Development of Interactive Learning Media Based Lectora Inspire in Discrete Method Course

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Abstract

This study aims to (1) produce a valid and practical interactive learning media based Lectora Inspire in a discrete method course, (2) see the effects of the developed learning media to the students' learning outcome in a discrete method class. Research and development, which consists of five stages: pre-development, development, evaluation, field test, and revision, was implemented in this study. The developed interactive learning media was tested against 23 students of discrete method class in the Department of Mathematics, Faculty of Mathematics and Natural Science, Sriwijaya University. The results of the analysis are: (1) based on the evaluation of the experts and the perceptions of the students, the interactive learning media which has been developed was valid, practical, and highly recommended to be used as a source of student's self-learning in discrete method courses, (2) the interactive learning media which has been developed was effective to increase students' learning outcome.

Keywords: Interactive learning media, lectora inspire, discrete method

1. Introduction

1.1. Background

Discrete method is one of the compulsory course in Department of Mathematics, Faculty of Mathematics and Natural Science, Sriwijaya University. Based on the data at the end of the even semester of academic year 2012/2013, the students' average score on that course is still low. It happened due to the lack of the students' motivation and understanding of the course materials. In addition, the teaching and learning process in this course still used conventional learning media such as books, modules, and static power point file (ppt without animations). Therefore, an interactive learning media that can create a two-way interaction between the students with the media and the learning resources is needed in the students' learning process.

The ability of Macromedia Flash, which can make various interesting animations, has made the software became popular in the development of interactive learning media. Some examples are the works by Garcia *et al*. (2005), Luthfi & Nafi' (2011), and Safitri *et al*. (2013). Interactive learning media are not only developed by using Macromedia Flash but also by using any other computer software, some example works are by Korakakis *et al*. (2009) who develop an interactive computer application to support the learning process for students in the 8th grade, and Khalid *et al*. (2010) committed a study to know the effect of work group method and interactive learning media in algebra learning of engineering students, another work was also done by Lee *et al*. (2012) that made interactive multimedia modules in electrochemistry learning and it was aimed to see the effect of the developed modules toward the students' understanding and learning motivation.

Although interactive learning media have been widely developed, there are not many teachers using it in their class. It happened because they are still lack about web management

and design graphics technic. Therefore, one of the aims of this study is to develop an interactive learning media using a special software for interactive media and e-learning, namely Lectora Inspire. This software is an authoring tool which can be easily used by any common teachers and lecturers to make contents of interactive learning media. Another aim of this study is to see the effects of the developed learning media to the students' learning outcome in a discrete method class. To reach the latter aim, we have tested the developed interactive learning media against the students of discrete method class in the Department of Mathematics, Faculty of Mathematics and Natural Science, Sriwijaya University.

1.2. Formulations of The Problem

Based on the background, the formulations of the problem of this research project are:
1. How to produce a valid and practical interactive learning media based Lectora Inspire in a discrete method course?
2. How the developed interactive learning media affect the students' learning outcome in a discrete method class?

1.3. Aims and Benefits of The Study

The aims of the study are:
1. To produce a valid and practical interactive learning media based Lectora inspire in a discrete method course.
2. To see the effects of the developed learning media to the students' learning outcome in a discrete method class.
   The benefits of this study are:
1. To give a learning resource which based on information technology for both the lecturers and students in a discrete method course.
2. It is expected to be more and more lectures are using interactive learning media in a math class, especially in the subjects of discrete methods.

2. Research Method

2.1. Design

Research and development cycle design was used in this study, and it has been modified and fitted to the research aims. The research design contains of five stages, i.e. pre-development, development, evaluation, field test, and revision.

2.2. Subjects

The subjects of this research are 23 students (10 male and 13 female) of Department of Mathematics, Faculty of Mathematics and Natural Science, Sriwijaya University. All the students have taken the discrete method course class A in the semester of academic year 2012/2013.

