THE IMPLEMENTATION OF INTERACTIVE MULTIMEDIA IN IMPROVING MATHEMATICS LEARNING OUTCOMES

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ABSTRACT. Mathematics is a difficult subject and even becomes a phobia, more due to teaching conventionally in where the teaching and learning process emphasizes more on teacher, working on problems, memorization and speed of arithmetic, so students lack understanding of what they are learning, which in this case does not have an understanding of the concepts taught. Students tends to be lazy and have low motivation to study mathematics both classically and to study independently at home. The growth of information and communication technology in society is reflected in policies to encourage the use of ICT in education and the development of educational multimedia. Multimedia includes using text, images, animation, video and audio to prepare courses for students in various levels of education. Attendance of multimedia technology can help students learn to be more interesting and help students understanding in learning. The purpose of the study was to know whether there was any significant difference in the result between the students of class IV Manyaran 01 Elementary School towards increasing their understanding in math who taught by using the interactive multimedia and who taught by conventionally. The result of the study showed that the interactive multimedia gave an effect to the improvement of the students' understanding in mathematics.

Key words : Mathematics, Technology, Multimedia

INTRODUCTION

Mathematics is a subject matter that requires good logic and reasoning power. Mathematics is part of national education system taught at all levels of school education. School math is fundamental science required by learners to support their success in further education. Learning mathematic is aimed to establish learners' reasoning ability reflected through critical thinking, logical, systematic and able to solve problems in mathematics and other areas of daily life. This gives the sense that in the teaching of mathematics, educators should be able to associate learning with situation in everyday of learner's life.

There has been perception that math is a difficult subject, less fun and only some specific learners can master it. Such students' perception cause learning outcomes to be less satisfying. Apart from that, the reality that occurred in the field shows that an increasing learning media to support mathematics learning is not available yet adequately. This causes the learning of mathematics lesson is to be less attractive, the enthusiasm of students in taking mathematics lesson is low. Lack of use of media in mathematical learning is considered as a causal factor of unsatisfactory learning outcomes.

To create a conducive situation in the teaching learning process, the teacher can use a variety of media that can assist the effectiveness and efficiency in teaching and learning. The use of media in the teaching learning process is full needed for the achievement of learning goals optimally, that is because learning media is a means that is able to convey or distribute information effectively and efficiently in learning activities. Apart from that, learning media has the ability to provide the same stimulation, equalize experiences, and emerge the same perception (Munadi, 2008)

In the old days, the teachers have to create many means to attract the students attention to stimulate learning. They were use almost three means for description the numbers, words and pictures. In some cases not all these means were used,could be only one of these means are apropriate for the current status and the others are not. Both the students and the teachers in the classroom depend on words, pictures and numbers to merge ideas.

Nowadays, the old traditional methods and aids of teaching are not effective anymore. So using multimedia in education became a must these days to improve the teaching and learning process. Multimedia includes using text, images, animation, video and audio to prepare courses for students in various levels of education (primary school, secondary school and universities).The concept of multimedia captures these many ways video, still images, text and sound in which words, pictures and numbers can be delivered for the purpose of assigning meaning. These tools assist the learning of new knowledge much more effectively. Through providing the ability for students to use those tools in their education besides using them for entertainment or social activities, this may have positive impact on education.

Mathematics

Mathematics is the study of numbers, shapes, and patterns, a discipline that has certain characteristics, These characteristics include direct objects andindirect objects (Sumardyono,2004). Direct mathematical objects include mathematical facts, math skills, mathematical concepts, and mathematical principles, while indirect mathematical objects include the ability to think logically, the ability to solve problems, the ability to think analytically and positive attitudes toward mathematics.

Media

One of the factors that determine the success of mathematics learning is usage of learning media. Learning media is a tool or equipment to implement processes that enable educators and learners to carry out learning activities (Prasetyo:2011).

