

The Development of Android-Based Learning Media in Multiplication Concept for the Fourth Grade of Primary School

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Abstract: This research is motivated by the low understanding of students about the concept of multiplication and teachers who have not forced learning such as developing learning media needed in the learning process. Learning media that can improve thinking skills and understanding students have an important role in improving the quality of learning. This research method uses research and development with research procedures, namely (1) needs analysis, (2) Development of learning media (3) validation of learning media that has been developed. The readability test results from this learning media also show that the readability criteria are easily understood with the average student score being 88.5%. Based on the exposure of the research that has been carried out, the development of an android-based learning multiplication concept for fourth-grade students of primary school is declared valid.

Keywords: Learning Media, Multiplication Concept, Android

INTRODUCTION

Mathematics is the study of numbers, concepts, and relationships between concepts in mathematics that are arranged systematically. Mathematical concepts are arranged systematically from the simplest concepts to the most complex concepts, from concrete concepts to abstract concepts. The nature of mathematics is in line with what was stated by Ismail, et al. (Hamzah and Muhlisrarini, 2014), Hodiyanto (2017) Mathematics is the science of logic concerning numbers, shapes, quantities and other relationship concepts which are numerous and divided into three fields, namely algebra, analysis and geometry. Based on the explanation above, mathematics is divided into three fields, namely algebra, analysis, and geometry. Algebra is a field of mathematics that studies symbols and counting operations in mathematics. The analysis includes material about the size, limit, series and functions, analysis material is usually studied in real numbers, complex numbers, and functions. Geometry is a field of mathematics that studies form, space, and connectedness.

Mathematics is a science with abstract concepts. Abstract means something intangible or just a picture in the mind. Abstract mathematical concepts will be difficult for elementary school students to understand. The same thing was stated by Hawa et al (Kesumawati, 2012), that mathematics subjects need to be given to all students starting from Elementary School to equip students with the ability to think logically, analytically, systematically, critically and creatively, and the ability to cooperate. To master and create technology and the ability to think logically, systematic, critical and creative analysis in the future it is necessary to have a strong mastery of mathematics from an early age and learning that makes students learn and become meaningful.

Mathematics learning needs to be given to all students, especially to elementary school students to equip students to have the ability to think critically, logically and systematically so that they will make students learn and make learning more meaningful. Learning mathematics in elementary school students also aims to equip students to have the ability to master mathematics from an early age as a provision for the future. Involvement of students directly in the learning

process, students are not just observing the teacher directly but must be able to experience and discover the concepts that will be learned so that learning will become more meaningful. This is in line with what was stated by Ruseffendi (Asih, 2009) that Learning mathematics is less understandable by hearing or seeing what is written by the teacher. Even if the children can understand maybe only a part of it, and their memory endurance is relatively shorter. The level of endurance and memory in learning mathematics education is higher what - if students search, work on and find their solutions.

Furthermore, Karlimah (2010) suggested that NCTM sets five standards of mathematical ability that must be possessed by students namely problem-solving ability, communication ability, connection ability, reasoning ability, and representation ability (Representation). Furthermore, Hamzah and Muhlirarini (2014), Murizal et al (2012) suggested that the specific objectives of mathematics learning in elementary schools include (1) Understanding mathematical concepts, explaining the interrelationships between concepts and applying concepts or algorithms, flexibly, accurately, efficiently and precisely in problem solving, (2) Using reasoning on patterns and traits, making mathematical manipulations in making generalizations, compiling evidence, or explaining mathematical ideas and statements, (3) Solving problems that include the ability to understand problems, design mathematical models, complete models and interpret (4) Communicating ideas with symbols, tables, diagrams or other media to clarify the situation or problem, (5) Having an attitude of respecting the usefulness of mathematics in life, which has curiosity, attention, interest in learning mathematics, and tenacity and confidence in problem solving.

Learning mathematics is not a science that contains several facts or information that is memorizing in nature. Mathematical learning must be obtained through a thought process so that in the learning process the teacher must be able to demand students to actively seek and find knowledge based on their own experiences. Learning through direct experience, students will acquire their knowledge, understanding, and skills so that learning will become more meaningful.

Mathematical learning should be meaningful, meaning that the material presented in mathematics learning is not only rote but more emphasis on understanding the material and its application to everyday life. Learning is said to be meaningful if students can learn mathematical concepts starting from the process of forming a concept, then being able to apply these concepts in a new situation.

Furthermore Batubara (2015), Muhammad (2012) that one of the most important factors in influencing the learning process of students in SD / MI is the presence of learning media. The presence of learning media is very helpful for students who are in the concrete operational phase in understanding material that is abstract or less able to be explained by verbal language. The complexity of the material to be delivered to students can also be simplified with the help of learning media so that students can more quickly understand the subject matter.

Types of learning media that are seen as having a positive role and influence on learning are technology-based learning media. This can answer the paradigm regarding (1) the role of the teacher as a source of information to the learning facilitator, 2) the classroom to where and whenever learning activities can be carried out, 3) paper to digital material online or offline, 4) physical facilities to network facilities, and 5) from cycle time (scheduled) to real-time (Ulum and Hasyim, 2016), Utama, et al (2012).

