

Android Application Development for Force Topics in Year Six (6) Science Subject

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Abstract: Android learning applications have become a necessity nowadays where students use them as an additional learning medium. This study aims to develop a learning android application for the topic of force in the subject of Science Year Six (6). This study uses the ADDIE model as a guide in the development of android applications for force topics in science subject Year six. The ADDIE model involves five (5) phases, namely the analysis phase, design phase, development phase, implementation phase, and evaluation phase. In the analysis phase, the developer analyzes the hardware and software requirements required for the development of learning application products. During the design phase, the developer designs the storyboard based on three (3) designs, namely content design, interface, and interaction. Development phase, developers develop learning android application products using software such as Adobe Animate CC, Adobe Flash CS6, Adobe Photoshop 2018, Adobe Illustrator CC, and Audacity. The implementation phase allows the developer to upload the apps to the Play store. Finally, the evaluation phase involves the evaluation of the level of functionality of the product by three (3) experts. The findings from the expert evaluation showed that all three experts agreed that the functionality of the product worked well and was appropriate for the age of the user. In conclusion, this product can be one of the teaching aids to enable students to understand the topic of force for science subjects in year six (6) better.

Keywords: Android Application, Learning, Sciences, Force, Mobile Learning

1. Introduction

Information Communication and Technology (ICT) has grown very rapidly in modern times where the field of education requires the use of ICT to facilitate the teaching and learning process. According to Chew et al., (2017), information technology is only at the fingertips where the use of smartphones is becoming more widespread, especially in the field of education. Teaching and learning are now more interesting when the use of technology is not only focused on the use of computers alone, but

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smartphones become a necessity in the implementation of the learning process inside and outside the classroom and it is also referred to as mobile learning.

Mobile Learning (M-Learning) is one of the self-learning approaches that can increase students' motivation to learn something according to their abilities (Hamzah et al, 2017). According to Neyema et al., (2012) through the m-learning method, the learning process is no longer concentrated in one platform only or only limited to a classroom instead, m-learning is more just-in-time, just-in-case, on-the-move, and on-demand. This shows that the use of this mobile device can happen anywhere, and it is very easy in the learning process compared to the use of notebooks that are easily damaged and do not last long. Ahmad Sobri (2010) also said that this situation has shown that mobile devices such as mobile phones, Pocket PCs, and other convenient devices have their own advantages over conventional materials. Therefore, learning android applications become one of the requirements for teachers to be used as Teaching Aids which is in line with the development of ICT.

1.1 Mobile Learning (M-Learning)

Georgiev et al (2006) stated that M-Learning is unique learning because mobile learning can be accessed wherever students are. This fact is supported by Listyorini (2013), M-Learning is a learning model that utilizes ICT. The concept of M-Learning provides training that is always accessible and has an attractive visual form. This can increase students' attention and motivation.

The use of mobile learning for teaching and learning purposes provides many advantages where users can use smartphones to meet the needs of teaching and learning. This is supported by Traxler (2015) stated that the use of mobile learning provides a good advantage when the learning process occurs. In addition, the use of smartphones for teaching and learning purposes provides many advantages such as increasing student motivation, and user-friendliness and can improve collaboration between students.

Barker (2005) argues that the use of Mobile Learning provides benefits such as (i) user-friendliness i.e. the use of mobile devices has a user-friendly nature where the equipment can be taken anywhere and implemented at any time required; (ii) collaboration i.e. students can collaborate with others through social networks such as Facebook, WhatsApp, Twitter and others that can be shared with other group members to increase their knowledge and (iii) motivation i.e. the use of mobile devices in learning can help in increasing the motivation and interest of students in following the subjects they study because students can be involved as a whole in the learning process.

1.2 The Use of Android Applications in the Teaching and Learning Process

The use of android applications for teaching and learning purposes is no stranger where it is a necessity in mobile learning platforms. In addition, learning android applications can attract students to continue learning and can directly increase students' motivation. According to Astuti et al., (2015) stated that one of the learning media that can overcome the problem of students' interest in bringing books to school is to use pocketbooks, but pocketbooks are less suitable to be taken anywhere. Therefore, the appropriate learning material according to the latest technological developments in mobile learning using android.

The use of learning android applications can provide many benefits, especially to students. Alhafidz et al, (2018) stated that learning using android applications it provides many benefits such as (i) this application developed can help students to use the benefits of mobile devices to the maximum in the process of improving learning because it can be obtained for free at play store and (ii) this application is a learning medium that is easy to carry anywhere and can be used anywhere.

2. Methodology

The research methodology selected in the development uses the ADDIE model as a guide. The researcher found that ADDIE models are one of the most suitable methods because they are more concise, clear, and easy to use in development.

