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INTERNATIONAL CONFERENCE ON MATHEMATICS, SCIENCE, AND EDUCATION
Faculty of Mathematics and Natural Sciences Semarang State University
Phone: +62248508112, 0818241519, 081225069298
Email: icmse2014@yahoo.com/ icmse2014@gmail.com
Website: www.icmse2014.com

Implementation of Digital Comic to Improve Creative Thinking Ability in Integrated Science Study

Pramudya Dwi Aristya Putra¹, Mochammad Iqbal²

¹Department of Physics Education, Faculty of Teacher Training and Education, University of Jember

²Department of Biology Education, Faculty of Teacher Training and Education, University of Jember

ABSTRACT

Using information and communication Technology (ICT) in learning process is one of characteristics learning in 21st century. One of ICT, the digital comic, can be used in integrated science study at physics education student, Faculty of Teacher training and education, the University of Jember. Digital comic can be used in the learning process with the purpose to improve creative thinking ability and learning activity. This research is experimental study with 52 samples that was divided into control class and experimental class. Source of data was obtained from pre-test, post-test, class observation and questioner. The result showed that the average score test of experimental class was 87,4 and the learning activity score was 67%. Whereas for the average score test of control class was 73,2 and the learning activity score was 47%. Based on this study, the conclusion show that there was a positive interference between digital comic and student creative thinking ability, and also proven to improve learning ability.

Key Word: digital comic, creative thinking ability, integrated science.

INTRODUCTION

Initiatives on 21st century bring a change point of view in education. Balance skill and competencies to be regard in an increase in learning. This was due to the advent of rapid technological and communication development. So that, the model of learning, instructional media and learning resources are approaches to use of computer. Therefore learning is used in learning process refer to digital literacy . Digital literacy means involves more than mare ability to use software or operate a digital device (Eshat, et al, 2004). Digital literacy can be developed by using e-learning. The e-learning include information and knowledge society, e-pedagogy, e-assessment, course, e-student and others. Implementation e-learning will help teacher and student in the learning.

One of instructional media that used in learning is comic digital. Comic is media visual to express ideas via images and is combined with text for information. Usually comics are made serial image. Implementation comic for learning make a student enthusiastic (Hosler and Boomer, 2011). Student was motivated with collaboration image and text.

Now development of comic can combine in digital. Spread of comic not only by paper but also by internet. Began many service is provided by the server, so people

can access easily. Make a simply can be read in mobile or gadget. In General comic digital's production was divided two ways. The first create comic manually then scan the comic to upload in computer. The other make software comic creator.

Creativity or creative thinking is a person's ability to generate new ideas that effective and ethical (tatang, 2012). Creative thinking has the meaning that a person has a diversity in solving a problem. Guilford (1986) considered creative thinking as involving divergent thinking, which emphasizes fluency, flexibility, originality, and elaboration. However, noted that creative thinking is not the same as divergent thinking, because creativity requires sensitivity to problems as well as redefinition abilities, which include transformations of thought, reinterpretations, and freedom from functional fixedness in driving unique solutions (Kyung Hee Kim, 2006).

Jember of University give a service to student and lecture to access e-learning. But this facility is less well utilized. Student and lecture are rarely to implementation in learning. Learning is carried out by discussion with classical method. So it is can the student did not motivation. In Science material for example, This characteristic is used in daily activity. For special

Indonesia's curricula, science can be learned with thematic method. Not only one of subject, such as physic, biology and chemistry but also combine in one of subject become integrated science for solve a problem. So beside cognitive many of element should be considered, for example: creativity, critical thinking, attitude etc. Choice of topic to teaching integrated science became a key to make motivation student.

The aim of a science lecture is training student began now to make interesting topic. Interesting topic can be applied in daily activity and give different experience for the learners (Depdikbud, 2008). To maximize activity, this implementation is comic digital to learning integrated science.

METHODS

This research was experimental study with control group pre-test post-test design. It was done at physics education department, Faculty of teacher training and education, the University of Jember. Total samples were cluster random sampling 52 undergraduate student in control class and experimental class. Control class was done learning conventional method. Teacher only give problem and student found solution in learning. For experimental class give a problem in the form comic was uploaded in e-learning. So the student can access anywhere and anytime. The process of research was include:

1. Developed of digital comic, digital comic was done expert test to media expert. The instruments were questionnaire related to the feasibility media. The questionnaires have 4 scale value.
2. Observation learning activity student. Learning activity was done two part. The first was trough e-learning, student give some respond via e-learning about comics have uploaded. Comic contain problem and the student find a solution. Student can give reason in forum session. Second in class or classical method, student was done in idea donate in class. All of activity that has been done collected by observation instrument. The result can be described by activity percentage activity.
3. Post test is used to view cognitive result student after implementation digital comic. Test was done in e-learning. Post test contain problem in daily activity approach creative thinking skills. Indicator creative thinking skill adopted The torrance test creativity thinking (TTCT, 1974).

Table 1. Indicator needed for creative thinking

Indicator	Description	Activity
Fluency	Student found relevant idea to solve problem was given. The solution is can practice and	Student can conclusion from problem's was given.

