THE DEVELOPMENT OF INTERACTIVE MATHEMATICS MULTIMEDIA ABOUT CIRCLE WITH CONTEXTUAL TEACHING AND LEARNING APPROACH FOR STUDENT GRADE 8 JUNIOR HIGH SCHOOL

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Abstract

The quality of learning mathematics can be promoted through the application of learning strategies and supported by using appropriate learning media. This research objective is to produce interactive multimedia with contextual teaching and learning approach on the subject of circle in class VIII. The research method used is development research which involves several main steps, as follows: 1) developed products need analysis, 2) developing the initial product, 3) expert validation and revision, 4) small-scale field trials and product revision, 5) large-scale field trials and the final product. Research trials for need analysis conducted at class IX of a public junior high school in Jakarta involving 60 students who have passed materials class VIII and two mathematics teachers. One of the materials that are considered to be difficult for the students is circle. Respondents assumed the mathematics subject needs to be connected with real life situation and they would be interested in learning mathematics using interactive multimedia. Based on the result of need analysis, initial product is developed by using software Adobe Flash. The next step is expert validation involves material, language, and learning media judgements. At this step, inputs and suggestions are received to a revised initial product. After that, small-scale and large-scale field trials are conducted at class VIII of a public junior high school in Jakarta involving 12 and 60 students, respectively. According to the result of expert validation and field trials, it can be concluded that the interactive multimedia developed has propered to be disseminated and used as mathematics learning media at school.

Keywords: mathematics, interactive multimedia, CTL, circle

INTRODUCTION
Science and technology today continue to grow rapidly. This development requires every person to be able to harness science and technology so well skilled in living a positive life and can compete in the globalization era. To achieve this goal, it is necessary to improve the quality of education in all disciplines, one of which is mathematics.

Mathematics is a subject that is considered very important and is taught at every level of education in Indonesia. All the people in his life cannot be separated from mathematical activities ranging from the simple to the complex. The purpose of learning mathematics is not just mastery of certain materials by students to answer math problems mechanically, but also enhance students' performance to solve problems in their life.

In general, students often have difficulty in learning mathematics, this is partly due to the low interest and motivation of students in learning mathematics. Mathematics is often regarded as abstract subjects, difficult, and tedious.

Difficulties experienced by students in mathematics learning can not be separated from the application of learning methods that are less precise. Currently the application of conventional learning method based on the teacher *(teacher-centered)* is considered no longer appropriate. Various innovations in learning mathematics needs to be done as an effort to improve the quality of learning mathematics.

Based on the results of needs analysis data processing about questionnaire involving 60 students of class IX of a public junior high school in Jakarta obtained the following information.

1. One of the topics that are considered difficult by students is a circle.
2. Students are considered materials in mathematics need to be associated with situations in daily life.
3. Most of students are interested in learning mathematics using interactive multimedia.

Learning math will be more meaningful and interesting to students if teachers can bring contextual problems, namely the problems that are already known and close to the daily lives of students. Contextual issues can assist students in understanding mathematical concepts are learned and can also be used as a source of mathematical applications. The application of contextual teaching and learning strategy need to be supported also by the use of appropriate learning media. The use of instructional media recognized by many educational practitioners help learning activities.

Based on the explanation above, it can be concluded that needs to be developed a model interactive multimedia with contextual approach in the matter circle to class VIII student of SMP.

THEORITICAL BACKROUND
1. Multimedia
According to AECT *(Association of Education and Communication Technology),* which is cited by Arsyad (2011), are all forms of media and channels are used to convey the message or information. Warsita (2008) says that learning is any attempt to deliberately create the conditions that can be facilitated achievement of learning objectives. Thus, learning media can be defined as anything that can be used to deliver the message (study materials) that can occur in the student learning process.

Media that can be used to help the learning process is very diverse, ranging from simple props such as books and traditional to modern instructional media such as audio-visual media. Arsyad (2011) classifies instructional media based technology development, namely: a) the results of printing technology media such as books and static visual materials, b) the results of media technologies such as audio-visual projector and *tape recorder,* c) media technology based on the results of a computer or regular known as *computer-assisted instruction,* and d) the results of the combined media technology that combines the use of some form of media that is controlled by a computer.

The use of instructional media is important to help the learning process. According to Arief (2007), the process of teaching and learning that occurs in schools is a process of

communication, which is a process of delivering a message from the message source via a particular channel or medium is the message recipient to students. The message will be communicated in this regard is learning materials. Source of the message can come from teachers, students, or author. The use of instructional media allows such messages can be conveyed properly and capable of accurately translated by the students.

