

The Effect of “*jarimatika*” Multimedia in Counting Ability of Children

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Abstract

This study aims to improve the ability to study mathematic in children that will ultimately affect the child's motivation and final score. The development of this method will also facilitate the teachers, the parents and their children to understand the things that exist around them. The main target of learning media is to improve counting number of children.

The paper based on an mix method research that conducted by embedded experiment design (John. W. Craswell, 2010). Techniques and data collection data using pretest and posttest. Quantitative reseacrh data analysis is using t test analysis techniques. This study also observe of implementation stage of learning it uses the “*Jarimatika*” learning media based on the multimedia.

The subjects of the study were primary school students in second grade, between the ages of 5-8 years with a total of 40 children. To analyst data this study using SPSS 21.0 conducted by pre-test and post-test design. Techniques and data collection data using achievement tests, research data analysis was using t test analysis techniques. In the result of paried-sample t test showed that children had counting ability significantly high in post test than pre test, $t(36)=-8.400$, $p < .001$. The data showed post test ($M=76.487$, $SD=15.673$) and pre test ($M=48.513$, $SD=12,409$). In the differensial Gender indicated that there were no significant different between boys and girls of testing both Pre test ($t(35)=-138$, $p=.891$) and Post test ($t(34.062)=-1.534$, $p=.134$). It was mean that between boys and girls there was simmilarity of counting ability and how to improve their knowledge.

Keywords: jarimatika, Multimedia, motivation, Learning

1. Introduction

Development of science is developept in the last time, it should be balanced with the ability to master technology so that the professionalism of educators can be tailored to the needs and dynamics of science itself. Especially for teachers of elementary school level , in addition to the mastery of teaching techniques , produce scholarly works , and it is important to master the technology in supporting learning process as one of the important skills that must be owned by the teachers in the future .

The main purpose of National Education in Indonesia is the nation's intellectual life . In particular , this means improving Human Resources . What is the situation of education in Indonesia today ? Eight years ago , i.e. in 1993 , the National Education Advisory Board consisting of educational experts , told the legislative council that based on the study of some universities and individuals , the quality of education in Indonesia was decreasing , especially in terms of attitude formation and behavior of students (Suara Pembaharuan , December 15, 1993) .

Accroding by the Indonesian Law(2003) on the national education system , which generally states that the meaning of teaching staff is anyone who is in charge of running the role and teaching , assessing learning outcomes , research, community service and education both as a teacher , lecturer , counselor , teaching staf, instructor , tutor , coach , widyaiswara, officials learned , facilitator or whatever it is called which has the same principle and not distinguishable from one another . Professionalism emphasizes the mastery of science or management capabilities along with its implementation strategy . Maister (1997) stated that professionalism is not just a technology and management knowledge , but rather an attitude. professional development is more than a technician , not only have the skill, but also has a required behavior .

Computer technology was developed in the early 1950s (Heinich , et al . , 1996) , and since then the computer has contributed much tremendous benefits to people's lives . The largest contribution in the field of education has been felt since long , though the use of computers in schools is still limited to word processing or by calculation work sheet.

The use of computer software for learning activities is actually quite limited (Fey and Heid , 1984: 21) , and the potential of computer technology as a medium of learning mathematics is so enormous (Fletcher , 1983: 1) . Lots of real contribution from computer dedicated to the development of education , particularly the teaching of mathematics . Computers can be used to address individual differences in students ; teach the concepts ; perform calculations and stimulate student learning (Glass , 1984: 11) .

Computer has advantages which are not possessed by other media. For example, the computer can provide

services in repetitive , featuring visualization in an attractive format and design , animated images and good sounds, and serves individual differences . A computer with good software design can visualize repeated presentations and dynamic characteristics that are not found in other media (Wilson , 1988) .

Education is one very important part in the life of the Indonesian people . With education from primary level to higher education has resulted in many educated workers who are ready to participate in the development of both current technology , political , economic and socio-cultural . But in reality there are many graduates who have not been able to work in areas of education , although the graduates have earned his bachelor degree . In one study , it is stated that human productivity in Indonesia is so low. This is because less confident , less competitive , less creative and difficult initiatives of its own course , it is caused by the top-down education system , and is not nurturing innovation and creativity (N Idrus CIRD 1999).

