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THE DEVELOPMENT OF SHIP NUMBER LINE MEDIA FOR IMPROVING LEARNING OUTCOMES OF INTEGERS MIXED CALCULATED OPERATING IN ELEMENTARY SCHOOL

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Abstract

This study aimed to describe the feasibility of a ship's number line media developed in integer operating material in class VI Elementary School, resulting in learning media in the form of a line number of vessels in integer counting operations in class VI Elementary School, describing how to apply ship number line media in operating material counting mixed integers in class VI Elementary School; and describe the improvement of student learning outcomes in calculating integer operating material after using ship number line media in class VI of Elementary School. Data collection techniques in the form of questionnaires were analyzed. The development research method or model used in this study was a 4-D model (Define, Design, Develop, Disseminate) that has been adapted, namely with the following stages of development research (1) product discovery, (2) product manufacture, (3) product development and (4) product dissemination. Based on the results of validation and dissemination, the shipyard media in mathematics learning developed by researchers was very feasible to use in the mathematics learning process in elementary schools or equivalent, because it had an average quality of 4.4 on a scale of 1-5 or (87%).

Keywords: Ship Number Line Media, Mathematics Learning Outcomes

Introduction

Mathematics is not a material to memorize but is a material understanding of natural phenomena that arise. Then learning mathematics is of course not only by giving explanations to students. Especially for elementary school students where according to cognitive development is still in the stage of concrete operational development that requires understanding through objects and events in a concrete manner.

One of the material in mathematics learning in class VI which must be presented concretely is the Material of Mixed Number Counting Operations. Planting concepts on operating material calculating integer mixes delivered by the teacher is done by drawing a number line on the board and illustrating positive integers with the word "pay or belong" while negatively using the word "borrow or debt." In addition, researchers demonstrated the concept of number lines by moving back and forth in front of the class. This resulted in the confusion of students to understand the material of the mixed counting operation concept which ultimately had an impact on a non-conducive learning atmosphere and student learning outcomes that were far from expectations.

It needs media development that can be used to construct students' knowledge to overcome these problems. The development is in the form of the use of number line media

that will be combined with miniature vessels so that it is easier for students to conduct demonstrations to solve operating problems to calculate integer mixes.

Understanding the media itself is proposed by Criticos (1996) in Daryanto (2010: 4-5) that the media is one component of communication, namely as a messenger from the communicator to the communicant.

Gagne (1970) in Sadiman et al. (2009: 6) states that media are various types of components in the student environment that can stimulate them to learn. Furthermore, The Association for Educational Communication and Technology (AECT) as quoted by Rayandra Asyhar (2011: 2) states that media is what is used to channel information. Meanwhile, Suparman (1997) (in Rayandra Asyhar, 2011: 2) explains that media is a tool used to channel messages and information from the sender of the message to the recipient of the message.

From some of the opinions above, conclusions are taken, media is a form of channeling both printed and audio-visual messages that can present messages and stimulate students to learn or bring instructional messages to stimulate students' thoughts, feelings, attention, and abilities.

Research Method

The development research method or model used in this study was a 4-D model (Define, Design, Develop, Disseminate) that has been adapted, namely with the following stages of development research (1) product discovery, (2) product manufacture, (3) product development and (4) product dissemination.

In the first stage, which was the stage of product discovery, the basic idea of discovery begins with efforts to solve problems in mathematics learning, namely (1) the problem of the low mathematics learning outcomes, namely in integer operating material. (2) the problem of the low quality of the mathematics learning process. Limitation of problems to be resolved, namely in the operating learning material to calculate integer mixtures.

Henceforth in this product discovery, the researcher examined theory as a foothold in applying the basic idea of developing innovative works in mathematics learning. The theories studied are the basis for developing this innovation work, namely (1) mathematics learning, (2) learning theory, (3) the nature of learning media, and (4) learning outcomes.

The second stage was making products. Product creation began with the formulation of learning objectives based on Basic Competence (KD) found in integer counting operations. After that, media products will be used. The next step was collecting media tools and materials which were then carried out by the media making process.

The third stage was product development. Products that have been completed from the manufacturing stage were developed through the development stage, namely in the form of seeking evidence of validity. Validity values were obtained from the scores obtained divided by the maximum score multiplied by 100.