2.3. Procedure

In the pre-development stage, all the discrete method course materials were sorted based on the students' average score. Consequently, the course material about combinatoric which has the lowest average score became the main content of the interactive learning media that would be developed. In the second stage, Lectora Inspire was used to develop the interactive learning media. Various pictures, animations, audios, and videos were added into the media. There are three additional softwares that should be also installed in addition to Lectora Inspire, namely camtasia®, snagit®, and flypaper™. The evaluation stage was conducted when all the

development process in the second stage has been completed. Two experts in multimedia and content, who have been already selected, gave their opinions, criticisms, and suggestions about the developed interactive learning media.

After the interactive learning media had been fixed based on the experts' advices, then it was ready to be tested. The field test stage consists of three sub-stages, that is pre test, implementation, and post test. Each sub-stages took place about fifty minutes and the students should fill out the questionnaires at the end of the test. This test conducted in the Laboratory of Computation, Department of Mathematics, Faculty of Mathematics and Natural Science, Sriwijaya University. In the revision stage, some advices from the students were selected as the basis for the improvement of the developed interactive learning media.

2.4. Instruments

2.4.1. Achievement test

There are two kinds of tests that were conducted in this study, namely a pre test and a post test. The questions on the tests cover the basic knowledges that should be already studied by the students who already took a discrete method course.

2.4.2. Questionnaire

There are three kinds of statements of the students' perception questionnaire, namely perceptions about the multimedia and accessibility, perceptions about the content of materials, and perceptions about the example questions and quiz.

3. Results and Discussion

3.1. Results

3.1.1.The Interactive Learning Media

One of the benefits using Lectora Inspire is there are so many templates for interactive learning media which can be choosen. The face-to-face display for the developed interactive learning media is given in the figure 1. The left side of the figure 1 shows default template and the right side shows the adjusted template.
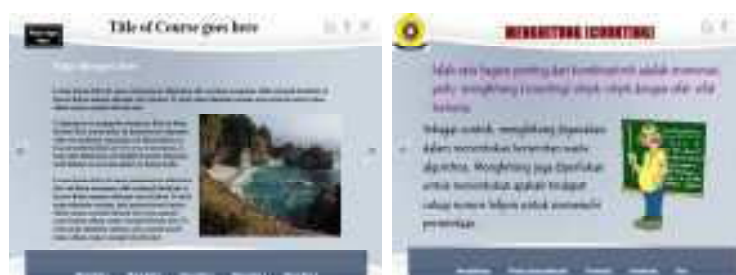

Figure 1. Adjustment of a default template with the learning contents

Musics and sound effects are also added to the developed interactive learning media. The videos which added to the media are made in format of flash video. To play a video in Lectora Inspire, we have to download flash player program which can be downloaded freely from the website http://get.adobe.com/flashplayer/.

There are eight types of question that can be added in Lectora Inspire, those are

true/false, multiple choice, short answer, essay, fill in the blank, matching, drag and drop, and hotspot. In this project, the questions are multiple choice type and it consist of three choices. In order the interactive learning media to be more interesting, classical music and illustrative image are also added to each question, and then a time limit of 3 minutes is also given for the students to answer each question. The students can access this test simulation at any time without having to read all the material by directly clicking the quiz menu button. Figure 2 shows an example question of the quiz.

Figure 2. A multiple choice type question

3.1.2. Expert Review

There are two experts who reviewed the developed interactive learning media, namely a multimedia expert and a content expert. Both of them have given some suggestions to the media and they also thought that the developed interactive learning media were practical and valid to be used in a discrete method course.

3.1.3. Field Test

This field test was conducted to know the effects of interactive learning media on students' learning outcomes. There are three steps in this field test, that is conducting a pre test, learning using the media, and conducting a post test. All the activities of field test took place on 8th of November, 2013.

The pre test was administered to determine the students' baseline knowledge of the course materials. There are four questions that were given to the students in the pre test and it cover almost all the basic topics in combinatorics. Based on the test that has been conducted on the students, the average score obtained at the pre test is 58,7. It can be seen that the students' pre test score is categorized as low because it below 60 scales of 100. The students' results in pre test are completely shown in table 1 below.