Indonesian traditional education in the school system that has been implemented in the classroom has lasted hundreds or even thousands of years which is usually delivered by teachers in delivering the subject matter by taking material from reference books that have been used previously (text book) which will be heard by the disciples then continued with the activities noted that the subject matter was submitted . However, with the increasing complexity of human life , the development of technology added with intense competition between human resources leads to the increasing demand for Indonesian people who must have high competitiveness to get a better life . At this time, many researchs have been done that show the new system of learning activity that is active learning which provides many opportunities for students to be able to absorb more the subject matter , remember and understand longer and the most important is to the learning activities itself rather than traditional learning . Fink suggests that students must do more than just listen , active learning system.

Educational development occurs in all countries as well as in Indonesia. The development of education in Indonesia is indicated by the development of educational curriculum, ranging from curriculum 1994 Competency Based Curriculum and the Education Unit Level Curriculum. In 2007-2008 school year , Indonesia is using Education Unit Level Curriculum which leads to more independence of any educational institution or school to manage learning in the classroom . it is mandated by Act No. 20 of 2003 and Government Regulation of the Republic of Indonesia Number 19 of 2005 . This requires a teacher to be creative in delivering both concerning the subject matter of emotional intelligence , such as linguistic and mathematical logic

Mathematics is one of the science branch which is very important for any country. this is agreed by Mornis Kline (1961) that the rise and fall of a nation today depends on the progress in the field of mathematics . Slamet also argued that the mathematical function can be an endurance Indonesia in the 20th century on the highway of the nations cited by Lisnawati in mathematics teaching methods (1993:25) . The importance of mathematics to the progress of the nation require students and pupils can deepen their knowledge of mathematics and can apply in everyday life .

Mathematics by the majority of students are still considered a scourge , a dull subject , filled with symbols, formulas are difficult and very confusing (Masykur and Fathani,2008) . Pranoto one observer of mathematics education and mathematics ITB lecturer , said , " less varied than the existing patterns of teaching , students' fear on mathematics teaching pattern is also caused by the teacher , who sees his students that is so much asking as being brash and does not adhere to the pattern teaching teachers " (Wirasto,1987)

Based on the explanation above it can be concluded that the role of instructor or teacher is very strategic in the teaching of mathematics , to make students interest in learning mathematics. Furthermore, the teacher is also required to be more creative in delivering mathematics and reduce the perception of students about the nature of mathematics as an abstract object .

Elementary students will be easier to remember and understand the mathematics learning if he is happy to do so and accompanied by concrete experiences that exist in everyday life . It is similar with what delivered by Zoltan P. Diene effendi (1980:135) says all abstractions based on the situation and concrete experience , Multiple Embodiment Principal is a principle in which when applied by teachers for each concept being taught will enhance students' appreciation of the concept . If an elementary school student involved in the learning the students will feel happy , not bored and spirit will increase in student learning . Through this game in the form of instructional media, students are encouraged to work directly in learning process and unwittingly been able to apply learning concepts in mathematics .

Based on what has been described above, it takes an innovation that can enhance elementary students' interest and achievement in mathematics. The one of the way that can be done is using learning media trough jarimatika game by utilizing a junk so that the child will understand more about Jarimatika material . through the game, children will be easy to remember and understand what they have done . The game will also educate children to be active in learning . The learning media can also support the program in achieving its purpose that is Education Unit Level Curriculum .

At the stage of field observations in primary school , which is based on sampling the data obtained student scores from year to year for Mathematics showed an increase in value - average grade for the period 2006 to 2010 was only 35 % each year. For that reason, created a new method in the new process of learning multimedia

technologies by using Jarimatika method but presented in the form of an interactive CD so that students in calculating arimatika only accompanied by computer, so students can quickly and accurately perform a variety of activities to improve numeracy skills with an interactive compact disk. Evaluation process and numeracy test at the end of this learning is also performed in this system. By utilizing this learning software writer designed a game form Jarimatika interactive, fun and will make students become interested in studying math and trying to improve the numeracy ability.

