Students’ Abilities in Developing Computer-Based Learning Media at Department of Mathematics Education

Yenita Roza*, Syarifah Nur Siregar, and Titi Solfitri

Mathematics Education Department
Universitas Riau, Pekanbaru, Indonesia

yenita.roza@lecturer.unri.ac.id, nurhafirays@yahoo.co.id, tisolfitri@yahoo.com

*Corresponding Author
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Abstract: National Standard for Learning Process in Indonesia required teachers to integrate information technology specifically computer in their classes. However, until now the use of computers as a medium in the school still limited for collecting and presenting teaching materials. This qualitative study aimed to explore students’ ability at mathematics education department in developing computer-based learning media. The results of the research will be used as a basis for improvement of the presentation of the computer application course itself and for designing teacher training in developing and using computer based learning media. The subject of this research are 24 students of mathematics education department who took computer applications courses. Completed the courses the students were asked to complete a questionnaire about their basic ability in the developing computer-based learning media. These information used to show their improvement through the course. Computer-based teaching materials created by students were rated on four adequacy aspects, there are Instructional, Cosmetic, Program and Curriculum. The ability of mathematics education students in the developing computer-based learning media are good with average score 3.04, their abilities in developing media increase from 1.88 to 3.04. Computer-based learning media developed by students at mathematics education department can be used as learning media at mathematics classes.

Keywords: Learning Media; Computer-Based Learning; Computer-based media; Mathematics education, Developing Learning Media.

1. Introduction

The computer as a teaching tool has been used since the 1950s in developed countries, in Indonesia computer-based learning media has also been used since the development of educational technology in the early 80s. However, until now the use of computers as a medium in the school still limited for collecting and presenting teaching materials. National Standard for learning process in Indonesia [1] stated that teacher have to integrate Information Technology into their teaching. Mathematics Education department at Universitas Riau offer computer application course to improve the ability of future mathematics teachers to develop and use computer-based learning media. Since the last two years, the subject of Computer no longer offer for the student at junior and senior high school level, but e

This study aimed to explore the ability of students at mathematics education department in developing computer-based learning media. The results of the research will be used as a basis for improving the presentation of the computer application course itself and for designing teacher training in developing and using computer based learning media. The subject of this research are 24 students of mathematics education department who took computer applications courses, those students have had an introductory computer course as course requirement.
2. Related Works

Computer has several advantages when using as learning media. Yamasari [2] found that by using picture, sound and animation it can increase activities and interaction among student and teacher within mathematics class. The use of sound and picture is one of indicator use in evaluating students’ product of computer-based media. Many researches showed that using computer-based media in teaching has influence several aspects in learning. Susanti and Khabibah [3] show that this media making the difference on student interest in learning mathematics, the increase in interest has also increase student achievement in learning mathematics. Haryoko [4] mentioned that achievement of mathematics class can improve if the teacher used the computer-based media in teaching. Teacher abilities in using computer-based media still limited that make them need a training in this skill.

Bottino[5] briefly outlined the evidence of the evolution of ICT-based learning environment in improving teaching and learning activities. By using computer-based media student can having more control for the speed of their learning activities. Mayer [6] indicated that computer with its unique feature can facilitate the learning through e-learning. This unique feature such as animation help teacher to bring outdoor setting to their indoor learning. Related to that information, Rutten [7] also stated that computer simulation enhance the traditional instruction. This simulation help student to picture the abstract object in mathematics. Many research discussed about the advantages of using computer in learning activities but teacher difficulties in using those media need to be explored to help them getting the appropriate training.

3. Material & Methodology

Computer Application course at department of Mathematics Education is designed to improve students’ ability in developing computer based-media for mathematics classes. The courses is delivered by project based strategies. Each student offer the project to be done for the semester and approved by the lecturer, the courses is run based on the project contract. At the beginning of the semester students were asked to complete a questionnaire about their basic ability in the developing computer-based learning media. This course guided the students to develop a computer-based learning media by using project-based strategies. Student having hand-on experience in developing media under lecturer supervise. In general, teaching materials were developed by using power-point combined by front-page. Completed the courses students asked to fill in questionnaire about their ability in developing computer based media at the end of the class.

