

Analysis of Learning Outcomes in Different Cognitive Abilities of Students Using Electronic Games

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Abstract: Electronic games in learning help teachers to easily convey material and create learning conditions that are not monotonous. Also, the aim is to improve student learning outcomes. With conditions of different cognitive abilities, are the effects of learning outcomes the same? The purpose of this research was to analyse learning outcomes at the conditions of students' cognitive abilities that are different from an electronic game. The method used was post-test and pre-test to find out the results of learning, and observations on students to find out the differences in cognitive abilities. The target of electronic game trials is students in Grade IV of Elementary School. Based on the trials conducted, it was concluding that electronic games that had developed had an impact on learning outcomes. It based on increased student learning outcomes tests and the media developed includes valid categories. So that the electronic game media developed is categorized as valid and effective for learning activities.

Keywords: learning outcomes, electronic games, cognitive

I. INTRODUCTION

Technology can be used in the world of Education that is by using technology in studying and learning (Allen et al., 1996). The rapid development of technology has implications on the availability of facilities are advanced, both visual and audiovisual, which is utilities as a source of learning. One of them is an electronic game in form encyclopedia (Sammut and Webb, 2011). There are innovations to use encyclopedias not only in the form of books. Encyclopedias can be developing into electronic games that play an active role in the world of education. Encyclopedias are reading material that presents information about illustrations, images and other media (video) (Mansyur, 2017). Information accompanied by the display of visual can increase 30% compared to the information that is read and heard by experience Dale (Asyhar, 2012: 22).

Electronic games are used include material about the metamorphosis of animals around. Encyclopedias in electronic games are used to help teachers when delivering material, as well as create a learning atmosphere that is not monotonous and helps improve students' cognitive abilities to understand the material (Antonenko and Niederhauser, 2010) — understanding the cognitive learning objectives, bloom taxonomy which has been in revision Anderson (Gunawan and Palupi, 2016).

There are six levels in Bloom's taxonomy, namely: (C1) remembering, (C2) understanding, (C3) applying, (C4) analysis, (C5) evaluating and (C6) creating. The ability to understand is an important basic skill mastered by students to achieve learning outcomes. Students not

only remember but also understand, by that Sabab understanding of the material needs to be mastered since elementary school. Children are still learning by using concrete objects to develop their intellect. They have begun to understand about writing, counting and correspondence (linking between form and content) and have started to learn to think abstractly but are still simple (Dessty, 2014).

Revisi Taksonomi Bloom						
(Anderson, L.W. & Krathwohl, D.R.: 2001)						
Taksonomi Bloom lama	C1 (Pengetahuan)	C2 (Pemahaman)	C3 (Aplikasi)	C4 (Analisis)	C5 (Sintesis)	C6 (Evaluasi)
Taksonomi revisi	C1 (Mengingat)	C2 (Memahami)	C3 (Mengaplikasikan)	C4 (Menganalisis)	C5 (Mengevaluasi)	C6 (Mencipta)

Figure 1. Taxonomy Bloom has revised

Playing into the activities are favoured by children, as well as with the adults, are happy when playing. MZW (2017: 14) said that playing is a primary need for children. In line with Montolalu, et all (2008: 1.2) play is a child's need. According to Hans Daeng in (Andang Ismail, 2009: 17) play is part of a child's life and is an integration in the process of forming his personality. Games that educate will create a character and can trainability to think cognitive in children. For them to gain

knowledge of new that will help future before them. However, quite interesting ways are needed to encourage children to learn according to their characteristic abilities that tend to like to play and can not be far from the concrete world.

The learning environment informal education will provide comfort to users in learning and learning (Praherdhiono, 2014). The learning media is a component of the learning environment contributing to the user's ability to access learning material democratically (Praherdhiono, 2016). Games electronic is a game that audio visualised, in the form of application (Giovannelli et al., 2016). This electronic game is what we call now a game (Gee, 2005). The game electronics found on the device - the device-specific such as televisions, computers, laptops, smartphones. As for the types of electronic games and various objectives, one of them is education which has a purpose for learning — utilising media game electronics, not more things that are not possible to use for learning.