 Mediawati (2011) states that if the media brings messages or information that having aims into instructional or contain the purposes of teaching, then the media is called media learning.

According to Nurseto (2001) , in teaching learning process , learning media is needed to improve effectiveness of learning achievement goals. That is, the learning process will occur if there is communication between the recipient of the message with the source/ channel message through the media.

This is line with Ena (2001) and Sudrajat (2008) , in which Ena states that the meaning of instructional media is a tool that serves to convey the message learning, while Sudrajat states

that learning media can channel the message, can stimuli the mind, feelings, and willingness of learners so as to encourage the creation of learning processes in students.

The use of media in the teaching and learning process is very important. Some criteria in the selection of materials to achieve effective results include (1).Interesting, meaning the media used should appeal to students, (2).Motivate, meaning the media used can motivate students to read, (3) Relevant/appropriate, meaning that the media used must be relevant or in accordance with the topic discussed and in accordance with the age of students (Johana &Widayanti,2007). In addition, for the media to be used appropriately and effectively in learning can consider aspects of visible, interesting ,simple, useful, accurate, legitimate ,and structured (Mukminan & Saliman,2008)

Multimedia

The growth of information and communication technology (ICT) in society is reflected in policies to encourage the use of ICT in education and the development of educational multimedia. As the role of educational multimedia increases, it is increasingly important to have an idea of the potential it gives for teaching and learning

Multimedia is a combination of text, graphic, animation, audio, and video which are everything we can see and hear in our daily life (Vaughan,2011). Multimedia also refer to the use of computer technology tocreate,store andexperience multimedia content. There are various ways to define multimedia but the simplest well-known definition is an integration of multiple media elements (audio, video, graphics, text, animation, etc) into one synergetic and symbiotic whole that results in more benefits for the end user than any one of the media elements can provide individually (Sanjaya, 2004)

Multimedia application can be used in many areas, for example like education, business, home and public places. For educational purposes, students can explore variety of information for further understanding by using multimedia applications. Educational multimedia learning environment involves numbers of elements in order to enable learning process taking places. There are six main elements in multimedia applications for educational purposes which are text, images, audio, video, animation, and user control (Yadav,2006)

Advantages of Multimedia in Learning Process

Nwaocha (2010) studies the impact of using multimedia in teaching mathematics achieved almost the same result which is, teaching with multimedia outcome the traditional methods. Here are 20 potential outcomes to consider:

1). Grab students' attention; 2). Focus students' concentration; 3).Generate interest in class ;4). Create a sense of expectation; 5).Energize or relax students for learning exercise; 6).draw on students' imagination; 7).Improve attitudes toward content and learning; 8).Build a connection with other students and instructor; 9).Increase memory of content; 10).Increase understanding; 11).Foster creativity; 12).Stimulate the flow of ideas; 13).Foster deeper learning ; 14). Provide an opportunity for freedom of expression; 15). Serve as a vehicle for collaboration; 16). Inspire and motivate students; 17). Make learning fun; 18). Set an appropriate mood or tone; 19). Decrease anxiety and tension on scary topics; and 20). Create memorable visual images.

METHOD

The research method used in the study was experimental method, in which researchers conducted experiments and different treatments into two groups of subjects. The first experimental group was assigned by Experimental Group who is given treatment by using an interactive multimedia, while the second experimental group was assigned by Control Group, who is given treatment by using the conventional method. The learning process is carried ot as many as 10 x meetings, with a learning time 60 minutes in each.(8x treatment + 2 pre-test and post-test). The randomized pretest and posttest comparison groups are presented in Table 1.

Table 1. Randomized pretest-posttest comparison group design

Group	Pre-test	Treatment	Pos-test
Experiment	R_1	Interactive Multimedia	R_3
Control	R_2	Conventional method	R_4

Objective of the Study

Based on the observations, for the past two years in 4th grade at the target research location, the results of mathematics learning are still in below standard. The fact above shows that most students still get difficulties in understanding mathematics. There is a widespread difficulty for the students in understanding mathematics and some teachers do believe that learning media, especially in teaching mathematics fraction indeed give a lot of contribution in teaching process. And to find out the extent of the contribution of interactive multimedia in learning mathematics, this research was conducted.