2. Literature Review

2.1 *Multimedia-enabled learning*

To make a popular and efficient multimedia system, the general principle for user interface design should be examined (Mayhew, 1992; Smith & Mosier, 1986). Additionally understanding the way of how people thinking, learning and realizing is also one important factor in designing userfriendly interface for multimedia systems (Najjar, 1997). Mayhew (1992) and Smith and Mosier (1986) proposed that interface design considerations could be grouped under psychology, computer science, graphical design and curriculum design. Whereas Najjar (2001) suggested the focus should be on improving students learning experiences, while constructing the multimedia system. Clark and Mayer (2003) combined those cognitive learning theory and proposed the following principles: Multimedia, presentations using images and verbal expression simultaneously are clearer than just verbal expression is selected. According to cognitive theory and results from experiments, information consisting of images and verbal data (oral or written data or both) can produce better learning performances. Presentations using multimedia can encourage students to establish linkage between words and graphics, resulting students with stronger willingness to learn. Second is Formation: the addition of oral explanation with text presentation improves the learner experiences. However, overloading with visual material should be avoided. When reading text students tend to concentrate on complicated words rather than the whole information. Audio delivery ensures sequential rate of information processing is maintained. This is essential when the quantity of information is large.

2.2 *Media*

Media is derived from the Latin which is the plural of "medium" which literally means "Intermediary" or "Introduction" is an intermediary or introductory message source to the recipient. Some experts provide a definition of instructional media. Schramm (1977) suggested that learning media is the messenger of technology that can be used for learning purposes. Meanwhile, Briggs (1977) argues that learning media is physical media to deliver content / learning materials such as books, movies, videos and many more. While, the National Education Association (1969) revealed that learning media is communication media in print and audio-visual, including technology hardware. From the three above opinions, it can be concluded that the instructional media is anything that can be channeled messages, can stimulate the mind, feelings, and the willingness of students so as to encourage the creation of learning process in self-learners. Brown (1973) revealed that instructional media are used in learning activities can affect the effectiveness of learning. At first, the media only serves as a learning tool used by teachers to teach which was visual aids. Around mid century, to 20 for utilization of visual features with the use of audio equipment, there was the audio visual aids. In line with the development of science and technology, particularly in the fields of education, current use of assistive devices or media become increasingly widespread learning and interactive, such as the computer and internet. Learning Media has several functions, including:

1. Learning media can overcome the limitations of experience possessed by the learners. Experience of each learner is different, depending on the factors that determine the child's wealth of experience, such as the availability of books, encircling opportunities, and so on. Learning media can overcome these differences. If learners may not be brought to the immediate object being studied, the object is brought to learners then. Objects referred to in the form of a real, miniature, models, and images that can be presented in audio visual and aural.
2. Learning media can transcend the limitation of the classroom. Many things may not be experienced directly in the classroom by the students of an object, because the object is too big or too small, the object is moving too slow or too fast moving, objects that are too complex, object sounds too smooth, and objects containing dangerous and high risk. Through the use of appropriate media, then all objects can be presented to students.
3. Instructional media allows for direct interaction between the learner and his environment.
4. Media produces uniformity observations
5. Media implants the basic concepts correct, concrete, and realistic.
6. Media arouse new desires and interests.
7. Media awaken and stimulate the child's motivation to learn.
8. The media gives the integral experience or thorough the concrete to the abstract.

2.3 Computer

A computer is a general purpose device that can be programmed to carry out a finite set of arithmetic or logical operations. Since a sequence of operations can be readily changed, the computer can solve more than one kind of problem. Computers can be used to address individual differences in students; teach concepts; perform calculations and stimulate student learning (Glass, 1984: 11). Computers are increasingly being incorporated into school curriculums. Teachers present processes and concepts using programs such as Powerpoint, and students can utilize visual models and word processor to enhance their learning experience. Are Computers Effective at instructing students to retain information better? Some studies show a dramatic increase in performance while others show that computer has small to moderate-sized positive effects on achievement (Avrim, 2000). From research, it can be concluded that computer is best used when it is in addition to the instruction of a teacher and not when it replaces the teacher. The exact implications of computers in the classroom are unclear, but one thing that is apparent is that the outlook of computers in education is promising.

2.4 Arithmetic

Arithmetic is an ability to calculate arithmetic operations such as addition, subtraction, multiplication and division quickly without the help of a calculator even for numbers whose value is quite large. While the clever finger arithmetic is practical theory quickly learn to count by twisting fingers of the two hands. Smart Fingers Arithmetic capabilities such as Add, Multiply, Subtract, For fraction, Circumference, Area, Volume, rank, roots Rank, Prima Factor. There are several advantages of Smart Finger Arithmetic, the memory of which is not to overload the brain, does not change the basic mathematical methods, using a mathematical formula that is standard, Moving counting from the brain to the fingers, has a curriculum that relevant with the Education Unit Level Curriculum Mathematics in primary school which can apply mathematics hands and fingers to play while learning.