It is giving the effect of a variety of fields, including in the field of education. Education by utility technology will facilitate the learning process. Piaget (2013) states that the age of children in elementary school (7-11 years) classified as a concrete operational cognitive development stage, where they begin to solve problems for real. On stage is (1) the child can think logically, (2) understand the concept of conversation, (3) clarify an object, (4) able to cope with the problems that are concrete and solving solution.

Learning media in the form of electronic games is an important thing in completing the success of the educational process in schools (Smaldino at al, 2004). With so required the innovation of new or alternative in learning. Seeing the importance of learning media as an intermediary in delivering information, the development encyclopedia in the game electronics serve as one of the solutions to overcome the problems mentioned.

Characteristics of Class IV Elementary School Students According to Piaget (Sugihartono et al., 2007), there are 4 stages of thought development in children, namely the sensorimotor stage (0-2 years), the preoperational stage (2-7 years), the concrete operational stage (7-11 years), and operational stage (12-15 years).

Child by the age of 7-11 years began using mental to solve a problem. Thinking activity characterised by the ability to think such as remembering, understanding and solving a problem.

Elementary school students have different personality characteristics, including differences in intelligence, cognitive, language, personal development and physical development.

Cognitive is the intellectual ability to think, know, and understand. The importance of the cognitive to improve the ability to think on a child by way of giving experience new that makes the child happy and be able to accept the things that the good and no trouble to comprehend.

II. METHOD

This study uses data collection instruments such as questionnaires and observation guides. Whereas to measure the effectiveness of the product is to use a test of

learning outcomes in the form of pre-test and post-test. Processing of the data, the test results of the study in research obtained by calculating result test subjects test try. Test try which made against 30 students grade IV in SDN Kalipang 03 Regency Blitar. To calculate the test results of learning is done by way of comparing the reference KKM eye lessons science with a score of test results to learn to use. The following is the method of data processing (Arikunto, 2006):

$$\text{Presentase Rata – Rata} = \frac{\text{Jumlah Siswa yang Mencapai KKM}}{\text{Jumlah Total Siswa}} \times 100\%$$

To improve the effectiveness of the results of the study after using media game electronics can be seen in Table 1 below :

Table 1
Success Criteria (Arikunto, 2000)

Category	Percentage	Qualification
A	80-100	Effective
B	60 - 79	Effective enough
C	50 - 59	Less effective
D	<49	Ineffective

Effectiveness criteria table:

a. Percentage of the number of students who reached KKM reach a level percentage of 80% - 100%, then learn to use the medium of learning the game electronics to be effective.

b.The percentage of students who reach KKM reaches the percentage level of 60% - 79%, so learning to use electronic learning media learning games is said to be quite effective.

c. The percentage of students who reach the KKM reaches the percentage level of 50% - 59%, then learning to use electronic learning media learning games are said to be less effective.

d.The percentage of students who reach the KKM reaches the percentage level of 0% - 49%, then learning to use electronic learning media learning games are said to be ineffective..

III. RESULTS AND DISCUSSION

Data on student achievement test scores of SDN Kalipang 03 Blitar Regency are presenting in table below:

Table 2
Student Achievement

No	Name	Pre-Test Value	Post-Test Value	KKM	Remarks (post-test / after using electronic games)
1	Student 1	90	90	70	Achieve KKM
2	Student 2	90	100	70	Achieve KKM
3	Student 3	40	60	70	Not yet reached the KKM
4	Student 4	90	100	70	Achieve KKM
5	Student 5	70	80	70	Achieve KKM
6	Student 6	60	100	70	Achieve KKM
7	Student 7	60	80	70	Achieve KKM
8	Student 8	70	90	70	Achieve KKM

