

The Effectiveness of Interactive Multimedia in Mathematic Learning. (Utilizing Power Points for Students with Learning Disability)

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ABSTRACT

The fact shows that students with learning disability need media of learning mathematics. The purpose of this study was to (1) develop interactive learning multimedia of power point, and (2) examine the effectiveness of power point in mathematics learning. The sample was a group of students in elementary school in Ngawi, East Java, Indonesia, especially those with learning disability. This study was a research and development comprising three stages: preliminary study, product development, and testing the effectiveness of the product. The data were collected through questionnaires, interviews and tests, then analyzed by descriptive qualitative, and t-test was to analyze the effect of the product. In the development stage, the result showed that Experts validation is high as indicated by the mean score of 4.50 for the learning material, and the mean score of 4.44 for quality of the multimedia. The trial results showed that the quality of multimedia was very good as indicated by the mean score of 4.32. In term of the effectiveness of the product, the result from the t-test shows an increase of 14.27 (21.88%). This means that the interactive learning multimedia of power point improves the achievement of mathematic learning for students with learning disability in mathematics..

Keywords: Interactive multimedia, Power Point, Mathematics, Research and Development, Learning Media.

INTRODUCTION

Learning mathematics at school is considered important because in the educational curriculum, mathematics is a compulsory subject at every level of education from kindergarten through college. It is believed that mathematics is a tool for seeking solutions to the various problems in daily life. This view is in line with Hudojo (2005: 35) who said that mathematics is a tool to develop a way of thinking regarding the logical concept and structured ideas.

In practice, as a matter of fact, many students with learning disability assume that mathematics is difficult (Harwell, 2001). This makes sense because most of them have problems of abstraction in learning. Basically, as stated by Thobroni (2011), learning is the process of constructing knowledge by way of abstracting the experience as a result of interaction between students and reality; personal reality, the reality of nature, or social reality. Abstraction of experience makes these students difficult. Moreover when used in interactions within the instructional process, the media are often utilized inappropriately.

It also happened to students in SD Muhammadiyah Ngawi. This is indicated by the low scores of students' test in the 2nd half in the academic year of 2014/2015, particularly when compared with the other subjects. The mean score obtained by students in the subject of Mathematics is 7, 48. While Indonesian score is 9, 00 and IPA (Natural Sciences) is 8, 50.

Another result was found in observation in the third grade of SD Muhammadiyah Ngawi and interviews with math teachers and students. They find that there were difficulties in learning mathematics at the school related to the learning activities. In the process of learning, the students often acted as if paying full attention to the teacher's explanations, yet they found themselves hard in completing the exam questions. From interviews with students in the class, 13 out 25 students said that mathematics was not fun, and their interest in mathematics was only about fifty percent. The students' statement in the interview indicated that the learning process was only going one way. The classroom atmosphere which was quiet and full of concentration made the students uncomfortable since they just listened to the teacher's explanation. Learning media provided to students were only in the form of stickers or pictures in textbooks which, of course, were less attractive to students. Thus, the interaction between students and teachers was too little. As a result, classroom learning seemed to be monotonous and boring. Such a condition is quite alarming since elementary school is the basic level of the whole process of further education.

Based on these facts, the further study on the issue is indispensable for a teacher to help students to improve their learning achievement in mathematics. One important thing to be noted here is that mathematics should be explained in a more interactive way to make the students more interested in this lesson. However, the problem remains there, because most teachers are burdened with additional administrative tasks of the institution (school). Therefore, the researcher is highly concerned with the solution to this problem by developing interactive multimedia. Vaughan (2008: 6) states that multimedia would spur radical changes in teaching and learning. The benefits of using of multimedia are as listed in the

following points such as: (a) students who are achieving could be honed in their abilities, (b) the change of model will change the passive to become active learners accordingly, (c) the teacher's role is no more than as a guide, mentor or facilitator in the learning activities, (d) the students become the center of the learning activities (student-centered).

