

# Artikel dengan mas Aziz

*by* Niken Wahyu Utami

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## Comparative Study of Learning Using E-Learning and Printed Materials on Independent Learning and Creativity

Niken Wahyu Utami & Abdul Aziz Saefudin

Univeristas PGRI Yogyakarta

niken@upy.ac.id\*

**Abstract.** This study aims to determine: 1) differences in students taking independent learning by using e-learning and the students who attend the learning by using the print instructional materials ; 2) differences in the creativity of students who follow learning with e-learning and the students who attend the learning by using the print instructional materials ; 3) differences in learning independence and creativity of students attend learning with e-learning and the students who attend lessons using printed teaching materials in the subject of Mathematics Instructional Media Development. This study was a quasi-experimental research design using only posttest control design. The study population was all students who take courses in Learning Mathematics Media Development, Academic Year 2014/2015 100 students and used a random sample (random sampling) is 60 students. To test the hypothesis used multivariate analysis of variance or multivariable analysis of variance (MANOVA) of the track. The results of this study indicate that 1) There is a difference in student learning independence following study using the e-learning and the students who attend lessons using printed teaching materials in the lecture PMPM (  $F = 4.177$  ,  $p = 0.046 < 0.05$  ) ; 2) There is no difference in the creativity of the students who complete the learning by using e-learning and students to follow the learning using printed teaching materials in the lecture PMPM (  $F = 0.470$  ,  $p = 0.496 > 0.05$  ) ; No difference learning independence and creativity of students attend learning by using e-learning and the students who attend the learning using printed teaching materials in the lecture PMPM (  $F = 2.452$  ,  $p = 0.095 > 0.05$  ). Based on these studies suggested that the learning using e-learning can be used to develop student creativity, while learning to use e-learning and teaching materials can be printed to use to develop students' independence.

### 1. Introduction

Mathematics Education Study Program is one of the courses in the Faculty of Teacher Training and Education at PGRI University Yogyakarta. One of the compulsory subjects in



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The Mathematics Education Study Program is the Mathematics Learning Mathematics course (PMPM). The course of PMPM is organized with the aim of producing graduates who are competent in the field of mathematics education, especially in producing mathematics learning media. The subject of PMPM learns about everything about mathematics learning media, the final project is a mathematics learning media in the form of software (using Macromedia Flash 8 Professional) or hardware that can be used in learning in school. Making learning media of mathematics demands high creativity so that obtained by learning media with good quality. Nevertheless, based on observations made on student work outcomes this year, especially in the form of software, the creativity of students is not good, that is seen from the still not variations of the types of animation, object / form, or simulation of learning used in explaining certain material. Ahmar and Rahman doing research about development of teaching material using an Android [1], the result of this research that teaching material using Android is effective to learn. They doing research in cognitive style [2], learning style [3], and the relationship with problem solving [4] in the learning process. So far, the learning course of Mathematics Learning Media Development (PMPM) is still dominated by lecturers [5].

Learning a lot using a lecture method that is assisted by the media slide material in explaining the learning materials to students. After that, usually the lecturer provide direction and guidance to students to practice in the computer lab. With such learning, enabling student self-reliance in understanding and practicing the material obtained tend to be less because very dependent on the lecturer. In turn, this also allows students' creativity in producing good mathematics learning media is also not running optimally. Preliminary analysis of student creativity is also done through observation of the results of work students who follow the lectures PMPM Academic Year 2013/2014. The result of observation on student work showed that the result of the work in the form of software, the making of object images in the learning media is also less smooth. It is possible the lack of student flying hours in creating / drawing objects using tools in Macromedia Flash 8 Professional. In addition, this is also possible because students do not practice independently in drawing objects or making animations used in the software [6]. Therefore, the independence of student learning is needed in the manufacture of software learning media mathematics. Innovative learning relevant to current conditions is student centered learning. That is, it is learning that emphasizes to students that knowledge should be built (constructed) by students themselves. Students can be directly involved to gain experience learning from lecturing process. Moreover, learning to students includes learning to adults (andragogy learning) to enable students to learn independently either with or without the help of others (lecturers).

Independence of learning is important for the creativity of students in producing the work to develop optimally [7]. Learning using e-learning or web-based learning and learning using printed materials provide students the opportunity to hone their creativity and learning independence in solving problems related to the learned concepts . Web-based learning or learning using e-learning is one of innovative learning that has characteristics such as the existence of more communication (interactivity), independence, accessibility, and enrichment of various materials. This characteristic allows students to learn independently and optimize their creativity in learning. While learning using printed materials that contain material and guidance in understanding and practicing the lecture material also provides opportunities for students to learn independently. The requested tasks and materials provided in the printed materials provide an opportunity for students to explore their creativity in producing the work

/ product. With these characteristics, it is possible that learning using e-learning and learning using printed materials provides an opportunity to increase students' learning independence and creativity. Based on the various descriptions, it is necessary to study the application of learning using e-learning or web-based learning and learning using printed materials in lectures PMPM [8].

Through the application of these two lessons are expected to increase the independence of learning and creativity of students in developing and producing the media of learning mathematics.

