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DEVELOPMENT OF EDUCATION GAME BASED INTERACTIVE MATHS TEACHING MEDIA ON PROBABILITY FOR YEAR ELEVEN STUDENTS

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Abstract

The development of science and technology further urge the efforts of renewal in education sector particularly in the teaching process. The use of the product of technology in education sector can be in the form of interactive maths teaching media. Teacher is expected to be able to develop the skill in creating teaching media besides being able to use on hand teaching media. Year eleven student's low interest in maths learning process along with the difficulty in understanding probability especially on sample space experiment sub topic is an obstacle faced by teacher in reaching the goal of teaching. The lack of teaching media used in the teaching process causes student to be easily bored. All this time, most teachers only use simple teaching media, for example carton made dice for sample space experiment. Based on these problems, therefore interactive maths teaching media is necessary. This teaching media is developed on Education Game based and equipped with student worksheet. The development of this teaching media consists of three stages which are product analysis, creating first product, and product trial. Product trial carried out consists of two stages. The first one is expert validation to see if the teaching media made is valid or not as teaching media. Afterwards small scale trial is carried out to see student's response towards interactive teaching media. Student's response is gained through questionnaire. It is hoped that the existence of this teaching media helps teacher in teaching maths, increases student's interest and understanding in maths.

Keywords: *interactive media, education game, development research*

INTRODUCTION

One of the factors causing student's lack of interest towards maths learning is the inappropriate and less varieties of media used by teacher. Teaching media is an instrument for delivering learning material. An effective teacher in using a media can increase student's interest in learning and in this way student can quickly and easily understand learning material being delivered. According to Winataputra (in Arindawati, 2004, pp. 47-48) the functions of teaching media are as follows:

1. To create an effective learning and teaching situation
2. Teaching media as an integral part of the entire learning process
3. The utilizing of teaching media must be relevant with the teaching goal and its content
4. Entertain and stimulate student's interest
5. To speed up learning process
6. Increases teaching and learning quality
7. Teaching media puts solid foundation in avoiding verbalism disease to happen

The development of science and technology further urge the efforts of renewal and the use of the product of technology in teaching process. Teachers are expected to make use of technology products in form of teaching media. Teacher is expected to be able to develop or create teaching media besides being able to use on hand teaching media.

To overcome year eleven student's problem in understanding probability subject matter especially determining sample space therefore, the writers create education game based interactive maths teaching media. This teaching media is design in CD using Macromedia Flash equipped with student worksheet. Macromedia flash is software which can make a simple to complex animation. This teaching media (CD) presents an interactive material with animation, game, sound, and equipped with exercise and evaluation. Constructivism approach is applied in utilizing this teaching media. According to Cobb in Suherman (2003, p. 76) learning maths is a process where student actively construct math knowledge. According to constructivism point of view student built their own knowledge through active learning participation. Each knowledge or ability can be achieved or mastered by an individual if that individual constructs actively the knowledge acquired.

Therefore, in teaching process teacher should give more priority to student's activity and give student opportunity to develop and express new ideas which are appropriate with the material presented.

With this interactive teaching media, it is hoped that teacher is capable in functioning it and hence it will increase student's interest and understanding in maths learning process. On the other hand, teacher will be helped in presenting teaching materials. Students only focus on the teaching media (CD) being used and teacher only act as facilitator who controls student's activity during learning process. Besides that, this learning media (CD) can be used to help them study at home.

Interactive Teaching Media

Interactive teaching is a way or teaching technique used by teacher when presenting teaching material in which during that time teacher act as the leading role in creating an educative interactive situation. This means there is an interaction between teacher and student, student with student, and student with teaching media to support the achievement of learning goal. Arsyad (2006, p. 85) states steps in developing interactive teaching as follows:

- a. Identifying topic lesson
- b. Developing teaching presentation. All information expected by student must be mastered
- c. Reading/observing presentation and determining where interactive dialogues can be combined and inserted
- d. Determining information want by student; develop questions or other strategy which need student's participation in analyzing, synthesizing, evaluating, and making decision
- e. Deciding which instructions to be delivered through interactive activity
- f. Determining important discussion items; important items can be presented after engaging student in discussion or other strategic activity

Interactive teaching is a vehicle which can stimulate student to do an active learning activity since there is a chance to explore and find math concept. Therefore, a teacher

should be able to develop interactive teaching media to create expected learning condition. One of the interactive teaching media is interactive teaching media (CD) equipped with student worksheet.

