

Development of Interactive Teaching Material using Multisensory Learning Model on Multiplication Material to Improve Student Results Third Grade Primary School

Reva Juwita, Makmuri, Wardani Rahayu
Postgraduate State University of Jakarta
Front Street Rawamangun, East Jakarta, Jakarta 13220

Abstract:- This study aims to improve the learning outcomes of third-grade students of elementary school. Through the development of interactive materials using multisensory learning model on multiplication materials. This research was conducted at SDN Cipinang Cempedak 06 Pagi by using Research and Development method, which in English is called *Research and Development* (R & D). The results of this study are Based on the results of questionnaires individual testing showed that interactive materials have received a very good response from students with 89.60% percentage. While the results of small group questionnaire data obtained a very good response from students with a percentage of 83.80% and Effectiveness of the use of interactive teaching materials can be seen from the results of learning after conducting field trials by providing a matter of pretest and posttest. The data obtained are $t = 12,98$ with $df 25$ and $p\text{-value } 0,000 < 0,05$ or H_0 rejected. Therefore, it is concluded that there are differences in learning outcomes in learning multiplication materials between before and after using interactive materials.

Keywords:- Interactive Teaching Materials, Multisensory Learning Model, Research And Development.

I. INTRODUCTION

When the third-grade students are given basic multiplication exercises (multiplication of two numbers), after the analysis there are still many students who are still wrong in laying multiplication numbers using multiplication of stacking, so that the value of students in multiplication material less reach KKM. As well as the value of student learning is less achieved can be seen based on observations are known results Final Exam Semester 2016/2017 academic year at SDN Cipinang Cempedak 06 Pagi, math lessons only get the classification of C for the final value average of 60.75. The average score for this math lesson is the lowest among the other subjects.

The questionnaire results of the students in the analysis of the need that the students in Cipinang Elementary School Cempedak 06 on average only some students who have another handbook to study mathematics at home, but unfortunate during the process of teaching-learning activities do not use interactive materials. Then students

love learning in an interactive way through direct practice during the learning process takes place.

The multisensory learning model is the need to provide tools/learning materials that fit the needs of students in conducting activities. For learning mathematics tools that need to be provided are interactive teaching materials, interactive learning media, and props as well as educational game activities.

One of the characteristics of mathematics is abstract, while students of primary education age, especially elementary school are still at the concrete operational thinking stage. To encounter these conditions requires props.¹

Given the importance of the use of technology and information in learning and student learning outcomes are still low on multiplication material is abstract and abstract than the media needed in accordance with the needs of students and the demands of the era. By utilizing a wide variety of media (audio, visual, motion animation, etc.) it will produce maximum cognitive processes. One medium that meets these criteria is the Intercept CD.

By using the media or props in the learning process, it aims to provide a more concrete experience, increase motivation and strengthen students' absorption.

Based on the above explanation, the researcher is interested to arrange and develop teaching materials which in its presentation is assisted with visual aids that can arouse interest and attention of students according to the characteristics of primary school students. Thus, the researchers raised the title "Development of Interactive Teaching Materials Using Multisensory Learning Model On Multiplication Material to Improve Student Results Third grade Primary School".

II. INTERACTIVE TEACHING MATERIALS

According to Arends quoted Andi Prastowo, that good planning involves the activities of allocating the use of time, choosing the appropriate teaching methods, is any form of

material used to assist teachers or instructors in implementing the process of learning in class. The material in question can be either written or unwritten material.²

In accordance with the guidance of the development of high school teaching materials delivered by the Directorate of High School Development (2010), that teaching materials are all forms of materials in the form of a systematically arranged material used to assist teachers in carrying out learning activities and enable learners to learn.

Teaching materials is a tool that allows helping students to learn a competence or basic competence so as to be able to master all competencies thoroughly. Teaching materials are the content that is given to the students during the learning process. Through this teaching materials, students are delivered for the purpose of teaching.³

According Amri and Ahmadi cited Malina that the principle of development of teaching materials are: 1) Starting from the easy to understand the difficult, from the concrete to understand the abstract; 2) repetition will strengthen understanding; 3) positive feedback will provide reinforcement to learners' understanding; 4) high learning motivation is one of the determinants of learning success; 5) reach the goal as if going up the stairs, step by step, will eventually reach a certain height; 6) knowing the results that have been achieved will encourage learners to continue to achieve goals.⁴

From the above explanation can be said that the teaching materials are all forms of materials used to help teachers in the learning process organized system so that the creation of an environment/atmosphere that allows students to learn well.