One of the interactive multimedia which serves a suitable solution to the problem in this study is power point. This media can contain photos, videos and music to make learning more interactive. Utilization of multi-media will give big impact on the students' spirit of learning. Simple operation of multi-media makes it easy for teachers to use during the instruction.

Many people, as a matter of fact, consider Power Point as a medium of presentation only. Yet, according to Munir (2012, 19) "If media has the elements in the form of ... navigation, simulation, game and exercise to control these elements, multi media are powerful to function as interactive Multimedia ". In this case, Power Point can contain all of these elements. Then, PowerPoint can be regarded as interactive multimedia. The focus of the problem in this research was how to produce contents of multimedia to support the needs of mathematic learning as how to make the the class interactive that the students learn and achieve better in mathematics.

RESEARCH METHOD

This research was located in SD Muhammadiyah 1 Ngawi, Ngawi, East Java Province with a sample of 90 students (30 students of the experimental class, 30 students in control class, and 30 in experiment class). The type of research that was used was a mixed method research to product development known as Research and Development (R & D). According Sugiyono (2009: 407), research and development (R & D) is a research method that is used to produce a specific product and test the effectiveness of the product.

As before doing the research, researchers conducted a preliminary study. This stage aimed to obtain information on how the process of learning mathematics was running so far in the third grade of Elementary School. The next step was conducting a needs assessment or needs analysis. This analysis included analysis of the curriculum, the characteristics of mathematics learning, student characteristics and the utilization of media of learning mathematics. On the further stage, the researchers conducted placement of the basic competencies and learning objectives developed in interactive multimedia. This was the result of discussion and consideration of the various subject teachers of Mathematics.

Next, the researchers made the design of interactive multimedia for class III in Mathematics. This phase included the design of the display material in interactive multimedia including image selection instruction, video support and training which was appropriate to the material and the purpose of this multimedia production. Before this product was applied and tested, it must first be validated by experts. The validation phase was divided into two, namely material validation and media validation. Material validation was performed by an expert of the subject matter. The goal was to get an expert assessment of materials related to

the material presented. The media validation was performed by a media expert. The objective of this phase was to get an assessment of the feasibility of media associated with the media developed. The data in this validation was obtained through a questionnaire filled out by the experts.

The last was the stage of evaluation of the data obtained from questionnaires and achievement tests that have been given in earlier stages. The evaluation results were used as a reference to see whether or not the media was eligible for use as final product. Related to the collection of data, the researcher used a test of effectiveness of the product to measure the feasibility of the media. The data obtained after the product evaluation, then, was analyzed using statistical tests (t-test) by using Ms.Excell and SPSS statistic- 23.

RESEARCH RESULTS

After going through the design and evaluation of the experts, the researchers then produce multimedia that have been planned in advance. An example of display of the media production can be seen in the following figure:

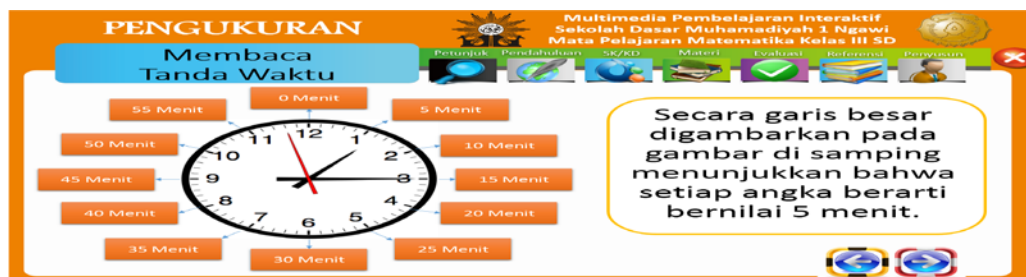


Figure 1. Learning materials (measurement of time)

In this step, the data collected by the researchers was obtained from the prerequisite test and validated the results to see the feasibility of the content or the material of media from the experts (Media and Materials). The results of the validation of the material can be described in following table.