## 2. Research Methods

The research procedure in this research includes three stages, namely preparation stage, implementation, data analysis, and reporting. Stages of Preparation, The purpose of this stage is to prepare the research tool after analyzing the learning problems. Activities at this stage include analysis of learning problems, concept analysis, instrument preparation, and device preparation. The description is as follows. Analysis of learning problems, The problems that are often encountered by students in lecturing the Development of Mathematics Learning Media (PMPM) is the independence of learning and creativity of students who have not been optimal[9]. The materials taught in PMPM lecturing activities, namely functions, and types of learning media, selecting and determining learning media, designing instructional media, creating and using learning media [10]. From the material taught, conducted research about lectures on the material of making computer-based learning media using Flash 8. For this learning, divided into several materials, namely Introduction to Flash, Drawing objects with Flash, Animation Each Frame, Motion Tween Animation, Animation Shape Tween, Symbol Button, [11] Full Media View Using Various Animations and Buttons (Symbol Button). The research instruments compiled in this study are self-directed questionnaire and creativity test.

Learning tools are arranged in research activities include the syllabus PMPM Course, PMPM Course module, and PMPM Course webpage (learning.upy.ac.id). Implementation phase of this research is experimental test and implementation of quasi experimental research [12][13]. The implementation includes: a) independent questionnaire test of learning independence and creativity tests, b) the application of learning, ie the application of learning using e-learning and print materials in the classroom to improve students' learning independence and creativity in the experimental class and control class; c) provides a questionnaire of learning independence and student creativity tests in both classes [14]. The experiment class is in class 4A3 and control class in 4A1 class. The instrument test is done in 4A2 class.

## 3. Result and Discussion

Prior to Monova test, prerequisite test is performed first. The prerequisite test conducted in this research includes the data distribution normality test, homogeneity test of variance, and multicollinearity test. The data normality test showed that the Kolmogorov-Smirnov test statistic value for the learning independence variable has a significance level of 0.122 (greater than 0.05) and student creativity has a significance level of 0.183 (greater than 0.05). That is, the data is otherwise normally distributed.

The homogeneity test of variance shows that the statistical value of Levene statistic test for the data of learning independence variable has a significance level of 0.003 (less than



0.05) so that the data is not normally distributed, but for the creativity variable data has a significance level of 0.397 (more than 0.05) otherwise normally distributed. The multicollinearity test results show that the VIF value coefficient is close to 1 for all independent variables. Similarly, the tolerance value is close to 1 for all independent variables. This means that between the same bound variables do not occur multicollinearity. After fulfilling the specified requirements, then a multivariable of variance analysis (MANOVA) is performed. MANOVA test results are as follows [3].

There is a difference of student learning independence that follow the learning by using e-learning and students who follow the learning by using printed material in PMPM lecture ( $F = 4,177$ ,  $p = 0,046 < 0,05$ ). There is no difference of creativity of students who follow the learning by using e-learning and students who follow the learning by using printed materials in PMPM lecture ( $F = 0,470$ ,  $p = 0,496 > 0,05$ ). There is no difference of learning independence and creativity of students follow the learning by using e-learning and students who follow the learning by using printed materials in PMPM lecture ( $F = 2,452$ ,  $p = 0,095 > 0,05$ ).

Based on the results of this study, the group of students who were given learning by using printed materials, after being given the treatment had an average score of learning independence of 70.87 with a standard deviation of 10.73 highly qualified. The group of students who used e-learning learning after being given the treatment had an average learning independence score of 66.1 with a standard deviation of 6.92 that was highly qualified. Qualification of the average score of independence of student learning both groups in the same qualifications so as to not have a significant difference. Even so, in general the average score of learning independence of student group learning given by using printed materials is relatively better compared to the group of students who use learning with e-learning. The group of students who were given learning using printed materials, after being given the treatment had an average score of creativity of 68.4 with a standard deviation of 23.28 that qualified creatively. The group of students who used e-learning learning after being given the treatment had an average creativity score of 72.33 with a standard deviation of 21.10 that qualified creatively.

Qualification scores average creativity of students of both groups in the same qualification so as to have no significant differences. In general, however, the average score of students' learning creativity using e-learning learning is relatively better compared to that of students who use learning with printed materials. Based on the results of descriptive analysis and MANOVA one-way analysis, it can be taken a justification that learning using printed and learning materials using e-learning there is no difference in influencing students' learning independence and creativity in PMPM lectures. The reason is that students who follow the learning by using print and e-learning materials are both doing media development activities independently. Lecturers only provide guidance when students have difficulty in the learning process. As a result, student learning independence is well established. Meanwhile, students' creativity in learning between students using printed materials and students using e-learning differs significantly even in creative qualifications. This is possible because students who learn to use e-learning will find it easier to develop ideas by way of direct browsing on the internet. As a result, the ideas obtained are not monumental, but tend to be varied and the students try to develop the idea either by imitation (imitation) or adaptation of those ideas. This result is in line with Rusman's opinion (2012: 293). He stated that the advantages of learning done with e-learning is the web as a medium equipped with a hyperlink that allows

to access information at random which impact on our speed to obtain information on the web. Students who learn through e-learning certainly have these advantages compared if he learns through printed materials. Thus, students are easier to obtain creative ideas in the process of developing innovative learning media.

#### 4. Conclusion

The results of independent questionnaire and creativity test showed that the independence questionnaire and creativity test can be used in the research because it is valid and reliable. There is a difference of student learning independence that follow the learning by using e-learning and students who follow the learning by using printed material in PMPM lecture ( $F = 4,177$ ,  $p = 0,046 < 0,05$ ). There is no difference of creativity of students who follow the learning by using e-learning and students who follow the learning by using printed materials in PMPM lecture ( $F = 0,470$ ,  $p = 0,496 > 0,05$ ). There is no difference of learning independence and creativity of students follow the learning by using e-learning and students who follow the learning by using printed materials in PMPM lecture ( $F = 2,452$ ,  $p = 0,095 > 0,05$ ).

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