Table 1. The Students' Results in Pre Test

Score	Category	Frequency
76-100	Very Good	0
51-75,9	Good	11
26-50,9	Bad	9
0-25,9	Very Bad	3

After the pre test was done, the next step was implementation which lasted about fifty minutes. The students learned the contents of the developed interactive learning media. When the time for learning and exploring the media has been ended, the students committed a post test. In this post test, the students should answer five essay type questions and the test also lasted about fifty minutes. The average score that was obtained by the students in this post test

is 72,61. The activities of the students and their results in the post test are shown in figure 3 and table 2 respectively .

Figure 3. The students explored the interactive learning media

Table 2. The Students' Results in Post Test

Score	Category	Frequency
76-100	Very Good	11
51-75,9	Good	8
26-50,9	Bad	4
0-25,9	Very Bad	0

3.1.4. The Students' Perceptions

When all the steps in the field test phase have been completed, the students had to fill out the given questionnaires. Generally, the statements in the questionnaires are divided into three aspects, namely perceptions about the multimedia and accessibility, perceptions about the contents or materials, and perceptions about the questions of the quiz. In this questionnaire, all the students can also give their opinions and suggestions about the interactive learning media by writing it in a special column on the last page of the questionnaire.

The first aspect is the students' perceptions about the multimedia and accessibility of the developed interactive learning media. This students' perceptions are summarized and shown in table 3. On that table, the perception rates about the multimedia, that are stated in the statement 1 to 4, are excellent. Statement number 5 is the students' perception about the accessibility of the interactive learning media. Very good rate is given by the students. One of the reasons is because the menu-driven system in the media makes them should not start the learning from the beginning, otherwise they can directly go to the desired materials by pressing the appropriate menu button.

Table 3. Students' Perceptions about The Multimedia and Accessibility

No.	Statement	Students' Answer					Likert Scale		Rate of Perceptions
		SDA	DA	LA	A	SA	Total	(%)	
1	Face-to-face display is so interesting	-	-	-	2.96	1.30	4.26	85.22	Excellent
2	Pictures and texts are so interesing	-	-	0.26	3.13	0.65	4.04	80.87	Excellent
3	Sounds and musics are so interesting and enjoyable	-	-	-	2.78	1.52	4.30	86.09	Excellent
4	Animations and videos are so interesting	-	-	0.13	2.96	1.09	4.17	83.48	Excellent
5	Navigationsto explore this media are easy	-	-	0.91	2.09	0.87	3.87	77.39	Very Good

Explanation : SA=Strongly Agree; A=Agree; LA=Less Agree; DA=Disagree; SDA=Strongly Disagree

Likert Scale : 0%-20% = Very Bad; 20.01%-40% = Bad; 40.01%-60%= Good; 60.01%-80%= Very Good; 80.01%-100%= Excellent

    The students' perception rate about the given materials in the developed interactive learning media are very good in the average as shown in table 4. After the students have learned the interactive learning media, their interest to the combinatorial topic became higher than before as shown by the rate of perceptions in statement number 5.

Table 4. Students' Perceptions about The Content of Materials

No.	Statement	Students' Answer					Likert Scale		Rate of Perceptions
		SDA	DA	LA	A	SA	Total	(%)	
1	This media helped me to understand the materials easily	-	0.17	0.39	3.13	-	3.70	73.91	Very Good
2	The information in this media was comprehensive and easy to remember	-	0.17	1.04	2.26	-	3.48	69.57	Very Good
3	By using this media, i could see the connection among the topics in discrete method course	-	0.09	0.78	2.61	0.22	3.70	73.91	Very Good
4	By using this media,	-	0.09	0.52	2.61	0.65	3.87	77.39	Very Good

No.	Statement	SDA	DA	LA	A	SA	Total	(%)	
	i could understand the connection between the materials and the real life problems								
5	After using this media, my interest on the combinatorial topic become higher	-	-	0.13	3.48	0.43	4.04	80.87	Excellent

Explanation : SA=Strongly Agree; A=Agree; LA=Less Agree; DA=Disagree; SDA=Strongly Disagree

Likert Scale : 0%-20% = Very Bad; 20.01%-40% = Bad; 40.01%-60%= Good; 60.01%-80%= Very Good; 80.01%-100%= Excellent

The perception rates of the students toward the given example questions and quiz in this interactive learning media are excellent as shown in table 5 below.

