

Development of 2D Animation Application Learning to Drive Class D Vehicles on The Driving School Circuit

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Abstract

The goal of this project was to create a 2D animation application for teaching class D vehicle driving on the driving school circuit as an extra learning tool for teachers and applicants for driving tests. As a design paradigm with five phases: design, development, implementation, and analysis, the ADDIE model has been chosen. This 2D animated Android app was created by the creators using Adobe Animate and Adobe Illustrator. Three multimedia experts who teach at the Faculty of Technical and Vocational Education and three content experts who teach in driving schools make up the group of chosen specialists. The information was gathered, examined, and given as feedback comments and frequency values. The results of the data analysis demonstrate that all three experts concur on the interaction design, but there is disagreement among them about the interface design and how the multimedia element is presented. This suggests that the developer has to make some improvements in these areas. On the other hand, when it comes to content specialists, everyone agrees on the application's content design. In conclusion, the Android application's construction has been successfully tested for functionality.

1. Introduction

These days, smart technology is rapidly spreading and rejuvenating throughout the world, especially in Malaysia. According to research from the World Mobile Phone Application Market, the market for mobile phone applications might reach up to USD 250 million in 2015 (Ayop, 2012). Malaysia is now not falling behind wealthy nations in terms of the development of cutting-edge technology, such as smartphones.

A mobile application, sometimes referred to as a mobile application, is software that may be run whenever and wherever a mobile phone is present (Islam, Islam, and Mazumder, 2010). Numerous applications that are specifically made for mobile phones exist to make it simpler for users to access the Internet, communicate with friends, manage files, engage in educational activities, plan their calendars, produce basic documents, and access entertainment programmes.

Nugraha and Fajar Mahmud (2020) contend that the use of 2D animation in learning materials can facilitate a teacher's work of imparting knowledge more successfully. Additionally, learning to use media like 2D animation can facilitate learning through simple observation of 2D animations. Because they are simple to

grasp, 2D animated movies can encourage pupils to continue learning. The sound, video, and images in this 2D animation are designed to grab students' attention.

1.1 Problem Statement

There are gaps in the developer's comprehension and expertise of how to operate the vehicle, according to the background the developer has uncovered. The applicant who will take the driving test will suffer as a result of this condition. Due to time restrictions that allow for just 10 hours per person, driving school instructors are unable to provide a thorough discussion of the topic of vehicle control. Additionally, the developers discovered that a person's excessive life activities would affect their ability to study since they would leave them with insufficient time. The trainers' ability to convey the scenario in the circuit during the circuit learning session has certain problems, which has made it difficult for the candidate to comprehend the handling of the car, according to the developers.

1.2 Project Objective

All The objectives of the project for the development of the application of driving learning class D on the driving school circuit are as follows:

- (i) Designing a 2D animation application for learning to drive a class D vehicle on a driving school circuit.
- (ii) Developing a 2D animation application for learning to drive a class D vehicle on a driving school circuit; and
- (iii) Assessing the functionality of the 2D animation application for learning to drive a class D vehicle on the driving school circuit.

2. Product Design

The approach used by the developers to guarantee that the application development adheres to all the criteria that have been planned to make the learning and teaching process successfully viable is the means to accomplish the goal of generating applications. As a result, the user will appreciate the application's content information. As a result, to create a successful learning application, the makers of this Android application used the ADDIE teaching design model as a guide. This ADDIE model's phases are broken down into the following categories: analysis, design, development, implementation, and evaluation. To properly execute and accomplish the goals of Android application development, Android application development must adhere to the ADDIE model's flowchart.

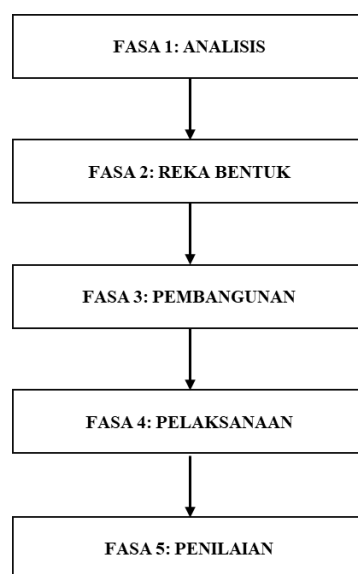


Fig. 1 Design Model (Rosset, 1987)

2.1 Design

A significant approach for instructional design is the ADDIE design model, which Rosset first presented in 1987. The ADDIE paradigm comprises five stages: analysis, design, development, implementation, and evaluation. The

development of Android applications is thought to be able to provide developers with a benefit over other models. Nasohah, Abd Gani, and Shaid (2015) state that based on the discussion's outcomes, the use of this model has proven to be successful since it can accomplish learning and teaching goals.

