The Implementation of Blended Learning Using Android-Based Tutorial Video in Computer Programming Course II

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Abstract. Computer programming course is theoretical. Sufficient practice is necessary to facilitate conceptual understanding and encouraging creativity in designing computer programs/animation. The development of tutorial video in an Android-based blended learning is needed for students’ guide. Using Android-based instructional material, students can independently learn anywhere and anytime. The tutorial video can facilitate students’ understanding about concepts, materials, and procedures of programming/animation making in detail. This study employed a Research and Development method adapting Thiagarajan’s 4D model. The developed Android-based instructional material and tutorial video were validated by experts in instructional media and experts in physics education. The expert validation results showed that the Android-based material was comprehensive and very feasible. The tutorial video was deemed feasible as it received average score of 92.9%. It was also revealed that students’ conceptual understanding, skills, and creativity in designing computer program/animation improved significantly.

1. Introduction

Computer programming is a compulsory course since recent technologies relatively connect to computer [1]. One of its objectives is to enable students to design computer program for physics instruction in schools. This course requires skills in designing program, a lot of practice, and exercises [2]. This course also requires logical thinking skills to design computer programs or animations. Students are also required to understand concepts and theories [3].

The overuse of computer laboratory of Universitas Kanjuruhan Malang results in the students’ limited lab work opportunity. This leads to students’ lack of skills and creativity and long completion of coursework.

The implementation of blended learning using Android-based tutorial video becomes a necessity to overcome this problem. Using Android-based instructional material, students can practically learn
anywhere and anytime so that their learning frequency increases. Tutorial video can facilitate their conceptual understanding and provide more opportunity for independent learning.

Android is one of the ever rapidly growing operating system [4]. Since it is open-source, it receives many supports from various technologies [5]. It can be used on various mobile devices so that the users can explore and experience more than other mobile platforms. It is user-friendly; just touch and swipe. The rapid advancement of smartphones and their ever-cheaper price become an encouraging factor in the prolific implementation of mobile blended learning. This shapes a paradigm that teaching can be done anywhere and anytime. Nowadays, many students use their smartphones as learning media [6].

Blended learning is a combination of in person teaching and computer-aided teaching [7] or of conventional classroom teaching and e-learning [8]. Blended learning was developed due to the insufficiency of online learning. Not all instructions can be done online [9]. Blended learning is the best choice to make learning more effective, more efficient, and more interesting.

In order for the lab work to be more efficient, more effective and encourage students to be independent learners, a tutorial video was developed. This video demonstrates step-by-step tutorials of how to make animations or to design computer programs. It shows images, graphics or diagrams. It is very informative and can be replay and rewind, so the materials can be more easily understood by the students.

The tutorial video is very suitable for learning process [10-11]. The average learning outcomes of students who learned using Android-based tutorial video [12-13] were better those who attended conventional lesson. The tutorial video also helped students correct their mistakes and do the coursework as instructed [10]. One of the advantages of the tutorial video is that it provides feedback for the students [14].

Based on the aforesaid explanation, a blended learning using Android-based tutorial video was developed to improve students’ conceptual understanding and skills in designing computer programs/animations. In particular, the aim was to figure out the feasibility of the developed Android-based instructional material and tutorial videos for computer programming II.

2. Methods
This study employed a Research and Development method adapting Thiagarajan’s 4D model [15]. The Android-based instructional material was developed using Adobe Flash 6, and the tutorial video was design using Camtasia 8. The developed design is illustrated in Figure 1.

![Figure 1. The design of Android-based instructional material](image)

The developed Android-based material was tried out using five smartphones with different brands and specifications. And the developed tutorial video was tried out using several desktops, laptops, netbooks, and smartphones.

The comprehensiveness and the feasibility of the developed Android-based instructional and tutorial video were validated by four experts: one expert in instructional technology and material, one expert in instructional material, one expert in instructional technology, and one expert in innovative teaching. The instruments were a check list and a Likert scale questionnaire. The obtained data were analysed qualitatively.
3. Results and Discussion
The display of Android-based instructional material is shown in Figure 2. The users just need to touch and swipe the screen. The material was presented concisely, consisting of key points only. The programming/animation making practice was presented in detail so that the students can easily understand it.

![Figure 2: Home, Main Menu, and Chapter II]

The results of try-out using five smartphones with different brands and specifications can be described as two points. First, users can be operated smoothly on all brands and types of Android-based smartphones. Then, second, users cannot be operated on Windows-based smartphones because it is not designed for operating systems other than Android.