When speaking about interactive teaching media (CD) it is of course related to multimedia topic since interactive teaching media (CD) itself is one of the multimedia products. According to Mulyanta (2009, p. 1) multimedia is a combination of computer and video so principally multimedia is combination of three basic elements namely sound, picture, and text.

What is meant by interactive teaching media (CD) is basic systems namely sound, picture, and text used as teaching media in math teaching process. It is considered interactive since it is a two way activity, student as user can give input and computer can give response and feedback to user. The creation of this interactive teaching media (CD) is using macromedia flash software.

Research Method

This research is a design research. According to Soenarto (2006, p. 1) research and development is:

Research for developing and producing education products such as material, media, teaching instrument and teaching strategy, evaluation instrument and others used to overcome education problems, increase teaching and learning effectiveness in class or laboratory and not to test theory.

This research design is a process to develop and validate products used in teaching to support practical problem solving in education sector, particularly teaching problem in class or laboratory. This research produces education product in form of interactive CD teaching media and equipped with student worksheet.

Design research model

Interactive media design research procedure applied is Borg and Gall's design research procedure quoted from Soenarto (2006, p. 8) which involves several main steps:

1. Developed product analysis
2. Developing first product
3. Product trial consisting of:
 - a. Expert's validation and revision
 - b. Small scale field trial and product revision
 - c. Big scale field trial and last product

Because of the writer's limits hence research procedure conducted only as far as small scale field trial and product revision.

RESULT AND DISCUSSION

Interactive Teaching Media Development Result

Development stages conducted are: developed product analysis, developing first product, expert's validation and revision, small scale field trial and product revision. The results are as follows:

Analysis of developed product

At this stage analysis is done towards various things needed in developing the product both in designing teaching media and in creating teaching media. From the analysis, the general structure of teaching media is seen in the diagram below.