Purpose of the study are to describe the use of interactive multimedia- based learning media to 4th grade students of SDN Manyaran 01 Semarang in improving mathematical learning and to explain the level of students' success in mathematics.

The focus of the study is related to the effectiveness of interactive multimedia as a medium in mathematics learning, and the problems are formulated as follows:

1. Is there any significant different between the students' understanding mathematic who are taught by using interactive media in mathematic learning.
2. What contribution can interactive multimedia give to the students' understanding of mathematics?

Research Design

The participants for the study were the elementary students of the 4th grades. There were 50 participants who take a part in the study, those were 25 students of class IV A, and 25 students of class IVB . Participants were divided into two treatment groups. Class IV A signed as the experimental group and class IVB signed as the control group. The experimental group was taught by using interaction multimedia and the control group was taught conventionally for the same materials of mathematics. Each group was assigned to do the same test, containing sections which consist of mathematics material. The topic taught was fraction. The data was carried out through interview, and test.

Pre-test was given before the experiment, and post-test was held immediately after the experiment was over. The Null hypothesis of no significant differences were constructed and tested, and then one-tailed t-test was used to compare the score of both groups and to analyze the hypothesis. The alpha level was set at .05 for the statistical tests.

FINDING AND DISCUSSION

Table 2. The Result of Pre-Test and Post-Test

	Control Group	Experimental Group
Total (Pre-Test)	1180.00	1120.00
Mean	47.20	44.80
Varian	90.6667	86.6667
Standard Deviation	9.533	9.309
Total (Post- Test)	1608.00	1872.00
Mean	64.32	74.88
Varian	47.8933	40.6933
Standard Deviation	6.921	6.379

After finishing the whole experiment for eight weeks, and getting the results for post-test scores of both group, then the data are processed. From the computation ,it was found that the mean score of the experimental group was 74.88, while the mean score of the control group was 64.32. It was also found out that the standard deviation of the mathematics scores of experimental group was 6.379 and its variance was 40.6933 while the standard deviation of the mathematics score of control group was 6.921 and its variance was 47.8933.

From the data above, it can be seen that the mean score of the experimental group was higher than the control group (74.88 > 64.32) so the standard deviation of the experimental group was also higher than the control group

Based on the findings, it can be concluded that there is any significant difference between the student's understanding of mathematics when they were taught by using the interactive multimedia-based learning media rather than taught conventionally since the results indicated that the experimental group score is higher than the control group in where the mean of experimental group was 74.88 while the mean of control group was 64.32.

Therefore it was conclude that interactive multimedia can give the contribution to the students' understanding to mathematics, since the students who taught by using interactive multimedia got higher scores than the students who taught conventionally.

CONCLUSION

Learning media is something that can be used in transmitting learning messages, it is done so that it can stimulate the attention, and thoughts of participants. The learning system does not always have to be done conventionally, but can be done in a more modern, efficient and effective way.

The uses of interactive multimedia in teaching mathematics indeed give great impacts to the students'understanding of mathematics . The experimental group showed an improvement in performance and this improvement was statistically significant since the students got better achievement in their mathematics understanding by using interactive multimedia-based learning media.

Most of students agreed that multimedia presentation is a good contributor to their creativity in performance tasks. With the presence of graphics, audio and customized templates, the students absorb the lessons in a more creative manner.Their creativity thinking skills develop as well. Result showed that multimedia learning encourage to learn more.

Throgh this study, it is expected that the teachers are always create and do learning innovations by means of learning model that is suitable with the student's condition and ability, so that they will be more motivated and have more interest in the lerning process.

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