According to Prastowo quoted by Arni Nurmariza, an interactive material is a teaching material that combines some interactive learning media (audio, video, text or graphics) to control a command or natural behavior of a presentation.⁵

According to Darmawan Ari Isnaini quoted that interactive learning is able to enable students to learn with high motivation because of his interest in the multimedia system capable of presenting the look of text, images, video, sound, and animation.⁶

According Hofstetter quoted Prihantana, suggests that multimedia is the use of computers to create and combine text, graphics, audio, moving images (video and animation)

by combining *links* and *tools* that allow the use of navigating, interacting, creating and communicating.⁷

According to Fenrich Prihantana cited, good learning media should bring a message on learning. Learning will be effective in the presence of media when students receive and understand with the message.⁸ The purpose of interactive teaching materials is to visualize things that are abstract.⁹

This interactive learning materials are teaching materials that combine some interactive learning media with interactive content in order to occur the relationship between teaching materials and users and the purpose of interactive materials is to visualize things that are abstract.

III. MULTISENSORY LEARNING MODEL

The model offers a variety of learning activities so that learners are not saturated with learning. The diversity of the model is applied, it is expected to reach more sides of the integrity of learning in the classroom. The learning model is a learning reference systematically implemented based on certain learning patterns. The learning model is composed of several components, namely *syntax*, *social systems*, and *systems* support.

According to La Iru and La Ode Safin, the learning model generally has characteristics of having a systematic procedure, specific learning outcomes, specific environmental setting, a certain size of success, and a teaching model that defines the way in which students interact and react with the environment.¹⁰

According to Iif Khoiru, a learning model can be interpreted as a plan or pattern used in preparing the curriculum, organize teaching materials, and give instructions to the teacher in the classroom in *settings* teaching *settings*. Other.¹¹ A learning model is basically a form of learning illustrated from beginning to end that is typically presented by the teacher.¹²

Rusman quoted Akhmad Yazidi suggests that the learning model is a plan or pattern that can be used to shape the curriculum (as a long-term learning plan), designing learning materials, and guiding classroom learning.¹³

Thus, it can be said that the learning model is a plan or a pattern used as a guide in planning the learning in which

there are a mindset and pattern of action on something from the application of an approach, strategy, methods, techniques, and learning styles.

Multisensory learning is a learning that is carried out by involving various sensory stimuli including the listener, sight, touch, and sometimes also smell and taste. This is, of course, different from the learning that usually involves one sense only eg hearing. Through various stimuli is expected to process information not only one source but from various sources.

According to Blackwood, learning involves the use of a variety of props, learning objects, interactive tools, video clips, drama, art, music, thematic backgrounds, food, water, odors, and other facial elements that stimulate sensory perception. A variety of stimulation for students so that students are able to respond that will awaken attention, understanding, and retention.¹⁴

Jacobs and Jildirin cited Yusniwati, a multisensory learning model based on the assumption that we are engaged daily by involving all the senses. Objects and events can be correctly identified and responded according to the stimulus because our brain works by using information obtained from different sensory/sensory devices simultaneously.¹⁵

The principle of multisensory learning is based on simple thinking that is, the teacher considers the senses as a means of receiving information. In other words, the senses act as the recipient of information and then the information to the brain for processing, learning, and acting. Multisensory learning is oriented to enhance understanding and retain it in long-term memory.

Bethel cited Yurniwati,¹⁶ expressing the students' absorption of the material depends on the learning process experienced by the students. One of the efforts that can be done is to apply the multisensory model in the learning of mathematics.

Perception is generally a multisensory process. Most situations involve sight, sound, and perhaps touch, taste, and smell. Because most of our sensory inputs are found, or at least modulated by, our motor sampling strategies and routines.¹⁷ By using the various senses as an information sensory device, students will be able to build a real mental representation in their minds so that they will be able to manipulate sensory information, ideas, feelings, and experiences into unforgettable knowledge.

