DEVELOPMENT OF LEARNING MEDIA AT MOBILE-BASED CALCULUS COURSES AT INFORMATICS AND COMPUTER EDUCATION DEPARTMENT IAIN BUKITTINGGI

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ABSTRACT
This research is motivated because in the Department of PTIK IAIN Bukittinggi for the calculus course, the process of learning that developed so far only lecturers present the material and formulas in learning by being recorded and displayed in media such as infocus. In addition, students only use mobile devices as a means of communication, playing games and accessing social media. So researchers make a mobile-based application that can be used as an independent learning media for students in Calculus courses. The type of research that the author uses is Research and Development (R & D). The author uses an ADDIE (Analysis-Design-Develop-Implement-Evaluate) R & D. And the system development model of SDLC (System Development Life Cycle) version of Waterfall. And test the product by using validity test, practicality and product effectiveness. Expert validity test results show that the designed application is declared valid with the value of 82.1%. While practicality test results show that the designed application is stated very practical with a value of 86.7%. The effectiveness test result also showed by the students that the designed application is declared very effective with 89.75% value. So the learning media in mobile-based calculus courses can be used and used by students of PTIK IAIN Bukittinggi.

Index Terms — Learning Media, Calculus, Mobile, ADDIE Model, SDLC

INTRODUCTION
The process of learning that developed so far only lecturers present the material and formulas in learning by being listed and displayed in media such as infocus and then explained, students are given training and then discussed together. With the widespread use of android devices among IAIN students Bukittinggi, but the utilization of these devices have not been maximized. Students only use it as a means of communication, playing games and accessing social media. With these facts encourage writers to create mobile learning applications as a medium of learning.

This mobile application learning media can be accessed anywhere and anytime and easy to carry and attracted many students, so that students can learn in a relaxed manner wherever and in a relaxed environment.

LITERATURE REVIEW

1 Learning Media
Gerlach & Ely, said that the media when understood in broad outline is human, material, or events that build conditions that enable students to acquire knowledge, skills, or attitudes. In particular, the notion of media in the teaching and learning process tends to be interpreted as graphic, photographic, or electronic tools to capture, process and rearrange visual or verbal information (Arsyad, 2002: 3). Gagne states that the media are the various types of components in the student environment that can stimulate them to
learn, while Briggs argues that the media are all physical tools that can present messages and stimulate students to learn (Arif S. Sadiman, 2003: 6).

The medium of instruction according to Ibrahim and Syaodih (2003: 112) is defined as anything that can be used to distribute messages or content, stimulate students' thoughts, feelings, concerns and abilities so as to encourage teaching and learning. From the various definitions above can be concluded that the media are all objects that can distribute messages or content of the lesson so as to stimulate students to learn.

2. Mobile Learning

The need to access information regardless of time and place has enhanced the effects of mobile technology and mobile learning, and also led to a change of strategy in the learning process (Uysal & Gazibey, 2010). Compared with PCs, mobile learning is basically improving the ability of learners to physically move their learning environment to their liking (Ogata & Yano, 2004). Mobile learning is implemented with lightweight devices such as Personal Digital Assistant (PDA), mobile phone, Tablet PC. Mobile devices can connect to the internet with wireless communication technology. Mobile learning is considered a new stage in computer development and distance learning (Georgieva, Trifonova & Georgeiev 2006).

Milrad (2003) defines mobile learning as e-learning using mobile devices and wireless transmissions. Salmon (2004) considers mobile learning as the fourth generation of the electronic learning environment. Mobile devices have given people the freedom to use them when they need wherever and when needed (Trifonova & Ronchetti, 2007). Whatever learning happens when the learner is not fixed by place or time, this can happen anytime, anywhere, with services offered by mobile devices that present learning content and enable wireless communication between faculty and students (Dye, Solstad, & K ’ Odingo, 2003). In addition, mobile devices also provide opportunities for students and faculty to take advantage of their free time while traveling for duty or preparation in lessons (Virou & Alpis, 2005). Ease in accessing learning content in mobile learning, this will provide the option for self-study and can be used as an evaluation and feedback tool (Eschenbrenner & Nah, 2007; Jacob & Isaac, 2008).

Mobile learning also facilitates the interaction between students and lecturers in the classroom and allows for the exchange of information outside the university (Lam et al., 2011). Mobile learning is defined by Clark Quinn (Quinn 2000) as: The intersection of mobile computing and e-learning: accessible resources wherever you are, strong search capabilities, rich interaction, powerful support for effective learning, and performance-based assessment. E-Learning independent of location in time or space. Based on these definitions, mobile learning is a learning model that utilizes information and communication technology, anytime and anywhere.

3. Calculus

Fundamentally different calculus of mathematics, calculus is not so static and more dynamic. Calculus with regard to change and movement, which handles quantities close to other magnitudes.