9	Student 9	40	50	70	Not yet reached the KKM
10	Student 10	80	90	70	Achieve KKM
11	Student 11	80	90	70	Achieve KKM
12	Student 12	80	80	70	Achieve KKM
13	Student 13	90	90	70	Achieve KKM
14	Student 14	100	100	70	Achieve KKM
15	Student 15	40	60	70	Not yet reached the KKM
16	Student 16	80	80	70	Achieve KKM
17	Student 17	80	100	70	Achieve KKM
18	Student 18	80	90	70	Achieve KKM
19	Student 19	90	100	70	Achieve KKM
20	Student 20	70	80	70	Achieve KKM
21	Student 21	70	70	70	Achieve KKM
22	Student 22	80	100	70	Achieve KKM
23	Student 23	90	100	70	Achieve KKM
24	Student 24	60	60	70	Not yet reached the KKM
25	Student 25	60	80	70	Achieve KKM
26	Student 26	40	70	70	Achieve KKM
27	Student 27	70	80	70	Achieve KKM
28	Student 28	60	70	70	Achieve KKM
29	Student 29	50	60	70	Not yet reached the KKM
30	Student 30	60	80	70	Achieve KKM

From the presentation of the data in table 1 the results of the pre-test data presentation of student learning outcomes before using electronic games can be analysed and interpreted from 30 students, 19 students reached KKM and 11 students who had not yet reached KKM. From the pre-test data on student learning outcomes that reach the KKM, then a calculation is performed to determine its effectiveness before using electronic games, with the following formula:

$$P = \frac{\text{Jumlah siswa yang mencapai KKM}}{\text{Jumlah siswa keseluruhan}} \times 100\%$$

$$= x 100\%$$

$$= 63.33\%$$

While the results of the presentation of the post-test data of student learning outcomes after using electronic games can be analysed and interpreted from 30 students, 25 students reach KKM and five students who have not yet reached KKM. From the post-test data on student learning outcomes that reach the KKM, then calculations are performed to determine the effectiveness after using electronic games, with the following formula:

$$P = \frac{\text{Jumlah siswa yang mencapai KKM}}{\text{Jumlah siswa keseluruhan}} \times 100\%$$

$$= x 100\%$$

$$= 83.33\%$$

Based on the completeness of data processing learning above, as a whole, the results of the pre-test percentage of 63.33%. Based on the interpretation of the data, included in category B with a percentage of 60% - 79%, it can be concluded that before using the electronic game learning media, including the sufficient category effectively used for the learning process.

Whereas based on the mastery learning data processing above, overall, the results of the post-test percentage of 83.33% can be obtained. Based on the interpretation of the data, is included in category A with a percentage of 80% - 100% of electronic game learning

media, including the effective category used for the learning process.

SWOT analysis on Maze Game media aims to determine the strengths, weaknesses, opportunities and threats of the being developed product. The following table 4.6 tables regarding SWOT Analysis :

Table 3
SWOT Analysis

No	Information	
1	Strength (<i>Strength</i>)	a. Provide learning that is attractive to students b. Improve student learning outcomes c. The developed media is easily accessible d. Can be used as a learning resource e. Can be used as teaching material f. Do not waste paper
2	Weakness (<i>Weakness</i>)	a. Means and infrastructure are less complete b. Not all computers can support c. File size too large
3	Opportunity (<i>Opportunity</i>)	a. Can support learning b. Develop media that has no c. The media of learning in the form of games electronics in schools
4	Threat (<i>Threat</i>)	a. Students can only press a button that should not be press when the game is in progress b. Shifted by other learning media such as media with the Android Studio application that can installed on Android

IV. CONCLUSION

Trials can carry out if the media is declared "valid". The result of trying obtained a percentage of pre-test (before using the medium of learning) amounted to 63.33%, while the percentage of post-test (after using a medium of learning) amounted to 83.33% Arikunto (2006). Electronic games, in general, said it is feasible to use in learning. Electronic games with metamorphosis material declared effective. This is evidence from the post-test student learning outcomes showed 25 students achieved KKM of 83.33% and five students had not yet reached KKM. These results take from learning outcomes after using media electronic learning game. Based on the explanation that can infer that the research and development that do have cover five areas of technology education by AECT namely the design, management, appraisal, development and utilisation.

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