The results of Ladam Shams and Aaron R Seats research are that multisensor training can be more effective

than similar training paradigms.¹⁸ In other words, training using multisensory is more effective than using only one sensory.

Multisensory learning has advantages in learning the advantages of applying multisensory learning according to Blackwood¹⁹ as follows: 1) Generating student interest in learning; 2) Accelerate students to understand the material being learned; 3) Placing a longer understanding because understanding is stored in long-term memory; 4) Make learning more clear; 5) Involve students directly in carrying out critical inquiry activities; 6) Developing learning becomes more fun for students.

Learning by using a multisensory model in practice is a learning that creation so that the learning material is abstract to the material is concrete.

Mathematics at the Elementary School of Multiplication Material The development of mathematical competence is directed to improve *life skill*, especially in building creativity, critical thinking skills, collaborating or collaborating and communication skills that demand 21st-century skills.

Studying mathematics with both procedural and conceptual understanding is important to ensure an appropriate development of individual math knowledge. It is important to equip learners not only with the skills necessary to achieve higher education and career aspirations but also in achieving personal fulfillment. As an important recognized discipline, mathematics has been introduced as a core subject to be studied at the elementary level of school level throughout the world.

In the mathematics learning curriculum at the elementary school level in the lower classes, there are materials such as the nature of numerical count operations, geometry, and measurement. One is the basic multiplication of two numbers of numbers.

The definition of multiplication is said to be significantly more difficult than addition and subtraction because it involves binary operations with two different entries. This often confuses children, especially those who are in the early stages of learning this concept. Many children do not know what multiplication.²⁰

The steps to study multiplication are 1) the student should do multiplication by first changing the multiplication

into the sum; 2) After the student understands the purpose of a multiplication process, then the student is asked to calculate the result; 3) After the students are proficient, the next step they are invited to multiply directly between two numbers, then count the results.²¹

Learning outcomes and student activities are certainly influenced by many factors. Sacramento quoted Afrizal argued that the factors that affect student learning outcomes, among others, internal factors and external factors.²² Internal factors include intelligence, attention, interest, talent, motive, maturity and readiness. While external factors include the role of teachers as learning managers, where teachers should be able to apply approach, models, methods, learning strategies or media that emphasizes the active learning of students so that able to organize and explore the potential that is in the student self.

Learning is done to seek behavioral change in the learning individual. Behavior change is the result of learning. The results of learning according to Winkel²³ is a change that resulted in changes in human behavior and behavior.

By considering the above theory can be concluded that the learning outcome is a change due to learning and the results can be changes in cognitive, affective and psychomotor aspects.

IV. RESEARCH RESULTS

Field trials are the last stage in formative evaluation. The purpose of the field test is to see the effectiveness of interactive teaching material achieve the expected goals and to determine the user's response to the use of these products. To measure the effectiveness of interactive teaching materials it is necessary to test the results of learning through pretest and posttest. The pretest and posttest results will then be calculated using the t-test. Field trials were conducted on 25 respondents of students from SDN Cipinang Cempedak 06 Pagi third grade. The activities were undertaken during the field trial in the table below.

Table 1. Field Test Activity

No.	Day	Activity was undertaken
1.	Day 1	Provides a matter of pretest to students
2.	Day 2	Activity learning
3.	Day 3	Activity learning
4.	Day 4	Provide postes problem to students

Pretest and posttest using the questionnaire as much as 10 questions and essays as many as 5 questions. The results of pretest and posttest values from 25 respondents can be seen in the table as follows.

Table 2. Results of Pretest Assessment and Postes

No.	Name of Student	Pretest	Posttest
1.	Princess	55	95
2.	Nadya	40	90
3.	Arumi	55	100
4.	Sandy	35	70
5.	Isni	70	80
6.	Zahra	75	100
7.	Amanda	50	100
8.	Asyam	40	85
9.	Naila	35	90
10.	Interest	35	80
11.	Zaskia	35	75
12.	Khumaira	85	100
13.	Janika	45	80
14.	Reyva	30	70
15.	Riski	50	80
16.	Ariq	45	90
17.	Didan	40	70
18.	Junior	50	75
19.	Natasya	30	65
20.	Camellia	40	70
21.	Aldi	35	60
22.	Farhan	30	60
23.	Bed	35	65
24.	Raguel	50	70
25.	Nurul	55	70
	Total	1145	1990
	average	45.8	79.6

Based on the above table, the results of the pretest value and posttest on 25 students from SDN Cipinang Cempedak 06 Pagi can be seen as a difference. The lowest pretest value obtained is 30 and the highest at 85. While the lowest posttest score obtained is 60 and the highest 100. The data can be described by analysis and using the t-test.