Table 1 Results of assessment by the Content Expert

Validation of Content Expert	Total Answers					Mean	total questions
	1	2	3	4	5		
1	-	-	-	9	8	4,47	17
2	-	-	-	10	7	4,41	17
Total	-	-	-	19	15	-	-

Based on the results of a calculation validation of subject matter experts, the researcher found that the content of the material presented in PowerPoint Multimedia development was as much as 44% stated very good, and 45% were good, with an average score of 4.44 or 89%. When converted on a scale of 5, then these results were included in the category of "Very Good". Thus, it can be

concluded that the content of the material in the products developed were feasible for use as a Multimedia PowerPoint in mathematics.

Furthermore, the validation results by the media experts can be described as in following table.

Table 2 Mean Score Rated by Media Expert

Aspect Rating	Mean Score
Display	4,44
Presentation	4,56
Mean Total	4,50

Based on the result of the validation results by media experts, the researcher concluded that the presentation of the products developed was feasible for use with revisions in several parts:

- (a) Media expert I: support the product by sound though only slowly and by the icon to turn on or turn off the music, and give a different color on the hyperlink.
- (b) Media expert II: add backsound so this product does not seem boring and multiply examples of products.

Overall, based on the data that has been collected and analyzed, it can be concluded that the Multimedia PowerPoint meets the eligibility criteria to be tested in the field. Before testing, the researcher conducted a test for normality to the experimental group and the control group with the provision that if the significance value greater than 0.05, this data can be regarded as normal distribution. Based on the results obtained, it was concluded that the sample had a normal distribution for both groups for a significant level of more than 0.05, (0, 166 and 0.121).

Other prerequisite test conducted was the test of homogeneity. This test has provisions similar to normality test. Based on the results, significant value of the control and experimental class homogeneity test was 0.634, more than 0.05. Thus, it can be stated that both the data was homogeneous.

After going through the stages of the prerequisite test only then field tests can be performed. After the field test, all the data obtained were analyzed using T test with the following results:

Table 3 Independent Sample t-test

	T	df	Sig. (2-tailed)
Pre-Test	22.76	29	.000
Post-Test	59		

Based on the data, it can be seen that $|t| = 22,76$ while the t table with $df = 29 = 1,699$, hence, it can be concluded that the results were to prove that H_0 was rejected. Thus, it could be said that there was a significant difference between the

learning outcomes before and after using the interactive media, With the average increase in value of 12, 27 or 21, 88%.

DISCUSSION

The process of product development, in this research, in the form of multimedia learning program in Mathematics, was developed through several stages of development. The stages included: requirements analysis stage, the stage of product design, product development stage, the stage of implementation and evaluation stages

The Multimedia product was developed based on the needs analysis that was described before. The manufacturing process was to gather materials and resources that were relevant to support the development of the multimedia. The element which was contained in this phase included the preparation of materials, basic competence, and the design of instructional media.

The next stage of development carried out was the process of validation of the product. Validation of this existing products included material validation and validation of media. Validator selected to provide an assessment of the product are experts who have academic and professional competence in the field. This is done to obtain a comprehensive input to the feasibility of the media.

After receiving the recommendations of experts, then, Multimedia developed validated by the students through three stages: 1) Validation of individual, 2) Validation of limited groups of sample, and 3) Validation of larger groups of sample or operational field validation.

Based on the results of field validation, it is known that the Multimedia developed by the researcher can be used as a source of effective and efficient independent learning. It can be seen from the assessment indicators related to the quality of the material done by media experts, subject matter experts and students, each of which can be concluded that the Multimedia was developed very well.

Revisions which were given regarding the validation of this products were not so many. In fact, students felt more excited and interested in learning using the media and from various other aspects as well, the product is excellent. Display and letters which were presented in the media seems to be very clear and does not confuse the user. Therefore, this media was considered ready to be implemented into experimental class and used in learning mathematics.