2.5 Jarimatika

There are several advantages of Smart Finger Arithmetic, ie which are not burdening the memory of the brain, does not change the basic mathematical methods, using a mathematical formula that is standard, Moving counting from the brain to the fingers, Having relevant with Indonesian curriculum elementary mathematics, to apply mathematical hands and fingers to play while learning refers to. The combination of jarimatika and multimedia system would like improve children motivation for learning.

2.6 Gender

The concern over the shortage of highly qualified scientists, especially girls scientists, has highlighted the need for science education for children (Jarvis & Pell, 2002). The belief is that if children develop positive attitudes toward science and enjoy learning science during the school. Research on gender and attitudes toward science, however is mixed. Some research have shown girls attitudes toward science are significantly less positive than boys (Hendley, Stables, & Stables 1996).

3. Purpose the study and Reserach Question

The purpose of this study was to examine the effect of jarimatika Multimedia to counting acquisition of final score using jarimatika Multimedia software that developed by macromedia flash built for second grade in primary school. A previous study investigated how students with different ability levels performed in this multimedia environment (Liu, 2004). This sample of this study from second grade primary school. In addition examination any change in students attitudes and mathematic knowledge from pretest and posttest. There are two questions guided this study:

1. What is the effect of jarimatika multimedia learning on second grade of primary school final score mathematic?
2. Are there any differences in final score mathematic learning between boys and girls children after using the program?

4. Research Method

- a. Participant and Setting, There are 40 students from one primary school students and two teachers in Semarang Indonesia participated in the study. All participants were from formal education classes and 25 boys, 15 girls. Two teachers from the same primary school and they had experiences teaching 5-6 years.
- b. Design and Product, The design of this research was mix method research using embedded experiment design (One Phase), (Jown. W. Creswell, 2010). Figure 1 showed that there was two step of quantitative data finding. It was pre test and post test design. Observation qualitative data finding conducted by intervention step before build pretest to get result of experiment design. In experiment method during learning in the classroom and it was conducted by implementing the class act of the study consisted of two cycles, and the cycle there are activities including Planning, Implementation / execution of the action (acting), Observation (observing), and Reflection (reflecting).
- c. Product, The product of this study was jarimatika multimedia that design by macromedia flash MX

based on requirement study in the classroom. In planning steps describing about how to make a plan before develop product. The figure 2 and 3 showed design layout of this product (jarimatika Multimedia)

d. Measurement, The 10 items multiple choice questions and 6 items explanation questions examined in pre test for investigating students counting ability after conventional learning in the classroom that conducted by teacher without media learning . The next step was examined counting ability using jarimatika multimedia, There was 10 items online test as one of contents in jarimatika multimedia learning and students can saw their score directly.

5. Result

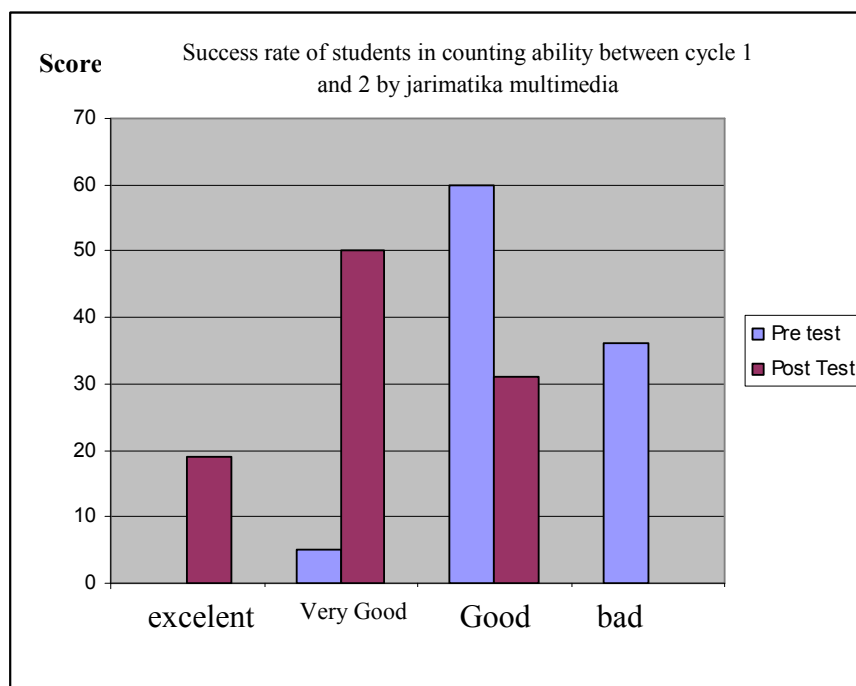
5.1 Descriptive Data, The result of the data analyst using SPSS 17.0 showed that both of boys and girls had Standard Deviation for pre test 14.409 and Mean 50.514, for post test Mean 78.514 and SD 17.673. The Table 1 showed the detail of result.