Calculus according to the Latin word Calculus, which means small stone to calculate, which is a branch of mathematics that includes limit, derivative, integral, and infinite series. Calculus is the study of change, as is the geometry that studies forms and algebra that study its operation and its application to solve equations.

RESEARCH METHODOLOGY

The method used in this research is the method of research and development or Research And Development, is a research method used to produce a particular product. The steps of research & development research that the author apply is the version of ADDIE. Model ADDIE (Analysis-Design-Development-Evaluate). This model uses 5 development stages:
1. Analysis
The analysis phase is a process of defining what the learners will need, i.e., doing needs assessment, identifying problems (needs), and performing task analysis.

2. Design
This stage is known for making blueprint design.

3. Development
Development is the process of realizing blueprints into reality.

4. Implementation
Implementation is a concrete step to establish the learning system we are creating. That is, at this stage all that has been developed is set in such a way in accordance with the role or function so that the bias is implemented.

5. Evaluation
Evaluation is a process to see if the system is being built successfully, in accordance with the initial expectations or not.

The development model is defined as a conceptual design process in an effort to improve the function of the existing model, through the addition of learning components that are considered to improve the quality of goal achievement. The development of the model can be interpreted as an expanding effort to bring a situation or situation gradually to a more complete or complete situation or better situation. Development here means directed on a program that has been or is being implemented into a better program. "Development involves activating resources, expanding opportunities, acknowledging success, and integrating progress". The development of a new model is based on the experience of implementing the newly implemented program, individual or group needs, and adapted to the development and changing learning environment of the learning community.

The learning model is a plan or a pattern used as a guide in planning classroom lessons or learning in tutorials and for determining learning tools including books, films, computers, curriculum, and so on. Each instructional model directs us into designing learning to help learners in such a way that the learning objectives are achieved.

The development model used by the authors in this research is the multimedia development model Luther-Sutopo version. According to Luther, multimedia development model consists of 6 stages:

1. Concept
The conceptual stage is the stage to determine the purpose and the user of the program (audience identification).

2. Design
Design is the stage of making specifications about the program architecture, style, appearance and material needs / materials for the program.

3. Material Collecting
Material collecting is the stage of collecting materials in accordance with the needs done.

4. Assembly
The assembly stage is the stage of making all objects or multimedia materials.

5. Testing
The testing phase (testing) is done after completing the assembly stage by running the application / program and see if there is any error or not.

6. Distribution
At this stage, the application will be stored in storage media. If the storage media cannot accommodate the application then it can be compressed. This stage can be called the evaluation stage for the development of finished products in order to become better.

In R & D there are 3 stages of research that must be done: 2 (1) Validation Test, Expert Test or Validation, done with the respondents of model or product design experts. This activity is carried out to review the initial product, to provide input for improvement (2) Practicality, after the validation instrument validated and the result is valid with some revisions, then the next step is done by
prektikalitas. From the description and data analysis based on the observation result, the interview by the validator, student comments, show the practicum of the assessment instrument on the practical material, (3) Effectiveness, Effectiveness is the match between the student and the learning result. Based on these opinions can be said that the effectiveness of learning is a process that must be passed by students to achieve learning outcomes. This means that when the goal is reached, it must be questioned how far its effectiveness.

RESULT

a. Design

The programming of mobile-based learning media uses two kinds of programming languages namely Java programming language as the system controller and XML programming language that serves as a regulator interface, such as color, layout and item size of the learning media interface. To do pengkodingan these two programming languages can be done in the editor of Android Studio.

The results of this learning media in the form of * apk files that can be installed on the android device.

b. Assembly

Figure 1. Introduction

Figure 2. Menus

Figure 3. Silabus Display
Figure 4. Content Display

Figure 5. Sub Content Display

Figure 5. Sub Content Display (1)

Figure 6. Theorem Content Display

Figure 7. Sub Theorem Content Display
c. Testing
The testing phase of the finished program. If there is a program error, it will be repaired, and if it is running
well, the process will go to the next stage of the distribution. The testing stage is done after the completion of the manufacturing phase and all data is entered. In the testing phase, the application is tested with the Blackbox Method.

Based on the results of the validity test that has been done that the media discussion of this problem can be used with a moderate revision, according to the results of practical test that this multimedia can be used with a little revision, and the results of multimedia effectiveness test is very interesting. So in general that this medium can be used as a medium to help students learn independently in school and at home.

CONCLUSIONS

The creation of learning media applications in mobile-based calculus courses are expected to help for learning can be done anywhere and anytime and learning becomes more interesting.

Mobile-based learning media is very practical to use and a small application program master so that the application access smoothly used on mobile phones with android mobile operating system.

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