



## ELECTRONIC GAMES IMPROVE THE STUDENT RESPONSE IN MATHEMATICAL LEARNING

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### Abstract

The problem in this research is that the students are not motivated in learning mathematic in the extra class tutorial. This is due to the fact the teaching and learning system are similar to the formal classroom instruction. The aim of this research is to create a joyful learning environment through a competitive and cooperative activities by using mathematics games. The researchers will use electronic games in learning math for fourth grade elementary school students. Math game in electronic form is a new thing for the students so that they can increase their motivation in learning. This research was carried out on Edu-Fun, educational institution in Jambi. The purpose of this research was formulated as follows: 1) Improve learning process more interesting, 2) Motivates students in following activities in pursuit of study in educational institutions of Edu-Fun, 3) create an atmosphere of learning math fun, 4) train students to compete for sportsmanship, and, 4) increase the ability of students of the class IV elementary school in understanding the basic concept of integer arithmetic operations. This research employed Classroom Action Research (CAR) and was divided into three cycles. Every cycle consists of planning, implementation, observation, and reflection. The instrument used is observation and video recording of learning activities. The qualitative data analyzed by employing the Miles and Hubberman (1994). The result showed that 1) the use of games in learning mathematics created a fun and interestingly learning, 2) grouping students randomly based on academic ability to effectively train students mutually learn and work together to get better grades, 3) competition in learning activities trained students to be sportive, learning to posed ideas, and confident to answer teacher's questions, 4) students response in learning activities affects students achievement, 5) the cognitive, affective and physicomotoric achievement based on students response, the classroom teaching process, competitive character, and students active involvement in learning activities

**Key Words:** *Math games, competition and cooperation, joyful learning*

### INTRODUCTION

Tutoring is an institution that aims to help students who have difficulty in learning. However the implementation of tutoring in the afternoon after coming home from school into one of the constraints is less effective as learning activities. This is because the physical condition of the students who are tired and no longer primed to follow the activities of the guidance.

The learning process at the current tutoring is not much different with the learning process in schools, so that students do not have a good motivation to follow additional tutoring lessons. Related to this problem, teacher have to design learning strategies that can create an atmosphere of learning more fun and challenging students to think. The different learning atmosphere will interest students so that the purpose of tutoring can be achieved.

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The researcher will use electronic games to resolve the problems in learning math for fourth grade elementary school students. Mathematics game in electronic form is a new thing for the students so that they can increase their motivation in learning. This research was carried out on Edu-Fun, educational institution in Jambi.

**A. Research Questions**

How does the process of learning math in fourth grade elementary school with using electronic math games can improve student learning activity in response?

**B. Research Objectives**

The purpose of this research was formulated as follows:

- 1) Improve learning process more interesting
- 2) Motivates students in following activities in pursuit of study in educational institutions of Edu-Fun
- 3) Create an atmosphere of learning math fun
- 4) Train students compete for sportsmanship, and
- 5) Increase the ability of students of the class IV elementary school in understanding the basic concept of integer arithmetic operations

**Theoretical Background**

***The theory of learning in children***

According to Nicholls (2005: 38), children learn through personal experience that they experience every day. Children cannot learn in an isolated environment. Experiential learning in children affected by interactions with other children, interacting with teachers, and interactions with the environment. According to Skinner (Nicholls, 2005: 39), that the lessons and tests that do not to know what students don't know and what material they can't, but more than that the role of the teacher is to help students understand the concept of what they learn.

There are several stages of child development that must be known in order for learning given appropriate and meaningful. According to Piaget (Nicholls, 2005: 40), there are three periods of cognitive development of children: (1) the knowledge of the newborn child of the motor until the age of 18 months, (2) the stage of concrete operations from age 18 months to children from 11 or 12 years old, at this stage the child can think logically, (3) the formal operations stage from the age of 12 to 15 years old, elementary school students are at the stage of concrete operations. At this stage the child already has the ability to sort objects based on size, shape, and other properties.