2.1.1 Analysis Phase

This phase of analysis also includes several steps to identify the issues that arise as well as the problems that need to be overcome and how they can be resolved. If the issues that arise can be identified, analytical measures will be implemented to find out the cause of the problem. Therefore, through the implementation of this Android application, some things need to be analysed by developers. Among them are the analysis of users, the analysis of the learning environment, identifying teaching objectives or goals, and so on.

When developers identify issues or problems arising from test candidates and instructors, they want to propose to this group the development of a Class D Vehicle Driving Learning 2D Animation Application on the Driving School Circuit. Then, feedback from driving test candidates and instructors of driving school institutions will be taken into account in the development of the application. Therefore, the development of this learning application is also based on the Kurikulum Pendidikan Pemandu (KPP) syllabus in the first edition related to class D vehicles (Jabatan Pengangkutan Jalan, 2016).

2.1.2 Design Phase

Through this design phase, it will explain the design, the theoretical approach to learning, and the structure that has been applied in the development. Therefore, the acquisition of all the information obtained by the developer has resulted in a sketch in the form of a storyboard. This storyboard sketching process is done before product development is implemented. This storyboard sketch has the purpose of illustrating the sequence, details of information, and compilation of the presentation display in the learning application.

The developer has chosen the Writer, Presentation, and Spreadsheets (WPS Office) software for developers to use in sketching storyboards. This storyboard can also help developers serve as a guide in developing the Class D Vehicle Driving Learning 2D Animation App at the Driving School Circuit as a result of all the details depicted in the storyboard sketch. Additionally, this design phase also deals with content design, interaction, and interface. The presentation design of the multimedia elements is also emphasized as being worked out according to the suitability of the target group to be more systematic and meet the objectives of application development.

2.1.3 Development Phase

Through this phase of development, the selected materials and information have been used to develop learning applications using the software chosen by the developer. Next, the implementation to create navigation buttons and learning application interfaces will use Adobe Illustrator software. Not only that, the production of such an image will also use Adobe Illustrator software for some of the editing steps that have been implemented.

Adobe Animate has also been used by developers to produce this learning software and application for the Android operating system. The application interface, buttons, and 2D animations have been developed using Adobe Animate software. Among the techniques that can be used to produce interesting applications based on 2D animation are, for example, keyframe, motion tween, and classic tween.

2.1.4 Implementation Phase

The implementation phase is a phase of learning applications that have been tested. This is to obtain feedback on any problems with the functions of the buttons and so on, either in perfect condition or at a satisfactory level. Therefore, the completed learning application was presented to the supervisors of the Bachelor Project as well as the driving instructors in the driving school institutions. The purpose of this presentation is to find faults or identify errors that need to be fixed at the main stage of testing. This situation during this phase of implementation can also directly help developers produce effective learning applications without any errors.

2.1.5 Evaluation Phase

In this evaluation phase, several important points were implemented to obtain relevant feedback. Among them are feedback on interaction design, content design, and interface design, as well as the presentation of multimedia elements applied and worked out in the development of this learning application. Thus, three Creative Multimedia lecturers from the Faculty of Technical and Vocational Education (FPTV) conducted an assessment of the multimedia elements that are processed and applied in the development of learning

applications. Meanwhile, a total of three instructors at the driving school institution were selected to assess the content.

2.2 Research Instruments

A research instrument is a tool, or any method used by a researcher when conducting a study. This instrument is used by the developer as a basis for obtaining the data needed to achieve the objectives of the study. In order to obtain feedback on the Android application for The Topic of Learning to Drive a Class D Vehicle on the Driving School Circuit, an interview and expert verification through an expert checklist form was necessary.

3. Results and Discussion

This chapter describes the data analysis procedure and the findings of the study that were made possible by collecting questionnaire response information. This evaluation examines the functionality of the end product produced utilising the components of content design, interaction design, interface design, and presentation of multimedia elements. To convey the exam results more understandably, a table of frequency value representations will be employed.

3.1 Expert Checklist Form

This form is distributed to all professionals for them to obtain the study's findings. Each of these questions requires a specialist's response to establish the frequency of analysis. Table 1 provides a list of the five components of this expert checklist.