Implementation was done to the students, accompanied by class guardian and the researcher and the implementation was done in class 3 Muadz (experimental class) with the number of students as many as 30 children. Meanwhile in the control class (class 3 Salman) the treatment given was using the instructional media commonly used every day (blackboard and books).

In the evaluation phase, after testing the effectiveness, it was known that the value of pretest and posttest in the experimental class was higher than the control class. This means that learning with multimedia interactive learning have a more effective impact in improving student achievement compared to conventional

media like blackboard and books. It was shown from the calculation of the mean scores between pretest and posttest, the experimental class obtained a gain of 12, 74 or 21, 88%. These results are in accordance with the opinion of Vaughan (2008: 6) which states that the Multimedia will spur radical changes in teaching and learning.

What is meant by radical change is change for the better which can be seen in any significant change in student performance. It is also in accordance a study conducted by Susskind (2004) with the title of Interactive Media and attitude nt's Power in the classroom: enhancing students' soft efficacy, with the results showing that students who were taught using the Interactive Media has the level of efficiency of learning tall one.

Furthermore, if we are talking about products that are developed, we will touch the sphere about the advantages and disadvantages. In the context of this product, there are several advantages: First, this product can accommodate the learning styles of students both visual and auditory (McMillan, & Schumacher, 2010). In addition, this product may contain materials that varied so as to allow students with learning disability to choose their own material to be studied depending on their types of learning (Meynert, 2014). Learning by using various media may be repeated in accordance with the will of the students' intersts. These products include exercises, inquiries, and making feedback that can visualize their abstract information particularly when the students work in groups for discussion (Gunarhadi,et.al., 2013). Hence, this product is suitable for independent study for students to challenge their will to learn.

The advantages mentioned are in conformity with the idea by Bartsch & Cobber (2003), who declare that there are benefits of learning media. Learning can be more attractive and interactive and can integrate visual and auditory learning to make comprehensive understanding of an object that they learn (Ormrod, 2011). Secondly, the length of time required in learning `can be shortened, and learning can be given anytime and anywhere in accordance with the wishes and needs. This means teachers do not necessarily explain every details of the materials to make the students get the knowledge. By emphasizing various advantages of media, henceforth, media will enhance a big opportunity to develop the students' motivation to become better (Ormrod, 2011). Similar programs are also very likely to be developed for secondary schools like junior high schools, or high schools where students particularly those with perceptual problems that often experienced by students with learning disability.

However, this program has some limitations such as: (1) presentation of the material that had not been able to fully review the material measurement, (2) pictures that are not using real measurements but uses other images contained on the internet so that the value of experience in learning was reduced, 3) limited product eligibility provision only from media experts and subject matter experts, no comparison with other products. To provide learning media, therefore, teachers should be alert of the characteristics of the users in adjusting the design of the media.

CONCLUSION

Based on the research and development of products that have been described previously, the researchers draw the following conclusion:

- a. The process of learning mathematics in SD Muhammadiyah Ngawi especially in the third grade is fully using the media and existing facilities. Teachers still explain the material only by using the lecturing method so that children do not get excited and bored in learning which resulted in lower math scores.
- b. SD Muhammadiyah Ngawi still desperately needs other interactive media to help teachers and students in learning. Because interactive media are proved to be useful in constructing better understanding of the material and raise students' achievement.
- c. The developed multimedia has met the requirements of the learning and the media aspect after the validation process from subject matter experts and media experts, On the basis of the results showing the average score of 4, 44 (subject matter experts) and the mean score of 4, 50 (media expert). In addition, this learning multimedia gained good responses from respondents from the target elementary school students with average scores on the material aspects and display aspects of 4, 32 each.
- d. The Learning Multimedia is effective for use in the learning *process*. This is proved by the results of a comparative analysis. In the test with the acquisition of posttest mean score of the experimental class was 77.94; higher than the control class (73.94) which did not use the media Multimedia learning.
 - e. This product was able to increase students' score as much as 12.74 points or 21.88%. Hence, it can be concluded that this Multimedia has an effective impact in improving student achievement.

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