Table 3. Paired Samples Statistics

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 Pretest	45.8000	25	14.26534	2.85307
Posttest	79.6000	25	12.98396	2.59679

Table 4. Paired Samples Correlations

	N	Correlation	Sig.
Pair 1 & posttest	25	pretest.626	.001

Table 5. Paired Samples Test

	Paired Differences					T	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pair 1 pretest – posttest	-3.38000E1	2.36784 -38.68698 -28.91302 -14,275.000					24	11.83920

V. DESCRIPTION

- In the table of paired samples statistics show that the multiplication math learning materials before using interactive teaching materials Average the value of the learning outcome is 45.80 with the standard deviation of 14.26 while after using the product the average value of learning results increased to 79.60 with a standard deviation of 12.98.
- In table paired samples correlations, obtained correlation coefficient score of learning outcomes multiplication between before and after given interactive teaching materials that are equal to 0.626 with p-value of 0.000 <0.05 meaning significant.
- In table paired samples test obtained $t = 14.275$ with $df = 24$ and $p\text{-value} < 0.05$ or H_0 rejected. Thus it is concluded that there are differences in learning outcomes in learning mathematics material multiplication before and after using interactive materials.

VI. DISCUSSION

Curriculum2013 is a curriculum that is currently being applied in the Indonesian education system. This curriculum replaces the KTSP curriculum (Curriculum Level of Education Unit) which has been enforced since 2006. The 2013 curriculum begins to be implemented in certain schools (pioneer schools) in elementary, junior and senior high schools. The difference between the curriculum of 2013 and its curriculum lies in the aspect of assessment which includes four aspects of the assessment of aspects of knowledge, attitude, behavior, and skills. In addition, the differences are also evident from the learning model in the 2013 curriculum using an integrated thematic learning model. Integrated thematic learning integrates several subjects that are integrated into a theme. The learning subjects that are integrated are subjects IPS, IPA, Bahasa Indonesia, PPKn, and SBdP, while the subjects of PAI, Mathematics, and PJOK remain separate.

In the process of implementation of the 2013 curriculum in schools is inseparable from the constraints experienced by teachers and students. The obstacles that are experienced such as the assessment system is too complicated, limited teaching materials and media,

insufficient time allocation dam etc. Constraints in the limitations of teaching materials and media became the main focus of this study. Teaching materials used in schools today have limitations on material content. The cause is only one specific material only. The learning media used by teachers is the print media. Though there are many other learning media that can be used by teachers for more varied learning.

The solution to overcoming the limitations of teaching materials is to develop interactive teaching materials. The results of research on the development of interactive materials on multiplication materials found that interactive teaching materials can increase the interest and motivation of students to learn multiplication and improve student learning outcomes.

This is consistent with the results of a Johann Taljaard study which states that "Technology enables better engagement and improved learning outcomes as they enable students to learn in their preferred learning styles. They also make learning fun and allow students to connect to real-life situations. It can also be suggested that taking into account the current technology shortage of tools, future multi-sensory learning tools can promote higher involvement and improve student learning outcomes."²⁴

Johann Taljaard's research results support that multisensory learning techniques can increase student engagement as well as improve student learning outcomes assisted by the current growing technology in the learning process.

Another study conducted by Jenny Rains et al also showed similar results that "Achievements in elementary mathematics are no exception to review relevant sections of the learning theories of Piaget, Bruner, and Vygotsky and discuss the difficulties teachers may encounter when introducing the concepts of learning, mathematical concepts. The theory review, along with a previously published empirical study review, supports the use of multi-sensory teaching techniques in elementary schools, especially kindergarten through third grade, classrooms. Because students (both regular and special needs) develop and learn

at different levels, it is unlikely that all will be gradually ready to assimilate new mathematical concepts at the same time. Multi-sensory techniques allow many students, with assimilation, to understand elusive concepts and follow their peers".²⁵

It can be concluded that the relationship between the results of research conducted by Johann Taljaard and Jenny Rains, et al with research conducted by researchers that have similarities in the use of techniques or multisensory learning model that is able to help students who have different learning styles in learning to improve understanding abstract concepts so as to improve students' understanding in learning mathematics so as to improve student learning outcomes later. Increased interest and motivation and student learning outcomes can be seen in the results of student questionnaires.

