world into mathematical form	10,4%	56,3%	4,2%	27,1%	2,1%
2	When students have difficulty in interpreting problems from the real world into mathematical form, they will ask the teacher.	29,2%	70,8%	0%	0%	0%
3	Students do not like to work on story problems transforming problems from the real world into mathematical form	16,7%	50%	16,7%	16,7%	0%
4	Students cannot formulate mathematical models in real-world problems into original mathematical forms.	10,4%	56,3%	10,4%	22,9%	0%
5	Students can formulate mathematical models in real-world problems into original mathematical forms.	2,1%	37,5%	33,3%	27,1%	0%
6	Transforming real-world problems into mathematical form is a student skill.	6,3%	12,5%	20,8%	54,2%	6,3%
7	When students cannot formulate mathematical models in real-world problems into original mathematics, students will ask their friends.	0%	79,2%	12,5%	8,3%	0%
8	Students find it difficult to capture a situation,	10,4%	77,1%	10,4%	2,1%	0%

No	Statement	Answer				
		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
	communicate with a problem, and explain the truth and provide justification as a solution to a mathematical problem.					
9	Students cannot determine the procedure to be used based on the facts that have been given.	4,2%	64,6%	10,4%	20,8%	0%
10	Students can determine the procedure to be used based on the facts that have been given	2,1%	39,6%	25%	33,3%	0%
11	Students cannot connect the types of problems in mathematics to real life so that students cannot make a conclusion on their own.	4,2%	62,5%	10,4%	22,9%	0%
12	Students have difficulty in planning the strategy that students will use to solve a problem	4,2%	77,1%	8,3%	10,4%	0%
13	Students cannot utilize symbolic expressions in a mathematical context	2,1%	60,4%	14,6%	22,9%	0%

The following Table 3 is the result of a questionnaire given to teachers related to the needs of android-based learning media.

Table 3. Questionnaire Results about the Needs of Android-Based Learning Media

No	Statement	Answer	
		Yes	No
1	Schools need android-based learning media	98%	2%
2	Schools need android-based learning media materials in accordance with the independent curriculum needed by elementary schools	98%	2%
3	Schools need android-based learning media that is in accordance with the level of development needed by elementary school students.	100%	0%
4	Schools need android-based learning media that presents text systematically	100%	0%
5	Schools need android-based learning media that fosters student interest in learning	100%	0%

6	Android-based learning media needed by schools can increase student activeness	100%	0%

The following Table 4 is the result of a questionnaire given to students related to problem identification and analyzing the needs of android learning applications to improve numeracy literacy skills.

Table 4. Results of Problem Identification and Needs Analysis Questionnaire for Android Learning Application to Improve Numeracy Literacy Skills

No	Statement	Answer	
		Yes	No
1	Do you like math?	85,9%	14,1%
2	Do you have difficulty in learning math, especially in the material of integers up to 10?	86,6%	13,4%
3	Does your teacher still explain math material theoretically by giving formulas and practice problems?	84,8%	15,2%
4	Do you agree if math teachers use android learning applications as an alternative teaching material to support the math learning process?	89,2%	10,8%
5	Do you agree if math teachers use android learning applications as an alternative teaching material to support the math learning process?	86,8%	13,2%
6	Do you have difficulty in learning mathematics in doing things related to numeracy literacy?	83,6%	16,4%

Based on the data in Tables 2-4, in-depth interviews were conducted with 4 student subjects and 4 teacher subjects to confirm the answers from the questionnaire. The results of the interviews show that according to students, mathematics material is difficult to learn because there are so many formulas that must be memorized and too many problems that sometimes they cannot solve correctly. Sometimes the material they learn cannot be repeated at home because they do not have enough time to take notes on the teacher's explanation in class. This makes students experience difficulties when they do assignments or homework at home. Because students' fighting power is low, they choose not to do the assignments.

Regarding learning strategies in the classroom, students feel that sometimes teachers deliver math material in a way that is less interesting, monotonous and confusing. Regarding android-based learning media, students need this media to support the process of learning math anywhere and anytime. Because sometimes there are some teacher explanations that are not in the lesson material book and are only explained verbally. The existence of android-based media according to students is also more practical when the media can facilitate them to be able to submit math assignments anytime and anywhere according to the limits set by the teacher. On the other hand, teachers also do not have sufficient competence and skills in making android learning applications. This is in accordance with Meliyani's statement that many teachers are not literate in digital technology [16]. In fact, the use of digital technology can make it easier for students to understand abstract content [17], [18].

Overall, this study reveals that the development of android learning applications is needed to improve the numeracy literacy skills of elementary school students. This is in line with previous research conducted which states that the progress of the times makes the use of technology-based learning media indispensable so that the learning process is not monotonous but students are more interested and active and learning also becomes more fun[15], [19]–[21].

4. CONCLUSION

Based on the results of the research, the data obtained that 1) schools need the development of android learning applications and 2) schools need learning resources to improve students' numeracy literacy skills. The

suggestions from the research activities are: 1) Teachers need the design of digital-based learning activities as an alternative media for learning mathematics in elementary schools; 2) Teachers need the design of interactive learning activities using various interactive learning models and strategies; 3) The learning media needed include android-based media; 4) teacher competence and skills are needed in designing learning resources in the form of mathematics materials that can improve student numeracy literacy; and 5) Teachers need to make student books to facilitate digital-based mathematics learning activities.

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