RITVET

Teaching E-Kit for Foundation Topic

Dayang Afiqah Awang Jepri[1], Maziana Mohamed[2]*

[1]Fakulti Pendidikan Teknikal dan Vokasional,
Universiti Tun Hussein Onn Malaysia, 86400, Batu Pahat, MALAYSIA

*Corresponding Author Designation

Abstract: To attract students, teachers need to wisely select and plan the use of appropriate teaching aids in ensuring teaching and learning runs smoothly while strengthening students' knowledge. This study was conducted to develop a Teaching E-Kit for Foundation Topic in building construction course as a teaching aid. The ADDIE model was chosen as a guide in the development process of e-kit and the research instrument used was an expert evaluation form distributed to 3 experts who are experienced in the field of building construction. The findings show that the content is suitable and the teaching E-Kit for Foundation Topic can be used as a teaching aid. Overall, this e-kit was successfully developed, suitable for the foundation works module and can be used as teaching aids to instructors and students who take building construction course.

Keywords: Teaching Aids, Teaching E-Kit, Foundation Topic, Building Construction Course

1. Introduction

Teaching aids is one of the strategies used by teachers in diversifying teaching techniques effectively (Ab. Halim & Lai, 2011). The use of teaching aids such as digital teaching and learning kits can stimulate students' desire to learn a topic in more depth in addition to producing effective learning (Abdullah, Zainal Abidin, & Mohamad, 2010). The function of the digital teaching kit must be guided by the syllabus that has been outlined by the Ministry of Education Malaysia. According to Mahamud, Shahril and Abdus Salam, teaching aids can affect student achievement (2018). When students able to understand a topic, they can indirectly improve their achievement of assessment in the classroom. Old methods such as chalk and talk, lecture methods and teacher centered approach have now changed and been replaced using media. Therefore, the use of digital teaching and learning kits as teaching aids is very important in technical subjects.

For the Building Construction course, substructure topics need a support tool to ensure that students understand the content of the lesson more realistically as well as increase creativity and mastery of a topic taught by the teacher. According to Hayazi (2008), the use of teaching materials can help teachers, especially for technical stream in explaining a content concept to students in more detail than verbally.

Therefore, a teaching E-Kit for foundation topic in building construction course was developed to assist the digital teaching and learning kit as a teaching aid.

1.1 Research Background

Most teachers nowadays still rely on material such modules, textbooks, labsheet and worksheets for teaching and learning sessions (Abdul Sani & Yunus, 2018). However, for some subjects or topics requires practice or support tools to provide more detailed and realistic description. Previous studies have found that teaching tool such as teaching and learning kits are not widely used due to their small number. This causes students to feel bored and easily get sleepy due to the bland teaching environment and the lack of supportive tools that can help them in imagining and challenging their mind. Furthermore, the content of a complex presentation of learning in this substructure topic will make it difficult for students to get a clear picture for the construction of the underground substructure. This makes students unable to master the knowledge and at the same time affected their achievement According to Mahamud et al. (2018), student achievement will be better with teaching aids because students can understand and master a topic as well as can improve assessment results in the classroom. Therefore, teachers need to be creative to use appropriate teaching aids while teaching to help provide experience and perception as well as improve student achievement at the end of the teaching and learning process.

1.2 Problem Statement

For Building Construction course, foundation is one of the topics that students need to master. However, students do not have the opportunity to see for themselves the construction of substructures on construction sites due to difficulty to see it because it has been constructed underneath the ground. This makes students unable to imagine it and lacks a solid understanding thus resulting in unsatisfactory student achievement and performance in learning this topic. Preliminary surveys also found that substructure topics were taught using modules without using teaching tool involving students due to the lack of use of teaching tools in vocational colleges. Therefore, teachers need to be more creative in diversifying teaching methods that are not only focused while in the classroom only, in order to produce quality students. Therefore, the use of teaching aids such as Teaching E-Kit for Foundation Topics developed can help give maximum understanding to students and make the quality of teaching more effective.

1.3 Research Objectives

This study was conducted to meet the following objectives:
   i. To design and develop Teaching E-Kit for foundation topics as teaching aid for building construction course.
   ii. To evaluate the usability of Teaching E- Kit for foundation topic for building construction course.