This interactive learning material using Microsoft *power point* can also help students who have visual and audiovisual learning styles in math learning. This is supported by the results of research conducted by Mark D. Treleven Weber et al. Who stated that, "the animation of the *power point* is useful for student learning (both in improving understanding and decreasing effort) as well as the proper use of animations *Power Point* in operations and classes supply chain management can add value to student learning experience. Values for students are twofold: (1) as an aid to initially understand concepts and techniques as presented in the classroom and (2) as an aid to learn their own concepts and techniques".²⁶

Similar results were also conducted by Samira Sehati that, "educators should strive to develop innovative teaching strategies that enhance student learning and understanding of listening skills. If the use of technology can help achieve this goal, then it should be considered for implementation in teaching listening skills. The application of teaching The *power point* enhanced (visual input) in the listening lesson seems to be an effective way to help students understand the content of the listening text, which contributes to increased listening to students, interest in classroom activities as well as listening lessons. As a result, the application of teaching *PowerPoint* enhanced (visual input) in a listening lesson encourages full participation of students in assigned tasks and makes the classroom atmosphere more enjoyable. In addition, the analysis also shows students' positive reactions to the application of teaching *Power point* improved (visual input) in the listening lesson".²⁷

From both research results conducted by Mark D and Samira Sehati can it is concluded that the images and sounds used in the *power point* can help the students understand the content of the material from the texts being heard as well as images that can visualize improving students' understanding

and can increase student participation and motivation in the learning process.

The relation of the two research results above with the results of research conducted by researchers is the similarity in terms of the content of teaching materials that contain visual elements (pictures) and audiovisual. Because it has the same content, interactive learning materials also have the same ability to increase students' understanding of the meaning and message contained in a reading. The results can be seen in the improvement of student learning outcomes after using interactive materials.

Students easily understand the material on impressions, manuals, and props cannot be separated from the mix of elements of images (visual) and audiovisual and props.

The conclusion of all the results of the above research related to the ability of teaching materials assisted Batang Napier props in improving student learning outcomes in multiplication material contained all in interactive materials. The update of this instructional material compared to other multiplication materials lies in the way of delivering new teaching materials that are using Batang Napier props and interactive teaching materials using impressions/video. While on other teaching materials usually only use multiplication in a way Verdun and only use props table multiplication only.

VII. CONCLUSION

The result of research of the development of interactive teaching materials using multisensory learning model in multiplication material to improve student learning result of the third grade of elementary school which refers to problem formulation that is as follows.

- The development of interactive materials using multisensory learning model on multiplication materials to improve the learning outcomes of third-grade students Elementary School produces CDs, Teaching Handbook for Teachers, Student Learning Handbook and Napier Stem Viewer that can be used as teaching materials and teaching aids by teachers and third-grade elementary school
- The development of this interactive resource has passed the theoretical validation by three experts, media, material and language experts. The validation results from the three experts stated that this interactive teaching material is suitable for use in the learning process in primary school with the condition to make revisions in accordance with the advice given by the three experts before.
- The development of interactive learning materials has passed the empirical validation/trials of individual testing and small group trials to see the students' responses to the learning process of using the product. Based on the results of questionnaires individual testing showed that interactive teaching materials have received excellent response from students with 89.60% percentage. While

the results of small group questionnaire data obtained a very good response from students with the percentage of 83.80%.

- The effectiveness of the use of teaching learning materials can be seen from the learning outcomes after conducting field trials by providing pretest and posttest questions. The data obtained are $t = 12, 98$ with $df = 25$ and p -value $0,000 < 0,05$ or H_0 rejected. Thus it is concluded that there are differences in learning outcomes in learning multiplication materials between before and after using interactive materials

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