Indicator	Description	Activity
	effective	
Originality	Student gives solution uncommon or unique idea. The unique idea is logic and systematic.	The originality list have been prepared for responses each student.
Elaboration	The number of added idea and can demonstration the subject.	Student can find the relation each idea and demonstration it.
Abstractness	Based on the idea can described in the picture.	Student make conclusion via comic.

RESULT

This research was done in education physics department the Jember of University. Before determined the experimental class and the control class was carried out homogeneity test with Analysis of varians. The data for analysis homogeneity test was done in pre test and the significant result upper medium 0.05 ($0.999 > 0.05$). from this result we may concluded that varian from experimental class and control class was homogeny. After that was determined by cluster random sampling for name of class.

Digital comic before use in experimental class have been done feasibility module test. The feasibility module test was performed by expert test.

Table 2. Result of expert test

Criteria	Result expert test	
	Expert 1	Expert 2
Comic's appearance	3	4
completeness	4	3
teaching materials		
Interaction between character	3	3
Language	3	3
Storyline	3	3
Science material	4	4
Total score	20	20
Avarege	2.87*	2.87*

Description

3-4 = can be used without revision

2-3 = can be used with revision

1-2 = revision yet to implementation

Based from table 2 from expert test total score was 2.87, so could be taken the comic digital before was uploaded in e-learning must be revision. Suggestion was given for appearance colorfull and story line. Comic was taken to development student activity trough interaction and

experience learning (Mulyasa, 2009). Revision was done so implementation could in experimental class.

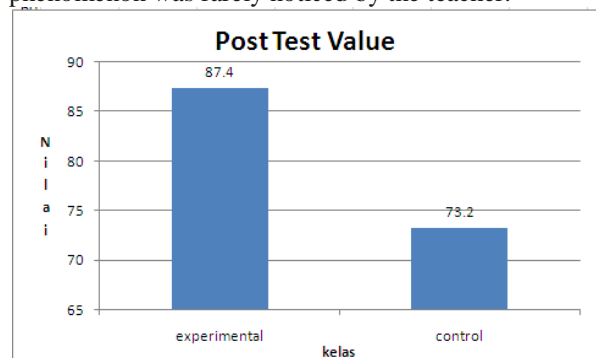
Observation was carried out to see the activities in experimental class and control class. Result from activity learning could description in table 3.

Table 3. Learning Activity Result

Class	Learning Activity		average
	Activity in e-learning	Activity in classical class	
Experimental	65%	69%	67%
Control	28%	66%	47%

Table 3 is describe learning activity between experimental class and control class. It was showed experimental class better than control class. The use of digital comic on the learning gives a good effect on the activity student. With the images on the comic to help understand material, did not bored, and finding the main idea faster (Wahyuningsih, 2012). In experimental class the problem was given by storyline in comic. The comic was scanned and was uploaded in e-learning. Student could download the comic and read anytime. Use comic digital form, student could learn continuously. Comic is an alternative visual media for learning, due to involvement readers will greatly affect emotions memory and will recall the subject matter (Mediawati, 2011).

Control class treatment, the problem was given only essay described. This essay was uploaded in e-learning. Student found the solution and was uploaded in e-learning too. In classical method learning activity was observed by instrument such us: questioning, answer the question, give a respond, make new ideas, presentation model. From the activity in e-learning and classical method found an average value like in table 3. Based from table 3 were showed that control class lower because the student not use of media for learning. Only discuss with same student or lecturer. Sometimes the student are less focused on the problem was given to them. Ability to understand problem in the form of essay was constrain on the experimental class. In general this phenomenon was rarely noticed by the teacher.



Picture 1. Creativity thinking post test

Picture 1 shows the average result post test from experimental class and control class. In the final test question divided into four section such as: fluency, originality, elaboration and abstractness. But to determine significant differences between learning outcomes and grade control class experiments using test required testing Independent Sample T-test. The results of the analysis of data obtained by the Sig. (2-tailed) of 0.040 or > 0.05. So it can be concluded that there are significant differences between the experimental class and the control class (Ha accepted, Ho is rejected). To know the benefits of the use of digital comics then tested the right side then Sig. (1-tailed) of 0.020 or < 0.05 level. so because Ha is accepted and Ho is rejected, it can be concluded that the average value of the results of the experimental class students better than the control class.

Test Items given to student was to test's ability to think creatively. Creativity is important to solve the problem. In experimental class implementation digital comic aims to provide image in real problem. Student could focus to find solve the problem. But in control class, learning only discussed about issue in science. Student was imagine by them self to understand the problem. So that the function of the digital comic was to provide clear direction related the learning process. Moreover, student was motivated to learn and read digital comic given. The relation with technology, student now can access the media not only by Pc but also in mobile for example: ipod, ipad, netbook, or handphone. So that phenomena allow student to learn wherever. Developed a digital comic was series image which ware many of problem but no solving. Student find solve the problem from the case.

CONCLUSION

Implementation digital comic give a positive respond for student. They can be motivated because the appearance was interesting. The result showed that the average score test of experimental class was 87,4 and the learning activity score was 67%. Whereas for the average score test of control class was 73,2 and the learning activity score was 47%

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