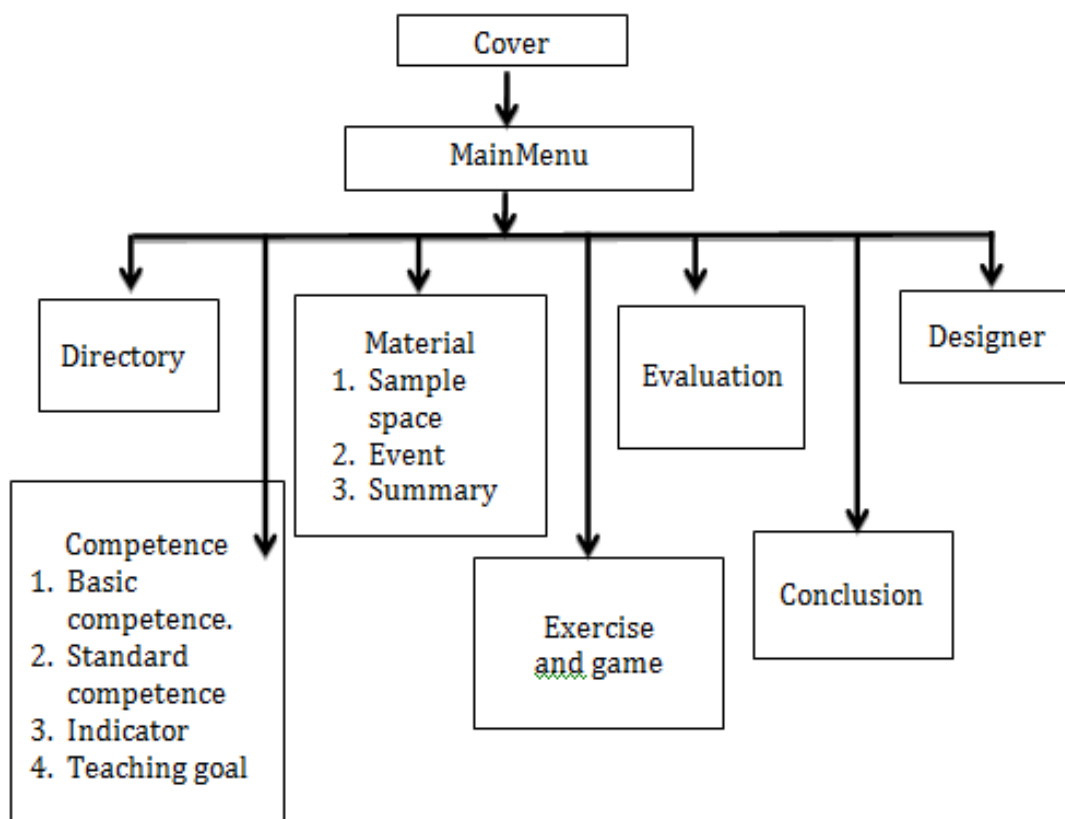


Diagram I: General structure of teaching media

General structure of teaching media is also used to compose student worksheet. Afterwards storyboard will be made from product general structure.

Developing first product

After doing analysis to the product which is going to be made, the next process is developing the first product. At this stage a document which has been composed at previous stage is put into each frame in the macromedia flash MX 2004 software and student worksheet document is composed using Microsoft office 2007 software. After creating first product, the writers perform editing process to the created product which then will be called Draft I.

Product trial

After first product is finished, the writers do product trial which consists of two stages namely expert validation and small scale trial. Validation is done by two validators. The validators are the math lecturers at Mathematics Education Department, Faculty of Teacher Training and Education, Bung Hatta University. Each validators give evaluations, comments, and suggestions. Revision on teaching media will be done based on validators' evaluations, comments, and suggestions hence teaching media afterwards is called draft II and then the writers did product trial.

Product trial is done in small scale. Small scale trial was done on Thursday, February 28, 2013 at SMAN 8 computer laboratory attended by one of its math teacher as an observer and also 25 year eleven students as participants. At the end of the lesson each students is given questionnaire to find out student's response towards teaching media(CD) and worksheet.

Analysis

Based on validation sheet given to two validators it can be deduced that teaching media (CD) and student worksheet on probability are good and can be used as teaching media with minor revision. Validation results are as follow.

Table 1. Teaching media (CD) and student worksheet validation result

No	Draft I	Validator comment and suggestion	Draft II(revised)
1	Teaching media (CD)	<p>It is not preferable to use the word <i>IPS</i> on the title since the teaching media (CD) can also be used for all students.</p> <p>The title "sample space experiment" on the material should be replaced with "sample space and event"</p> <p>CD instruction should be much clearer</p> <p>There should be a trial in throwing one dice and one coin in sample space material but let student fill the sample space in the worksheet</p> <p>The words "if set" should be changed to "it is called set"</p> <p>The language should be more communicative</p> <p>Student still does not understand the topic deliverance. Revise each animation so student can understand the material in this teaching media (CD)</p> <p>Discussion on trial topic is not necessary since it is common</p> <p>The table on the throwing of two dices and two coins trial should appear after the throwing of two dices and the throwing of two coins</p> <p>The word <i>PENDAHULUAN</i> in basic competence should appear after clicking one of the competences</p>	<p>The word <i>IPS</i> on the title has been eliminated</p> <p>Revised</p> <p>Revised with a much clear instruction</p> <p>Done</p> <p>Revised</p> <p>The language has been changed to a more communicative one</p> <p>Material deliverance has been changed with new animation</p> <p>Eliminated</p> <p>Table appear after the throwing of two dices and throwing of two coins</p> <p>Revised</p>