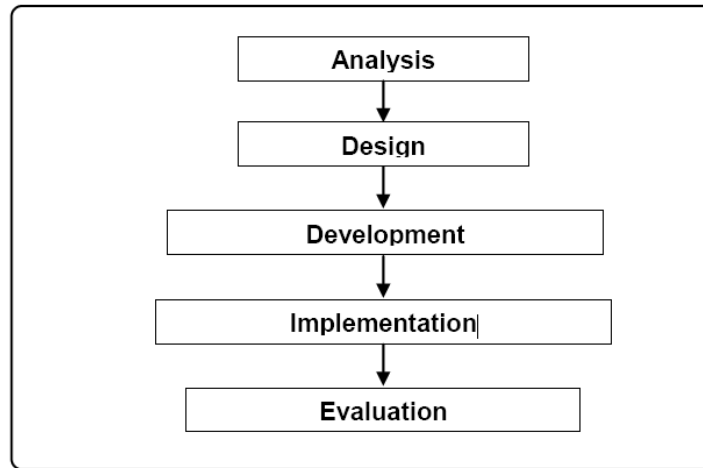


Figure 1: ADDIE Model (Rossett, 1987)

Figure 1, ADDIE Model (Rossett, 1987) emphasizes the five-phase. The ADDIE design model is one of the models used as the basis for the design model (Subramaniam et al., 2018). According to Nasohah et al., (2015) the ADDIE model has five (5) main parts namely (1) analysis (2) design (3) development (4) implementation, and (5) evaluation. In addition, according to Nasohan et al., (2015) also the ADDIE model is a burst of ideas developed by Dick and Carry (1996). ADDIE design is systematic in nature for designing, developing, implementing, and evaluating. To the statement of Bacotang et al., (2017) in the field of education, design is a guideline in finding strategies, systematic methods, and technologies used in achieving goals to facilitate the achievement of development objectives.

In the analysis phase, the researcher has performed the analysis to determine the appropriate software to be used in developing the product and able to achieve the teaching and learning objectives that have been outlined. The software used for the development of this learning android application is Adobe Animate CC, Adobe Photoshop CC 2018, Adobe Illustrator CC, Adobe Flash CS6, and Audacity. In this phase, there is also a lot of determination of the elements used either in terms of content, screen design, and navigation design through the preparation of storyboards. Storyboarding is a process of sketching and producing a storyboard is also a process of idea development or the process of transforming ideas into real form (Mohid et al., 2016).

The third phase, the development phase, involves storyboards that were previously planned to be translated more practically in the development phase. Android application development and combined with programming that further complements the process of user interaction with the application. In this phase, the developer will also start designing application buttons such as home, back, previous, exit buttons, and buttons related to the application to be developed. This development also includes interface development, animated video development as well as audio development.

The fourth phase is the implementation phase where each application content is tested by the developer to ensure there are no problems in terms of programming and in terms of graphic design. This phase is implemented to ensure that no errors occur when the application development is ready to be developed. If there are problems that arise the developer implements improvements. When the application is ready to be developed, the developer saves and converts the application to APK format

(android application package). After that, the developer uploads on the mobile phone to see the display of the application on the mobile phone.

The last phase the evaluation phase involves the developer choosing to make the evaluation summative, the developer uses an expert verification checklist form to be submitted to the expert to check the suitability in terms of content, interface, and interaction. This evaluation is important as looking at the suitability of the application being built to meet the objectives of the application. In addition, this assessment is also to see the suitability of all the designs used in accordance with the target users. If there are design and content errors the developer should make modifications and improvements.

The interview method was used to assess the functionality of the products produced. This interview was conducted with several experts involving a sixth (6) year science teacher at Sekolah Pintas Puding Parit Raja and 2 lecturers from the Faculty of Technical and Vocational Education in the field of Creative Multimedia. Structured interviews were used to evaluate three designs namely content design, interface design, and interaction design.

3. Results and Discussion

There are five phases based on the ADDIE model that is used as a guide in the development of this product. In the analysis phase, the developer analyzes the software and hardware requirements to develop this product. In the design phase, the developer produces the storyboard, and then in the development phase develops the product using the appropriate software. Next, the implementation and evaluation phase of the product is carried out. Figure 2 shows the main page learning android application. This web-based have five menu (Home, Instruction, Video Tutorial, Quiz and Frequently Asked Questions (FAQ)).



Figure 2: Main Page Learning Android Application

Figure 3 shows the main menu in the learning android application (which consists of three menus). Each menu will consist of an explanation about a related topic and detail about each content.



Figure 3: Main Menu Interfaces



Figure 4: Content Interfaces

Figure 4 shows an explanation each main menu in learning android applications (for example explanation about “maksud daya”).