Results and Discussion

Results

Validation of subject matter experts on the content of the source of mathematical learning was carried out by Sudirman, M.Pd. MIPA Department Lecturer of FKIP Nahdlatul Ulama University in West Kalimantan. Validation was intended to obtain information that will be used to improve the quality of mathematics learning media concerning the subject matter to be studied by students. The validation of learning media experts was carried out by Prof. Dr. H. Marzuki, M.Ed., MA., SH., Professor at Tanjungpura University.

Data obtained from the results of evaluations by subject matter experts were used by researchers to improve learning media. Based on the results of the overall evaluation of the

quality of the media the results of the development were very good with average score 4,3 so that they can be used for learning. The form of media developed was as follows:

Fig. 1 Full Display of Media (Media for a demonstration in front of the class)

Fig. 2 Full Display of Media (Media to be shared with students)

There were two forms of Shipyard media presented in the picture above, namely the media used for demonstrations in front of the wood-based class and the media to be distributed to each student with paperboard-based material. This was consciously and deliberately carried out by researchers with the consideration that the media used for demonstration was prepared for long-term use because it was made of hard and larger material. The goal was to be used by other teachers and researchers themselves if they want to teach mixed counting operations in the future.

Unlike the case with media distributed to students, researchers consciously and intentionally make the media from paperboard with more practical considerations if made in large quantities according to the number of students, lighter and safer for students. In addition, it also makes it easier for the two media to have a fundamental difference in their use.

The use of learning media was very easy to apply. Some of the provisions that must be understood before using this media were as follows: (1) The direction must be agreed upon. That was the direction to the right to show positive integers, and the direction to the left to show negative integers. (2) Signs of addition or subtraction were carried out by means of forwarding for a plus sign and reversing if reduced. (3) The end result can be clearly seen in the slide box provided.

The media for learning mathematics for elementary school students has several advantages, namely (1) contained the main material compiled based on the applicable curriculum, (2) the time needed in learning was shorter than conventional learning, (3) media can be used very easy because direct, can be used repeatedly and can be used anywhere and on any material, (4) students can learn while playing so learning was more fun.

The limitations possessed by Shipyard media in mathematics learning for elementary school students were (1) not all material was narrated in full only in the core parts of the material, (2) this media is the basic material concept that must be conveyed, thus in use this media, cannot directly use numbers that have a large value (3) numbers on integers were still very limited and simple because of the limitations of the length of the media field.

Based on the results of the final test conducted by the researchers after using Shipyard media in the first learning, the results showed that based on the results of the assessment on the first learning, data was obtained that as many as 6 students or equal to 18.18% students did not complete. The class average obtained from the results of the assessment is 91.21. Researchers have full confidence in improving student learning outcomes

if the optimization of the media developed can be done optimally. Therefore the researcher made improvements to the second learning which the final results of the assessment showed 100% of the students completed with a class average of 99.70.

Thus, Shipyard media used by researchers in the class can improve student learning outcomes in mixed counting operating material in the fourth grade.

Conclusions and Suggestions

Conclusions

Based on empirical data, it can be concluded that Shipyard media in mathematics learning developed by researchers are as follows: (1) Shipyard media development in mathematics learning in terms of ((a)) Learning material, very good quality with an average value average 4.5 on a scale of 1-5 or (90%). ((b)) Learning strategies are of very good quality with an average value of 4.2 on a scale of 1-5 or (84%). (2) Product results from Shipyard media in mathematics learning in terms of ((a)) Efficiency, good quality with an average value of 4.0 on a scale of 1-5 or (80%). ((b)) Display, very good quality with an average value of 4.4 on a scale of 1-5 or (88%). ((c)) The technical quality and efficiency of the media are of very good quality with an average value of 4.3 on a scale of 1-5 or (86%). (3) The results of the media are of very good quality with an average value of 4.6 on a scale of 1-5 or (92%). (4) Effectiveness for students, very good quality with an average value of 4.6 on a scale of 1-5 or (92%).

Based on the results of the above data, the Shipyard media in mathematics learning developed by researchers is very feasible to use in the mathematics learning process in elementary schools or equivalent, because it has an average quality of 4.4 on a scale of 1-5 or (87%).

Based on the results of the study, the suggestions that can be given as input for further development are as follows: (1) The mathematics learning media can be improved in quality. (2) The product developed can be used as a source of student learning independently at home. (3) Can be developed on a wider range of material and on other subjects. (4) Teachers who stutter on learning innovations are asked not to be prior to innovations made.

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