3.1. The Feasibility of Android-Based Instructional Material
Based on expert validation results, the Android-based material was deemed comprehensive and received an average score of 88.6%. And its feasibility average score was 92.5%. In detail, the expert validation results for five aspects of feasibility are shown in Figure 3.

Its effectiveness aspect was considered feasible with an average score of 89.8%. All validators agreed that the material was effective to facilitate the process of teaching and learning. This is in line with the results of some previous research [6,8,16,17] that mobile learning was effective in improving learning outcomes and students’ participation.
There were three items the validators did not agree upon. They were learning evaluation indicators, the sequence of material presentation, and the irrelevance of learning evaluation to the course objectives. The learning evaluation indicators were not as comprehensive as conventional instructional material indicators. This was meant to ensure its practicality and simplicity and to economize memory use. The sequence of material presentation was actually arranged in such a way that it was presented from the easiest to the hardest.

Its efficiency, usability, and compatibility were considered very feasible, receiving scores greater than 90%. Using the Android-based material, the process of teaching and learning became paperless and more practical, and could be done anywhere and anytime. It goes to say that students’ participation and learning frequency increased and that the instructional process became more intensive, more effective, and more efficient. In other words, blended learning improved the quality of learning and made the learning climate more conducive.

Its usability received a score of 92.5% or could be said to be very feasible. The usability was measured based on its user-friendliness, practicality, and simplicity. The touch screen made it very user-friendly.

Its compatibility received a score of 93.8%. It was measured based on its compatibility with different types of smartphones. The expert validation considered it as highly compatible.

The design was assessed in terms of its display, colours, images, graphics, and font use. There were two items the validators did not agree upon: the font use and colour combination. However, the design received an overall score of 88.5%, so it could be categorized as feasible.

3.2. The Feasibility of Tutorial Video

The tutorial video was created using Camtasia 8. It consisted of some crucial topics that students frequently found them difficult to understand. The developed video was in .avi format, enabling it to be played on different computers, VCD Players, and smartphones. Thus, it could be played anywhere and anytime. The quality of images and sounds depended on the computer specifications. When played on a VCD Player, the quality was lower than it was when played on a laptop.

The tutorial showed computer screen display, mouse motion, and other several changes on the monitor during the animation making. It was also equipped with explanatory audio to guide the students. The feasibility of the tutorial illustrated in Figure 4.

![The Feasibility of Android-Based Instructional Material](image-url)
The tutorial video, as shown in Figure 4, received an average score of 92.9%. With scores greater than 90%, its effectiveness, efficiency, usability, and compatibility were considered very feasible. The design was the only aspect to receive score lesser than 90%.

All validators agreed that the tutorial video could facilitate the process of teaching and learning. It improved students’ skills significantly and was proven to be more effective in improving students’ competence and knowledge.

There were two items the validators did not agree upon: the content and size. The video content was deemed irrelevant to the curriculum and classroom teaching and learning process. This was due to the fact that the video could not be as comprehensive as a book, but could explain complicated concepts that a book could not. In addition, the file size was also too big, so it consumed a large portion of memory.

The score for the efficiency of the tutorial video was 95.8%. The video improved the efficiency of classroom teaching and learning process. It can be easily transferred across devices.

The score of its usability was 93.8%. This aspect included its easiness to use. The .avi format ensured its usability as users could play it on various types of computers, VCD Players, and smartphones.

The video’s compatibility received a score of 93.8%. This aspect measured its capability of being operated on various electronic devices. The .avi format made it possible for the video to be played on different types of computers, VCD Players, and smartphones.

With a score of 89.1%, the design was validated to be feasible. The design validation measured the video’s clarity, display, practicality, and explanatory audio. The was only one item the validators did not agree upon; it was the clarity of audio. It was because the recording process was not done in a special room. Noises were recorded. However, the explanatory audio was still dominant and could be well listened to by the users.

4. Conclusion

The developed Android-based instructional material was proven to be able to be operated on various types of Android smartphones. With an average score of 88.65, the application was validated as comprehensive. Its efficiency, usability, and compatibility were considered very feasible, receiving scores greater than 90%. Overall, the average score was 92.5%. Thus, it could be categorized as very feasible to use in the process of teaching and learning. Further, the developed video was in .avi format, enabling it to played on different computers, VCD Players, and smartphones. With a score of 92.9%, the tutorial video was categorized as very feasible to use.

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