5.2 Counting Ability, The result of paired samples t test using SPSS 17.0 showed that children had counting ability significantly high in post test than pre test, $t(40)=-8.400$, $p < .001$. The data showed post test ($M=78.487$, $SD=17.673$) and pre test ($M=50.513$, $SD=14.409$).

5.3 Gender, The result indicated that there were no significant different between boys and girls both Pre test ($t(35)=-1.38$, $p=.891$) and Post test ($t(34.062)=-1.534$, $p=.134$). It was mean that between boys and girls there was similarity of counting ability and how to improve their counting ability.

Table 1. Means and Standard Deviations in preliminary for the pre test and post test :

Variable	Group	N	Mean	SD
Pre test	B	25	50.25	14.698
	G	15	50.824	14.441
	T	40	50.514	14.409
Post test	B	25	73	17.501
	G	15	80.588	12.485
	T	40	78.514	17.673



Graph 1 : Graph of success rate of students in counting ability between cycle 1 and 2 by jarimatika multimedia

This study also observe how to improve and provide great motivation in primary school students, especially the second grade that can not count well, this is a continuation of activities as early as possible students equipped with the activities of information technology-based, using computer media and interactive CDs, involving classroom teachers and students as mentors and assist students in learning the steps to run this. Based on these considerations can be formulated the problems, how do we improve elementary school students' interest and accelerate the process of mastering each letter and word, and answered the question of whether the research

activities and the learning of the students learning participants can quickly master how to read and intelligently know the colors that will be presented in this study, the process of how the motivation and desire of children to read, as well as follow-up research and learning to apply it on the capabilities and intelligence of children. The Graph 1 described that there was significantly increase of mathematic learning score categories between cycle 1 using konvensional learning method and cycle 2 using jarimatika multimedia learning.



Figure 1 : Design layout of jarimatika Multimedia



Figure 2 : The main design of jarimatika multimedia

6 Discussion

The results of the study showed that the children had significantly increased their counting ability final score from pretest and posttest. The teachers was also increased their performance, how to taught good learning using jarimatika multimedia, that results showed in quantitative data by action research in the classroom and action plan that maked by teachers. There was no gender difference in the pre test and post test score. Both boys and girls increased their counting ability final score. Such results are in line with the findings research (Whitehead, 1996). It also confirmed the findings of a previous study that examined the same multimedia learning and found no gender differences.

Students to the material absorption in Indonesian subjects first semester second Grade can be improved. It is characterized by good lesson plan that made by teacher, the student's ability to absorb the learning materials both conventional and multimedia based on the second cycle has increased significantly, so expect this learning model always can be applied by teacher at each lesson. Students learning outcomes in the Indonesian subjects first semester first grade can be improved., Particularly on the subject of improving the understanding and interest in mathematic for students that is characterized by an increased value of the average cycle 1 and cycle 2. The average results of the study on the second cycle and 76 percentages categorized as good and the number of students who responded to this study is viewed as the optimal value that can be achieved by the students. Students in difference gender had the same ability for counting, it based on the result of data analyst in gender area. There was no significantly diffrence final score counting ability between boys and girls. Both of them got increasing score before using jarimatika multimedia learning in post test.

7 Recommendation

To increase interest, the ability to self-learning and foster self-confidence of students in counting, it is recommended a few things, Multimedia-based interactive learning activities need to be implemented as a variation in the applied learning models, Students and teachers need to be done the update process of science, especially relating to the use of information technology.

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