		<p>It is better to change the word <i>UANG LOGAM</i> with the word COIN</p> <p>It is better to change the word <i>PELEMPARAN</i> for coin with <i>PELAMBUNGAN</i></p> <p>Backbutton should always appear during presentation</p> <p>Create the design with other object not just dice and coin</p> <p>Recheck for missing letters</p> <p>Replace background color with a softer color</p> <p>Make a bigger font size letter on teaching media (CD)</p> <p>Too many color variation in writing</p>	<p>Revised</p> <p>The word <i>PELEMPARAN</i> is replaced with <i>PELAMBUNGAN</i></p> <p>Back button appears during presentation</p> <p>Design has been created by using bridge card selecting on various event topic</p> <p>Missing letters have been written</p> <p>Has been replaced with soft color</p> <p>Letter size is bigger</p> <p>Less color variation in writing</p>
2	Student worksheet	<p>There is no need for definition on trial</p> <p>There is no need for the word <i>IPS</i></p> <p>Recheck for missing letters</p> <p>It is better to change the word <i>UANG LOGAM</i> with the word COIN</p> <p>It is better to change the word <i>PELEMPARAN</i> for coin with <i>PELAMBUNGAN</i></p> <p>The definition for trial is not necessary in summary</p>	<p>Has been eliminated</p> <p>Has been eliminated</p> <p>Missing letters have been written</p> <p>The word <i>UANG LOGAM</i> is replaced with KOIN</p> <p>The word <i>PELEMPARAN</i> is replaced with <i>PELAMBUNGAN</i></p> <p>The definition has been eliminated</p>

To see student's response at trial result stage towards teaching media used, the writers give out questionnaire at the end of the session. Based on the result of the questionnaire given to small scale trial participant, it can be deduced that the teaching media (CD) and student worksheet being made on sample space experiment

is suitable to be used as teaching media with slight revisions as suggested by validators. The results of the questionnaire are as follows.

Table 2: Analysis of student response towards teaching media on small scale trial

No	Description	Answer	
		Yes	No
1	I like the teaching media (CD) which I use	100%	0%
2	The teaching media (CD) shown helps me to easily understand sample space experiment	100%	0%
3	I like the game in the teaching media (CD)	92%	8%
4	The game helps me increase my understanding on sample space experiment	92%	8%
5	I am interested in the presentation (writing, picture, animation, and music) which is in the teaching CD	88%	15%
6	I can easily use this interactive teaching media (CD)	92%	8%
7	I feel the advantages of using teaching media (CD) in this lesson	100%	0%
8	Student worksheet that I use makes me understand sample space experiment better	96%	4%
9	The worksheet that I use can help me do exercise and evaluation better	100%	0%
10	I feel the advantages of using student worksheet	96%	4%
11	I am interested in the presentation (writing, picture, letters, and color) of this student worksheet	100%	0%
Total		1056%	44%
Average		96%	4%

Table 3: Student's suggestion towards teaching media at small Scale trial

No	Draft II	Student's response	Draft III
1	Teaching media (CD)	Add more interesting animation Add more games so it would be more challenging Add with more interesting animation pictures Add other materials	New animation has been added One type of game has been added New animation pictures has been added Limited to only sample space experiment
2	Student worksheet	Add animation	-

From table 2, it is seen that students responded positively (96%) to the usage of teaching media so there are no revisions that must be done to the tested draft II. It means that draft II is the same with the result of the questionnaire.

From the validation sheet analysis and the questionnaire given to students on interactive math teaching media which is developed by the writers, it is deduced that

interactive maths teaching media is valid and can be used as teaching media. This means that this teaching media is appropriate to be used in math teaching process.

CONCLUSION

Based on the result of the research it can be concluded that the product of development of education game based interactive math teaching media for year eleven students which consists of interactive teaching media (CD) and equipped with student worksheet is valid.

Related to the research done, so the writers suggest the following

1. High school math teacher is suggested to use interactive math teaching media which has been developed for teaching sample space experiment and able to develop interactive maths teaching media for other topic because it helps student in learning process.
2. It is necessary for a further research to test the effectiveness of education game based interactive teaching media because in this research the writers only conduct it to small scale trial stage.

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