***The Process Of Learning Mathematics***

The ability of each child is different in their store and process the information they receive. According to Anghileri (2006: 18-24) there are 3 human information processing system that directly affect in introducing mathematics to children such as the following:

- 1) Learning by induction, is the main thing about human learning process which strongly influenced the approach to learning in children that dominates in the process of identifying the range of their experience
- 2) Limited working memory capacity that the capacity of the human brain in storing information is extremely limited

- 3) Developing ' meta-cognitive ', apart from two things above that are not less important in the learning process is to develop knowledge of Metacognition that humans not only learned but learning how to learn.

To support the ability of children in remembering the use of media is needed. According to Schneider and Presley (Santrock 2001: 318) that the child of primary school can use the imagination to remember pictures better than they remember verbal material. So the use of audio visual media will greatly assist in providing an understanding of matter in children.

The above components greatly affect the success of teachers in learning math to students. The Learning Model used must be adapted to the characteristics of the students and the characteristics of the field of study that will be presented. The Model is very instrumental in learning.

According to Kilpatrick and Swafford (2002: 9) proficiency in math had five strands:

- 1) *Understanding*: understanding the mathematical concepts, operations, and knowledge linking mathematical symbols, diagrams, and understanding
- 2) *Computing*: do mathematical procedures like addition, subtraction, multiplication, and Division, accurate, efficient and precise.
- 3) *Applying*: able to solve of math problems and determine strategies to solve those problems by using the right concepts and procedures.
- 4) *The Reasoning*: using logic to explain the truth and seek solutions for the problem or find out what is already known or unknown in advance.
- 5) *Engaging*: looked at math with wise, it is true, useful and workable.

### ***Learning Theory To Use Multimedia and Games In Learning Mathematics***

Based on the book karso (2009: 13), according to Dienes theory, through the games, children began to observe patterns and regularity in the mathematical concept. They will pay close attention to any particular rules that exist in a given concept.

According to Gagne theory, in learning mathematics there are two direct objects, i.e. objects studied mathematics and indirect objects of learning math. Direct object includes facts, operations, concepts, and principles. While the direct object does not include the ability to investigate, resolve, self-discipline, be positive, and know how to properly learn.

Gagne has been determine and differentiate learning , there are eight sequences based on the difficulty level from simple to complex, : 1) learned cues, learned something as a result of accidental stimulus, 2) stimulus-response learning, learning that the physical response was deliberate, 3) series of motion, learning in the form of a series of ordered motion of two or more activities of stimulus response, 4) series of verbal, learning which is the Act of verbally ordered two or more activities of stimulus response 5) learn to distinguish, separate series of varied learning, 6) learning to know, learning concepts, or view the properties of an object or event, 7) learn the rules, learn provides a response to all the stimulation with all sorts of deeds, 8) problem solving, this is the type of learning the most high.

Theories of learning that the author outlines above in principle has the same meaning that learning math is learning concepts that should be instilled in students. Mathematics is a system of organized and ordered that the material that one is a prerequisite to study the matter further. Learning mathematics with children must also be contextual, i.e., by linking learning with activities of everyday life, making math easier to understand. Students are able to grasp the concept that it can improve its ability in problem solving and improve their reasoning in analyzing a problem.



According to Kenney (2005: 2), there are four basic actions that can be done to improve students' ability in problem solving and reasoning, namely: 1) Modelling and Formulating, making representation and mathematical problem connecting with real life, 2) Transforming and Manipulating, distorting the original mathematical problem that is so will be obtained the appropriate troubleshooting, 3) Inferring, applying the results obtained with the actual math problems, interpret and explain the results obtained according to the existing problems, 4) Communicating, reporting the results of what is learned.

The fourth step can be done with students and teachers to solve the existing problems. If these four steps is traversed in the learning process and students will have the skills in math. The fourth step was prudent because Kenney is the flow of human thought processes are carried out systematically and interconnected to each other.