Along with the advancement of technology, the media can be used to support the learning process is increasingly diverse. According to Guerrero (In Fadaee, Eslami, and Farhadian, 2008), the use of technology in mathematics instruction is intended to help develop a constructivist-based learning environment, the learning environment that allows students to build their own knowledge.

Instructional media are now more varied, ranging from conventional media such as books and traditional props up the audio-visual media are more modern. Interactive Multimedia is one of the media that have various forms of variation, there is a form of the game, the questions, and there is also a form of teaching materials (Prastowo, 2011) Some of the components in contextual teaching and learning approach can be contained in the interactive multimedia learning. The concept or learning materials mathematics is served in the interactive multimedia can be associated with the context in the life. The questions can be set in the interactive multimedia so that students will have the opportunity to think and analyze the context that given. After the students think and analyze the context is given, it is hoped that students can answer the question and build their own knowledge. Besides interact with interactive multimedia, the students also could have had a discussion with the teachers or other students to answer these questions that murders learning community. A Model that supports the process of learning can also be presented in the interactive multimedia. The interactive multimedia can also contain questions or comments that can direct the students to reflect on what they have learned.

2. Contextual Teaching and Learning

Doyle (2005) states that learning occurs in a meaningful context, the context that is relevant to the student experience. This will enhance the students' understanding of new concepts learned. Learning math will be more meaningful and interesting to students if teachers can bring contextual problems, namely the problems that are already known and close to the daily lives of students. Contextual issues can assist students in understanding mathematical concepts are learned and can also be used as a source of mathematical applications.

According to Johnson (2002), to be able to implement contextual learning, the teacher in the learning connects the material to be taught the students the real world and encourage students to make connections between the knowledge possessed by its application in everyday life. The seven components of the contextual approach is constructivism, inquiry, questioning, learning community, modeling, reflection, and the authentic assessment.

a. Constructivism

Contextual approach is the cornerstone of the philosophy of constructivism, which emphasizes learning philosophy that learning is not just memorize. Students must construct their own knowledge in mind. Constructivism developed the idea that students will learn more if given the opportunity for meaningful work, locate, and construct their own knowledge and new skills.

b. Inquiry

This component facilitates the discovery activities, which enable students to acquire knowledge and skills through discovery itself (not the result given the number of facts).

c. Questioning

Can ask students to develop an inquisitive nature. Asked the teacher is seen as an activity to encourage, guide, and understand the students' thinking skills, whereas the activity asks students to collect information, confirming what is already known and demonstrated attention to aspects that have not been learned.

d. Learning Community

The concept of learning communities suggests learning outcomes gained from the cooperation of other people. The results obtained from the study *'sharing'* between friends, between groups, and between the idea to the uninitiated. Community learning occurs when there is two-way communication, two or more groups are involved in teaching communications mutual learning.

e. Modelling

In contextual learning, the teacher is not the only model. Models can be designed to engage students and also bring in from outside.

f. Reflection

Reflection is a way of thinking or responses about what is newly learned or think about what you've done in the past. Realization of learning, the teacher leaves the students took a moment for reflection in the form of a direct statement about what day it was obtained.

g. Authentic Assessment

Assessment is the process of collecting a variety of data that can provide an overview of the development of student learning. In contextual learning, on the development of student learning teachers need to know in order to ensure that students experiencing learning correct. The focus is on the completion of the assessment task and contextual and relevant to the assessment of the process and results.

Some of these components can be contained in a multimedia interactive learning. Mathematical concepts or learning material presented in interactive multimedia can be associated with the context of everyday life. The questions can be raised in a multimedia interactive so that students have the opportunity to think and analyze real context given. After the students to think and analyze a given context, students are expected to answer questions and build their own knowledge. In addition to interacting with interactive multimedia, students can also discuss with the teacher or other students in answering these questions so that creates communities of learning. Models that support the learning process can also be presented in interactive multimedia. Interactive multimedia may also include questions or statements that can lead students to reflect on what they have learned.

3. Circle and Geometry

The circle is one of the materials that have learned in class VIII SMP. Some circles including the domain material geometry. Geometry is one of the branches mathematics who studied objects such as the starting point, line, the area, space-relationship, along with their relationship, the whole its object is abstract (Van de Walle, 2005).

METHOD

The method used in this research is a method of research and development. According Sugiyono (2010), methods of research and development is a research method that is used to produce a particular product and test the effectiveness of these products.