Table 5. Students' Perceptions about The Example Questions and Quiz

No.	Statement	Students' Answer					Likert Scale		Rate of Perceptions
		SDA	DA	LA	A	SA	Total	(%)	
1	The example questions in this media were not difficult for me to understand and solve	-	-	0.39	2.61	1.09	4.09	81.74	Excellent
2	The ilustration of the example questions was so interesting and made me more concentrated	-	-	0.39	2.61	1.09	4.09	81.74	Excellent
3	I was enjoying to do the test or quiz in this media	-	-	0.13	3.13	0.87	4.13	82.61	Excellent

Explanation : SA=Strongly Agree; A=Agree; LA=Less Agree; DA=Disagree; SDA=Strongly Disagree

Likert Scale : 0%-20% = Very Bad; 20.01%-40% = Bad; 40.01%-60%= Good; 60.01%-80%= Very Good; 80.01%-100%= Excellent

3.2. Discussion

In this study, flypaper™ became the main alternative software of Macromedia Flash in making animations for the developed interactive learning media. Among the three common types of animations for use in teaching: swf, exe, and avi, the swf type has the smallest size than the other (Garcia *et al*., 2007). The animations, that were designed using flypaper™ , were made in swf type, so that the animations may also be added to a web page such as math learning blog support (Arifin *et al*., 2010).

Results showed that students' average pre test score are still low. Although they have taken the course before, the majority of the students still thinks that the combinatorial materials are difficult to understand as shown in their final score at the end of the semester of academic

year 2012/2013. Then, the using of interactive learning media was applied to the students to increase their understanding and motivation (Lee & Osman, 2012) in the learning of discrete method, especially in combinatorial topic. This treatment successfully increased the students' learning outcome. It showed by their average post test score that can be categorized as good, that is 72,61 scales of 100. This result was along with other works (Garcia *et al.*, 2007; Arifin *et al.*, 2010; Sazali*et al.*, 2010; Safitri *et al.*, 2013) that made interactive learning media as one of potential novel learning techniques in general math learning.

Based on the students' perceptions, multimedia which added into the developed interactive learning media has increased the students' learning motivation. The same result was also committed by Khalid *et al* (2010) who showed that an interactive multimedia has an impact on students' learning. It is because of a majority of the students, who are still young, think that learning with music is very enjoyable. The students also think that the varying animations, pictures, and text colours are so interesting. In their opinion, studying with the interactive learning media is very much like playing a game on their personal computer.

The results also showed that the given materials in the media were presented completely and related each other among the sub topic. The given examples are any phenomena that are frequently found in students' daily life, consequently they could understand the relevance between the subject which was being studied and real problems. Furthermore, the example questions are given using animations, pictures, and sounds. As a result, the students were enjoying the explanations which have been presented in this interactive learning media. The explanations of the answer of the questions are presented with help of illustrating objects and animations. One of the advantages of Lectora Inspire is its capability of making a test simulation with various question types and many attractive illustrations.

4. Conclusion and Suggestion

4.1. Conclusion

Based on the results, the interactive learning media has been reviewed by the experts and some suggestions from them have been conducted to get a better interactive learning media. The students also gave their perceptions and they thought that the developed interactive learning media should be used regularly in discrete method class, although there are some aspects that have to be improved. Therefore, it can be concluded that the developed interactive learning media is practical and valid to be used in a discrete method course.

The interactive learning media have significant effects to increase the students learning outcome. It showed by the results of the field test that has been committed against 23 students of discrete method class in the Department of Mathematics, Faculty of Mathematics and Natural Science, Sriwijaya University. Based on the tests, the students' average score increased to 72,61 in post test from 58,7 in pre test.

4.2. Suggestion

It is suggested that the interactive learning media should be used widely by the teachers and lecturers, because it is easy to be developed using an authoring tool such as Lectora Inspire. The materials of the interactive learning media which have been developed do not contain all the materials in a discrete method course, therefore for the next development someone should develop a complete discrete method learning media.

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