Sometimes the students know how doing math, but they did not understand what the meaning of the math problem asked. So teachers are obligated to give understanding to the students how to interpret mathematical language, so it is easy to understand.

### ***Learning Media Used***

Based on the above, researchers used the media in this research, such as electronic math games that shaped the Macromedia flash. Media obtained by download over the internet, and also using edu-games, which can be obtained by purchasing it at the bookstore. The author uses the media existing math game with consideration of cost, time and skills that the researcher has. Because to make media based computerized game takes a long time and the cost is great. So it is not effectively and efficiently.

The math game Media that the researcher uses to create an atmosphere of learning math is competitive but still fun. In accordance with the characteristics of elementary school children are more motivated to learn when learning is packed in the form of the game. Based on learning theory Dienes, elementary school children would be easier to understand certain material if it is done with the game.

Through the use of media in this game children will learn to follow the rules, think quickly and precisely, and compete to get the best value with fixed learning ambience pleasing to them, as is done with the game. Though this math game will teach kids to work together with his friends, the more value the opinions of others and learning to wait its turn.

## **METHODS**

### **Methods Of Data Collection And Data Analysis**

This research employed classroom action research and was divided into three cycles. Every cycle consists of planning, implementation, observation, and reflection. Classroom action research was conducted in educational institutions Edu-Fun Learning Centre for the subjects of math. The subject of this research is the participant's guidance of fourth grade primary school. Election of the grade, fourth elementary schools because at the level of this class the students will need to instill the concept of operations to calculate the correct number.

Data collection methods in this classroom action research according to Koshy (2005: 87 and 103) is 1) Questionnaire, 2) interview, 3) Notes document filed, 4) observation, and 5) video recording. The fifth method will writers do to acquire accurate data during the process of research is carried out. There are three types of instruments that will be made to collect data, namely: 1) observational

learning process sheet 2) question form about the interest and motivation of students, 3) test results of student learning

Classroom Action Research is one of the qualitative research approach. Qualitative data analysis technique that is commonly used is according to Miles and Hubberman (1994: 24). Data collected in the form of sentences are analyzed through the stages of reduction of data, data presentation, conclusion and data verification.

### Data Interpretation

Interpretation of the data is the process of understanding the meaning of a set of data that has been presented, in forms that do not just see what Express, but rather on understanding or interpretation of what is implied in the data that has been presented. According to Mills (2003: 113-115) to interpret the results of data analysis can be done in the following way: 1) extend the analysis, 2) linking the findings with personal experience, 3) asked the opinion of my colleagues or supervising lecturers, 4) connects with literature, and analysis 5) back to the relevant theory

## RESULT AND DISCUSSION

### Results And Discussion The First Cycle

Learning activities in the first cycle was held four time meeting with the time duration during the sixty (60) minutes for each meeting. Based on the results of observation on table 1 data obtained from eleven (11) students, four (4) students that Ez, My, No Rf and shows very good response, and seven (7) other students of Rb, Ra, Ro, Ri, Al, Jo, and V. Show good responses. On this first cycle teacher used electronic games. The use of this media influence the response of students in learning activities. The use of electronic media to make learning atmosphere is very noisy and difficult to control students. However, this makes the soul of the competition, students become encouraged as trying to beat his opponent.

**Table 1.** Data of cycle one

No	Student's name	Students' response	Competitive soul	Result of the study
1	Rb	53.8%	35.4%	66.7
2	Ri	57.4%	64.6%	55.0
3	Ra	57.9%	16.7%	55.0
4	Ro	59.4%	66.7%	66.7
5	Al	68.1%	92.7%	73.3
6	Jo	70.6%	45.8%	60.0
7	Ez	93.9%	54.2%	76.7
8	My	78.5%	31.3%	61.7
9	NO	82.8%	33.3%	70.0
10	Ay	70.2%	25.0%	43.3
11	Rf	77.7%	40.6%	70.0

From table 1 above shows that in the first cycle of this student response will affecton the results of the study, whereas the competitive spirit has no effect on student response and outcomes

of learning. But the competitive spirit will influence the learning activities of students in liveliness. This is shown on the video recording of the learning.