Figure 5: Video in Learning Android Application For Detail Explanation of Each Menu

Figure 5 shows a video on learning android applications for a detailed explanation of each menu. Figure 6 shows the test/exercise interface provides ten (10) questions that cover the entire topic that students learn in this learning android application.



Figure 4: Quiz Interfaces

Table 1 shows the developers have analyzed the views and expert reviews that have been proposed by the three experts on the functionality of web application development video tutorials and practical learning Adobe Flash CS6 online. Improvements have been made to content design, interaction design, and design interface. Expert views and comments on the development of this product are as in table 1.

Table 1: Expert Views and Comments on the Development

Expert	Expert Positions	Reviews and Comments
Expert 1	Sciences Teacher at SK Pintas Puding Experienced for 20 years in the field of Sciences Subject	<ul style="list-style-type: none"> • The content is appropriate to the objectives to be achieved. • The content coincides with the sequence in the textbook. • The use of animation as content facilitates students' understanding. • Content that coincides with the syllabus of the Ministry of Education Malaysia. • Easy -to -understand application instructions. • Simple and attractive navigation buttons <ul style="list-style-type: none"> • Button size to suit potential users • Simple navigation usage instructions. • Built -in interfaces are interconnected. • Attractive interface for school students. • Accurate and appropriate icon design.
Expert 2	-Lecturer at the Faculty of Education Technical and Vocational at UTHM -Experienced for 15 years in the field of Information Technology and Creative Multimedia	<ul style="list-style-type: none"> • There are buttons that are less suitable for use. <ul style="list-style-type: none"> • There are buttons that the user needs to understand. Developers need to place the appropriate commands especially on the next button that should display the video page. • The use of the title of video 1, video 2, video 3 and video 4 is less appropriate to place the title on the video. • There are navigation buttons that are far apart from each other. • There is white text with a yellow background.
Expert 3	-Lecturer at the Faculty of Education Technical and Vocational at UTHM -Experienced for 10 years in the field of Information Technology and Creative Multimedia	<ul style="list-style-type: none"> • Content can be added by including the voice of the narrator.

Table 1 shows that all three experts have given suggestions for improvements to the products developed. The Android Application Developer for the Power Topic for Year Six (6) Science Subjects that has been developed has obtained expert validation to measure whether the objectives of this study are achieved or otherwise. Therefore, an evaluation form was issued by the university which was used as a research instrument. The comments and suggestions provided are to the development process of this application which includes content design, interaction design, and interface design.

The comments given by the first expert who is a schoolteacher who teaches Science Year six (6) have stated the content in accordance with the objectives to be achieved. Apart from that, it also coincides with the sequence in the textbook for year six (6) science subjects. As for the first expert

comment for Part C for the interaction design the first expert said that the navigation buttons are simple and attractive. In addition, the instructions on the app are also concise and easy to follow. In Part D, the first expert states which face are appropriate because they are interrelated. In addition, the designed background design is also suitable for primary school students. According to Padli, (2016) the design must be appropriate to the age of the user to ensure that the design produced attracts the interest of the user.

Next for comments and suggestions for the second expert, in part B which is content design, the expert did not give any comments and expressed agreement for all items. However, for part C, the second expert thinks that there are buttons that are not suitable for the user and require the developer to make a review. While for part D, the second expert stated that there is navigation that is far away from each other and causes users to have to follow the navigation quite far. The second expert also stated that there is white text with a yellow background that is not suitable. According to Nasohah, (2015) the effectiveness of the process in the development of a product produced depends on the navigation design produced which it shows good functionality of a product produced.

In addition, for the comments and suggestions of the third expert, all items were given consent. However, in part B, the third expert commented to add the voice of the narrator for the content part. Thus, improvements are made by development through expert comments. Overall, the evaluation of this application has received positive feedback from experts. All expert views and reviews given on the development of this product are used by the developer as a guide to improving the application. Therefore, the three experts stated that the learning android application produced can help students understand related topics wherever they are and at any time. According to Padli (2016), mobile learning facilitates students to learn anywhere and anytime without limits of space and time.

4. Conclusion

Overall, this study was implemented with the aim of developing a learning-based mobile application for Year Six (6) Science subjects in the Topic of Power which was identified as a problem for students who are weak in learning to understand it. In addition, it is also a new experience for students to get additional learning that can be used at any time. Overall, too, the developers have already managed to develop this android application successfully. After that, the developer also successfully performed a joint evaluation of experts by recruiting a total of three experts who have knowledge in content design, interaction design, and interface design. All the experts have given comments and suggestions positive through the development of this android application for improvement. However, in getting the perfect development result, the development planning process must be arranged neatly. In addition, the selection of learning strategies and theories should be appropriate to the target users as well as the development objectives that need to be achieved.

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