3.1. Data

There are two different data used in this research. The first is student self-evaluation on their ability in developing computer-based learning media. The data was about their ability on planning the project and developing the media. Aspect in this questionnaire related to need analysis, ability using power point and front-page, designing and developing media. This data was collected by using questionnaire that given to student at the beginning and the end of class meeting. The second data is the result of lecturer evaluation for student developed computer-based learning media. The data was collected based on four adequacy aspect (instructional, cosmetics, program and curriculum).

3.2. Method

Data of student self-evaluation on their ability in developing Computer-based learning media before taking the course were compared to similar data after completing the courses. The result show student improvement in developing computer-based learning media within one semester. The learning media created by students were rated on four aspects: Instructional Adequacy (15 topics), Cosmetic Adequacy (8 topics), Program Adequacy (10 topics) and Curriculum Adequacy (8 topics). The finding present based on the four adequacy aspects. The score was given in base 4.

4. Results and Discussion

The finding of the research is presented in two categories. The first is student improvement in developing computer-based learning media. This data is organized based on student self-evaluation on
their ability related to need analysis, design and develop the media. Comparison before and after abilities is presented in bar diagram. The second is the score given by lecturer for computer-based learning media created by students. The score was given on four adequacy aspects which are instructional, cosmetics, program and curriculum. The average score for each adequacy also presented in bar diagram. In this session also discussed the aspect that had a highest and lowest score and the related problem.

In the aspect of Instructional Adequacy it was found 4 out of 15 topics with the results less satisfying they were text ambiguity, the lack of user opportunity to interact with the program, the display rate were not suitable for learning tasks and un-efficient activities procedure. Text ambiguity related to student ability to communicate not to the computer abilities. Most of the product put some space for the user to interact with the program but it is not enough for them to understand the subject. Some of activities put the program have too much animation that cause un-efficient in term time spent and number of click to be used.

In the aspect of Cosmetics adequacy there are two topics with low score, the cramping of information on one screen and excessive use of animation. From discussion with student it found the excessive use of animation happened because they were offer excited in creating animation that just learned. The cramping information should be change with picture to make them look better.

In the aspect of program adequacy only found one problem were the designer do not predict the un-expected answer of the user. The product only provide optional Yes or No answer without predicting if the user giving a different answer. As the new user of the program they do not realized the case sensitive problem in using computer.

In the aspects of the curriculum adequacy, the problem found was the time needed to run the programs did not calculated as the time allocated for the topics in regular class. The program created by the student need longer time to use in the classroom.

![Figure 1: Students Improvement in Developing Computer-Based Media](image-url)
students were rated on their abilities making their design into real program by using power point and front-page.

Figure 2: Average Score of Computer-Based Media Created by Student

Figure 2 above shows students’ score based-on four aspect of adequacy on their product of computer-based learning media. In the aspect of Instructional Adequacy the average score is 2.96 it was found 4 out of 15 topics with the results less satisfying they were text ambiguity, the lack of user opportunity to interact with the program, the display rate were not suitable for learning tasks and un-efficient activities procedure. On this aspect most student did not giving personalize message in the program but the instruction given in the program is very clear and precise.

In the aspect of Cosmetics adequacy the highest score 3.2 and the lowest 2.2, with average 3.15. Overall the cosmetics aspect get the highest score because most of student able to choose good color picture and use them appropriately. In the aspect of program adequacy only found one problem were the designer do not predict the un-expected answer of the user. In the aspects of the curriculum adequacy, the problem found was the time needed to run the programs did not calculated as the time allocated for the topics in regular class.

In the aspect of Instructional Adequacy it was found 4 out of 15 topics with the results less satisfying they were text ambiguity, the lack of user opportunity to interact with the program, the display rate were not suitable for learning tasks and un-efficient activities procedure. In the aspect of Cosmetics adequacy there are two topics with low score, the cramming of information on one screen and excessive use of animation. In the aspect of program adequacy only found one problem were the designer do not predict the un-expected answer of the user. Computer-based learning media developed by students at mathematics education department can be used as learning media at mathematics classes.

5. Conclusion

As the whole can be concluded that the ability of mathematics education students in the developing computer-based learning media are good with average score 3.04.(base 4). Computer-based learning media developed by students at mathematics education department can be used as learning media at mathematics classes. This information will be the basis for improving the quality of the computer application course in mathematics education department. This finding also useful for designing teacher training in using and developing computer-based learning media because this skill is required by curriculum 2013. This research already explore the data related to students skill in developing and using computer-based media, but no information about the factor that influent students’ abilities. Further research need to be done in finding these factors.
References