**Results And Discussion The Second and The Third Cycle**

Learning strategies in the second and third cycle is not much different from the first cycle. However, in this cycle students grouped randomly based on gender and academic ability. The observations indicate that this cycle student response is better than the first cycle.

From the results of observation and video recording of learning to see that the advantage of grouping at random is 1) students can study each other, 2) created a good cooperation, 3) between the compact group members to win the game, 4) male students could succumb to the members of the group are women so that each group member has an equal chance to answer the question, 5) there is no dominating each other between group members. The following overall data from the first cycle to the third cycle:

**Table 2.** Student’s Response in cycle one until cycle three

No	Student's name	Cycle1	Cycle 2	Cycle3	Criteria
1	Rb	53.8%	69.3%	71.6%	Good – Good – Good
2	Al	68.1%	84.7%	78.5%	Good–very good– very good
3	Jo	70.6%	79.3%	74.2%	Baik-sangatbaik-baik
4	Ez	93.9%	95.5%	97.0%	Very good
5	My	78.5%	88.1%	82.3%	Very good
6	No	82.8%	81.1%	75.7%	Very good
7	Ay	70.2%	65.2%	71.6%	Good – Good – Good
	Sum	517.7%	563.1%	550.9%	
	Mean	74.0%	80.4%	78.7%	Good –very good– very good

On the second and third cycles the number of students decreased from eleven to seven people. However, from the table 2 above shows that the use of electronic math game media can improve the response of students in learning activities.

**Data Interpretation**

Electronic games on mathematical subjects, yet so many were used in the study. It is of interest to students, especially primary school students. Based on the research results of this classroom action research has obtained the data that media use electronic games can improve the response of students in learning mathematics..It is as expressed by Davies (1995) the excess using math games is 1) creates a meaningful situation, 2) motivate students, because students are free to participate and enjoy the game, 3) positive attitude, the games provide an opportunity for students to build on the concept of self and cultivate a positive attitude as well as reduce the fear of failure and false, 4) improving learning outcomes.

The results of this research show that grouping at random by grouping students both male and female, smart and less smart students very effectively create an atmosphere more conducive to learning. This is due to happen good cooperation between members of the group, the competition took





place in a fair and mutually learning so that students can subject matter easy to understand. Then it can be inferred that the grouping of students randomly based on the results of the study and the incorporation of students both male and female shows responses to learning and better learning results than classification based on the same gender.

## **CONCLUSION AND REMARK**

### **Conclusion**

From this classroom action research concluded that in order to create an atmosphere of learning more fun learning to use media can be either electronic math game. Research results obtained:

- 1) The use of games in learning mathematics grade IV elementary school created a learning atmosphere more fun and interesting
- 2) Grouping students randomly based on academic ability to effectively train students mutually learn and work together to get better grades
- 3) Competition in the game of train students behaved sportsmanship, dare and suggested learning to answer questions the teacher
- 4) Student response in learning activities affects student learning outcomes and make students more active in learning activities.

Based on the description above, it can be concluded that the use of electronic math game for elementary school students, effective learning atmosphere for more fun and meaningful.

### **Remark**

Based on this Classroom Action Research(CAR), Researcher puts forward useful suggestions for further researchers, teachers, school and tutoring agencies are as follows:

- 1) Learning Mathematics should be varied and not monotonous, so does learning outcomes more maximum
- 2) Learning activities in order to be able to work properly, the a teacher should always actively engaging students in learning activities
- 3) Teachers should use appropriate learning strategies tailored to the characteristics of the students so that learning outcomes can be a maximum of
- 4) Electronic math game Media is still very lacking, teachers can create and develop their own customized game with his protege participant condition

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