Based on observations made in mathematics learning in grade IV of Kodasari 1 Elementary School 1, Ligung Subdistrict, Majalengka District, there are gaps in students' ability, namely lack of understanding of students in mastering multiplication operations, so students have

difficulty in solving problems in subsequent multiplication concepts. Factors that cause a lack of understanding of students in multiplication operations occur due to several things, namely, the learning process is still teacher-centered. Teachers are less able to involve students to be active in the learning process, students tend to be passive and less participate in learning activities. The lack of variation in the learning process of mathematics also causes low student learning motivation, so students have difficulty understanding mathematics learning.

Meanwhile, the teacher still cannot develop learning media independently, so that in the implementation of learning the teacher still refers to the book that has been provided. Therefore, it is necessary to develop learning media that refer to technological progress. Through the development of android-based mathematics learning media, it is expected that the learning media created can be better understood by students so that learning is more meaningful and enjoyable.

METHOD

The research design used in this study includes the type of Research and Development or is a research development. The procedure of this study refers to the Borg & Gall model. Borg & Gall (Sugiyono, 2013) describes a series of steps that must be taken in this approach, namely: (1) preliminary study; (2) planning; (3) product design; (4) product validation; (5) product revisions; (6) product testing; (7) final product.

Step (1) is the first step of development research. Activities carried out in this regard Preliminary studies are the study of literature, identification of needs, and identification of problems. Step (2), at the planning stage, the researcher undertakes several activities including a) choosing type of android-based mathematics learning media with multiplication concept material, which is expected to be effective in the use of android-based mathematics learning media with multiplication concept material, b) Prepare an android-based mathematics learning media with multiplication concept material, c) Make an instrument of product feasibility. At this stage, the preparation of assessment instruments is given to material experts/content experts, and linguists. Step (3) product design developed, the result of the development of this research is android-based mathematics learning media with multiplication concept material. Then step (4) is the product validation step The step taken by the experts.

The development of android-based mathematics learning media with multiplication concept material for grade IV elementary school is done by validating learning media as a product of development to be carried out by media experts and material experts. After that, trial analysis data techniques are also limited to elementary school students who aim to determine the effectiveness of android-based learning media based on student responses. The response of elementary school students to Android-based learning media was analyzed by descriptive analysis.

RESULTS AND DISCUSSION

The results of the analysis of learning needs obtained from the analysis of the needs of educators and students include material developed in the form of learning media, material not only memorized, learning activities involve student activities.

The recapitulation of the results of the validator's assessment obtained from material experts and media experts on products developed in the form of android-based mathematics learning media can be seen in the table below:

Table 1. Recapitulation of the results of the validator's assessment

Aspect	Score
Feasibility of overall media appearance	86,74
Fill in the learning media	87,71
Feasibility of Android-based learning media for mathematics	84,25
Additional menu	88
Linguistics	77
Presentation	87
Average	85,12%

Based on the data in Table 1, it can be concluded that the recapitulation of the validator's assessment of the android-based mathematics learning media obtained an average score of 85.12% with the results are shown in the category is very valid. In linguistic aspects there are suggestions and input that researchers should pay more attention to the use of diction (word choice), pay more attention to writing sentence sentences with the use of question words and punctuation, pay more attention to writing sentence commands with the use of command words and punctuation, and pay attention to usage punctuation in each sentence in the learning media.

Readability test on android-based mathematics learning media conducted on 21 students in Kodasari Elementary School 1, Ligung sub-district, Majalengka Regency as a sample. The results of the readability test of the learning media that have been developed in this study get results with the average value of students are 88.50%. Based on the score, the learning media category is easy to understand.

This research resulted in an android-based learning application product, android based mathematics learning media in the multiple concept method. the result of expert validation is known that android-based mathematics learning media in the multiple concept method is worthy of being used. this too supported by the results of research that shows that in learning, the role of android-based mathematics learning media in the multiple concept method is becoming increasingly important in the present, because the android-based learning media system consists of media components (text, images, graphics, animation, audio, and video) designed to complement each other so that it becomes a strong and precise system, a unity that is better than the sum of its parts. The use of android-based learning media can be accepted in learning based on improving the process of independent learning and the active role of students. media learning mathematics based on android also provides stimulation for the learning process which takes place outside the classroom (Batubara, 2017), (Ikhsan, Yektyastuti, 2016).

CONCLUSION

Based on the results of research and discussion, it can be concluded that product development in the form of an Android-based learning media for fourth-grade elementary school mathematics students is developed based on the analysis of the needs of educators and students as data sources. From the results of the needs analysis, the principles of developing learning media are formulated regarding multiplication concepts which in general learning media contain practical material and learning activities that involve student activities in using the learning media itself.

Products that have been developed have been validated by material experts and media experts and readability tests have been carried out on 21 grade IV students of Kodasari 1 Elementary School 1, Ligung District, Majalengka Regency. The results of the overall validation of the two experts obtained a percentage of 85.12% with a very valid category and

the readability test obtained 88.50 results in an easy-to-understand category. Based on these criteria, android-based mathematics learning media are suitable for use as a medium for learning in grade IV elementary school.

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