Table 1 *Expert Checklist Form*

Section	Title	Item
A	Expert Demographics	6
B	Content Design	15
C	Interaction Design	10
D	Interface and Presentation of Multimedia Elements Design	12
E	Comments and Suggestions	1

3.2 Content Design Analysis

To determine the accuracy of the content used in this interactive application, a content design review is conducted. The expert assessment of the content design analysis is presented in Table 2.

Table 2: *Content Design Analysis*

Item	Statements	Frequency		Comments
		Yes	No	
1	The 2D animation of the S bend is easy for users to understand	3	0	Nil
2	The 2D animation of hills is easy for users to understand	3	0	Nil
3	The 2D animation of the Z bend is easy for users to understand	3	0	Nil
4	The 2D animation of side parking is easy for users to understand	3	0	Nil
5	The 2D animation of three-cornered parking is easy for users to understand	3	0	Nil
6	The contents are arranged in an orderly manner according to the Driver Education Curriculum syllabus	3	0	Nil
7	The contents coincide with the Driver's Education Curriculum syllabus	3	0	Nil
8	The content is following the learning topic	3	0	Nil
9	The content used can add to user knowledge	3	0	Nil
10	The content is easy for users to understand	3	0	Nil
11	The content knowledge can be applied to the handling of car	3	0	Nil

	driving skills			
12	Background voice delivery language is easy to understand	3	0	Nil
13	The audio of each animation's description is easy to understand	3	0	Nil
14	The quiz questions used are associated with the developed application knowledge	3	0	Nil
15	The quiz provided can test students' understanding	3	0	Nil

Based on the content design assessments that the developers have conducted, all experts have agreed that the content of each type of animation contained in the app is easy for users to understand. This is an important element for developers in ensuring that the content is appropriate according to the established JPJ module. After that, the experts also agreed that the contents of the application meet the syllabus and are organized in an orderly manner according to the Driver's Education Curriculum. This is supported by Mohamed Yusoff and Romli (2014). The content of an application or software developed should be guided by the syllabus so that the learning process becomes more interesting, structured, focused, and time-appropriate. In addition, all three experts agree that the content is compatible with the topic of learning. This is because the developers are concerned with the content on the driving school circuit. All experts also agree that the content used can add to the user's knowledge. This is due to the availability of Android applications that have the purpose of using driving test candidates as facilitators of learning. Next, the content is easily understood by users as well as being accepted by all experts. This is why developers use audio and animation so that users can easily understand. All three experts also agreed that the knowledge of the contents can be applied to the handling of the driving skills of the car. This is due to the existence of animated elements such as steering and accelerators that can be used when driving a car. The statement that the language of voice delivery is easy to understand is also accepted by all content experts. This is the developer referring to the KPP syllabus published by Jabatan Pengangkutan Jalan (JPJ). In addition, experts agree that the audio of the description of each animation is easy to understand. This is because developers use the narrator's voice on the website to obtain good audio quality. Experts also agree that the quiz questions used are associated with the knowledge of the application developed. Finally, experts agree that the quiz provided can test students' understanding. This is supported by Mohamad (2020), who states that the effectiveness of the quiz as a medium of review can improve students' understanding of the modules learnt.

3.3 Interaction Design Analysis

Ten items make up the interaction design analysis, which was created to determine whether the designed interface's interaction structure is adequate or not. The expert assessments for the analysis of the interaction design are displayed in Table 3:

Table 3 *Interaction Design Analysis*

Item	Statements	Frequency		Comments
		Yes	No	
1	The navigation buttons provided work well	3	0	Nil
2	Easy navigation buttons are controlled by the user	3	0	Nil
3	The navigation buttons on each app view lead to the right page	3	0	Nil
4	The use of icons in the application makes it easy to understand its functions	3	0	Nil
5	The application is easy to operate by users	3	0	Nil
6	The mute mode audio button works well	3	0	Nil
7	The unmute mode audio button works well	3	0	Nil
8	The Start, Stop, and Repeat buttons in the animation section work well	3	0	Nil
9	The Exit button takes the user to the opt-out menu	3	0	Nil
10	The answer options button in the quiz section works well	3	0	Nil