The procedure of this study refers to the development of five major steps proposed by Tim Puslitjaknov (2008), which needs analysis, product development, validation and revision of product experts, small-scale field trials and large-scale field trials.

a. Needs Analysis

Preliminary research in the form of needs analysis is the first step that must be done in research activities and development, it is intended to find out what requirements are needed in order to overcome problems and obstacles in learning activities. Needs analysis conducted by collecting data in the form of information and feedback from teachers and students who will be the target of research as well as input from other parties concerned and interested with it. By doing needs analysis, it is expected that the products really fit the needs *(based on need).*

b. Product Development (Learning Media)

The products will be designed and developed taking into account the suggestions and input from relevant parties such as teachers, lecturers, material experts, linguists, and media experts.

c. Validation Expert and Product Revision

Before the mass used, the products should be examined first by the expert or experts in accordance with the product. At this stage, the experts were asked to examine the initial product that has been generated, then asked to provide feedback about the product. Based on input from experts, the revised product.

d. Small Scale Field Trial

Respondents were comprised of 10-15 people are asked to use the products and then provide comments and feedback on products recently used. Based on input from these small groups, revised product.

e. Large Scale Field Trial

The move is widely product trials. Trials at this stage is given to a number of respondents were more numerous and heterogeneous. Input from the results of field trials are the basis for the final product improvement and refinement. Once repaired in accordance input from field trials, the product is considered final and ready to be distributed or used in bulk. The research has implemented a on March until June of 2012 at a public junior high school in Jakarta.

RESULT AND DISCUSSION

The results of this research is the development of interactive multimedia with contextual teaching and learning approach on the subject of the circle in class VIII SMP using the software Adobe Flash CS 5.

Initial products were then validated by experts and expert content and language learning media. At this stage the obtained feedback and suggestions for revision of the initial product making it feasible to use for small-scale field trials were followed by a

large-scale field trials. The end result of test material and language experts acquire a percentage of 87.88% to 81.91% and the indicator material for language indicator. The end result test media experts earn a percentage of 87.86% for the indicator display, 82% for the navigation indicators, and 80% for the indicator interactivity.
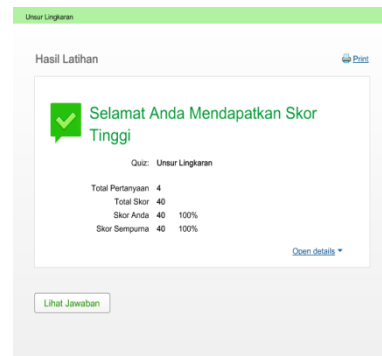
After the initial product was revised based on feedback from expert validation, field tested products. Small-scale field trials involving 12 students of class IX SMP 49 Jakarta. Large-scale field trial involves two teachers and 60 students of class IX SMP 49 Jakarta. The trial results for teachers to get a percentage of 92% for the indicator material, 97.14% for the language indicator, 90% for the indicator display, 88% for the navigation indicators, and 100% for the indicator interactivity. The results of testing students gain a percentage of 89.6% for the indicator material, 87.86% for the language indicator, 89.22% for the indicator display, 85% to 90% and navigation indicator to indicator interactivity. Interpretation of these results belong to the category of good and very good.

Here are some of the revisions made to the initial product that contains a pretty basic mistake.

Initial Product	Final Product
Only show examples of circles in daily life.	Showing examples and not examples of circles in daily life.
Circumference measurement process is still not right.	Circumference measurement process is appropriate.
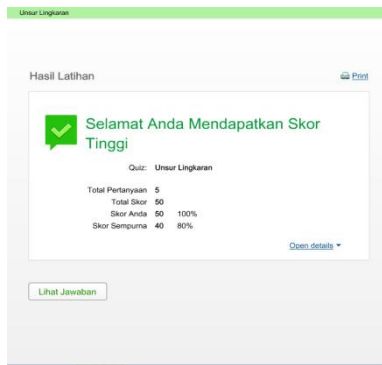
Scoring has not been right. Ideal maximum score is 80%	Scoring is right. Ideal maximum score is 100%
The circle consists of triangles. (This definition is not appropriate).	The circle consists of pie-pie. (This definition is appropriate).
Navigation buttons are still not good, quite disturbing.	Navigation buttons have been good.

CONCLUSION

Based on the results of this study concluded that the research undertaken has resulted in the development of *interactive multimedia with contextual teaching and learning approach on the subject of the circle in junior class VIII.* Results of the study concluded that the majority of respondents supported the development of the product. Respondents were comprised of professors as expert examiners, teachers and students responded positively to the interactive multimedia that have been developed. Thus, it can be concluded that the developed interactive multimedia is feasible to be disseminated and used as a medium of learning mathematics in school.

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