Based on the evaluation of the interaction design that the developer has implemented, experts agree that the prepared navigation buttons work well. Next, all three experts noted that the navigation buttons are easily controlled by the user. Then the experts also agree that the navigation buttons on each display of the application make it easy to understand its functionality. This is because developers use programming correctly and check so that the developed application does not error. Next, this application statement is easy to handle by the user, as

agreed by all three experts. Whereas the mute mode audio button statement works well, this is also agreed upon by experts. Similarly, the statement that the unmute mode audio button works well is also agreed upon by experts. This happens because, on each display, the developer uses different programming in terms of the button name so that the use of programming is not an error. After that, all multimedia experts agree that the start, stop, and repeat icons on the animation part work properly. Experts also agree that the exit button takes the user to the opt-out menu. This is because the developers have made a prior analysis of the appropriate programming code to be placed on the start, stop, repeat, and exit trays. Finally, the experts of all three agree that the answer option button on the quiz section works well. This is because the developers use the existing code snippet programming in Adobe Animate software, so it is easy for developers to produce programming on the quiz option button. This is the result of the findings after conducting an assessment carried out by the developer with reference to multimedia experts.

3.4 Interface and Elements of Multimedia Design Analysis

There were twelve items built for analysis related to interface design and multimedia presentation elements. The expert ratings for the Interface and Elements of Multimedia Design Analysis are displayed in Table 4:

Table 4 *Interface and Elements of Multimedia Design Analysis*

No	Item	Yes	No	Comments
1	Interesting application interface design	3	0	Nil
2	The design of the application interface fits the user's target	3	0	Nil
3	The design of the navigation buttons is compatible with their use	3	0	Nil
4	The position of the navigation buttons is appropriate	2	1	Please check the position (gear)
5	The size of the navigation buttons used is appropriate	2	1	Please increase size (gear)
6	The colour of the navigation buttons used is appropriate	2	1	Change the colour of the contraindications (shoes)
7	The size of the text in the application used is appropriate	3	0	Nil
8	The font of text used is appropriate	3	0	Nil
9	The colour of the text is appropriate to the background of the application	3	0	Nil
10	The interface design corresponds to the application theme	3	0	Nil
11	The use of audio in animation can be heard clearly.	3	0	Nil
12	The use of audio in animation can be heard clearly.	3	0	Nil

Experts stated that they find it intriguing that people agree with the application interface's design based on the feedback they have already received. Experts also agree that the design of the application interface corresponds to the user's target. This is because the developers had produced the storyboard before producing the interface design. Not only that, but all experts also agree that the design of the navigation buttons is appropriate for their use. This is because the developers sketched the navigation buttons in Adobe Animate software first. Two experts are agreeing that the position of the navigation buttons is appropriate. Meanwhile, an expert disagrees with the statement. Similarly, the statement about the size of the navigation button used is appropriate; only one expert disagrees, but the remaining two experts agree. This is because on one display only on the hill, the developers put a slightly smaller gear animation. Moreover, with the colour statement of the navigation buttons used as appropriate, only one expert disagrees, but the remaining two experts agree. This is because on one display only, on the hill, the developers use a less obvious shoe colour. After that, all experts have agreed that the size of the text in the application used is appropriate. This is because the developers use the size 12 base so that the text is clearly visible. But there are reviews received by the developers from the appraiser that there is a spelling error: "Quiz" should be changed to "Kuiz" and there is a need to change the text on the Quiz display, i.e., question 2, question 3, and others converted to "SETERUSNYA.". All experts agree that the font of the text adopted is appropriate. This is because the developers use standard text fonts like Arial so

that users can easily read them. Next, all experts also agree that the colour of the text is appropriate to the background of the application. Furthermore, for the interface design statement under the application theme, all experts agreed. This is because the developers have pre-produced storyboards using Adobe Animate and WPS software. All experts have stated that they agree that the use of audio in animation can be heard clearly. Therefore, developers use Audacity software to improve audio quality. But in terms of the audio angle, the developers got feedback from the assessors stating that there should be audio on the introductory display. Not only that, but it also needs to align the animated and audio movements on the hill. Finally, all experts also agree that the animation in the app is going well. This is because developers use Adobe Animate software with keyframes, classic tweens, and complete programming.

4. Conclusion

The 2D animation application has been successfully developed, and about the results obtained, the developers found that the Android application produced can meet the needs of students, especially in further enhancing the mastery of the driving test candidates on learning topics. Not only that, all the recommendations and reviews from multimedia experts and selected content experts have been considered by the developers in making improvements to the products. The existence of an Android application focused on the Class D Vehicle Driving Learning module on the Driving School Circuit is expected to have a positive impact in terms of the understanding of the driving test candidates before performing the practical. This situation in the Android app that has been developed can encourage self-learning among driving test candidates anywhere, regardless of time and place.

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