2. Methodology

The project implemented is based on the development of teaching kits for Foundation Topic as teaching aids. Researchers have referred to the ADDIE model which consists of five phases in product design include analysis, design, development, implementation, and evaluation. The use of the ADDIE model in this study is up to the third phase because the implementation phase and evaluation phase involves testing the suitability of the content and usability of the e-kit development. In the context of this study, the development of Teaching E-Kit for Foundation Topic is to help facilitate the teaching

and learning process in foundation topics for students who take building construction course. Figure 1 displays the process contained in the ADDIE model.
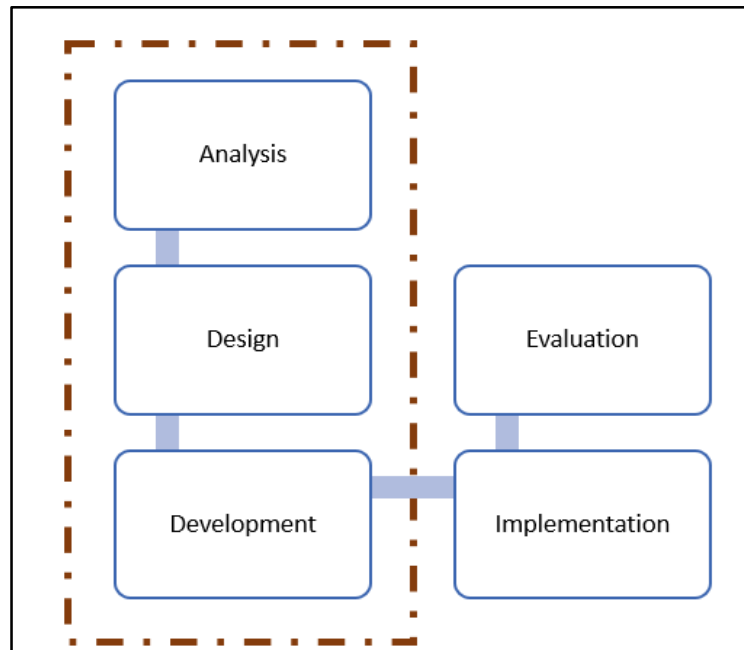

Figure 1: ADDIE Model

2.1 Research Design

The design of this study is a product design and development. The selection of the instructional model was determined at the beginning of the project development process to ensure that the implementation of this project can be implemented systematically according to the plan that has been drawn up by the researchers. The design selection of the model used in the development of Teaching E-Kit for Foundation Topic is ADDIE Model that introduced by Rosset in 1987 which consists of the phases of analysis, design, development, implementation and evaluation. However, in this study, the phase involved are only analysis, design and development.

In the analysis phase, the initial survey found that foundation topic is difficult for students to master due to difficulty in realizing the basic construction process, constraints to visit construction sites as well as learning. In the development of this E-kit, researches have collected and gather the information and learning content that required in this instructional video presentation so that student can understand each of the learning content.

The design phase is the second phase after the analysis phase where it is a process related to information that has been analyzed and detailed so that the development of this E- kit meets the desired objectives. This phase also interpreted the overall view related to the design and application of learning theory namely cognitive theory, multimedia cognitive theory and constructivism theory used in product development. Data related to content and multimedia obtained were used on storyboard development. Therefore, the researchers developed the storyboard using Adobe Premier Pro software and details each information obtained and summarized into a guide in the development of instructional videos. In addition, in this design phase, the content, storyboard and interface as well as presentation of multimedia elements for the development of E-kit based on teaching videos have been processed to be more structured to achieve the desired design satisfaction and requirements.

In content design, the researchers have determined the type of product to be developed, the appearance of the product, the approach used, the criteria that must be presented on the product as well

as the processes involved. Content design also includes the process of determining and organizing the content and information to be presented based on the topics that have been selected. Storyboard design is important in the video development process in detailing information and guidelines to video production. In designing a storyboard, the researchers draw a script that illustrates the video storytelling manually using paper without the use of software. This is to ensure that the videos to be developed are arranged according to the correct steps based on the information that has been \\collected. This storyboard is important in ensuring that the design of the script arrangement meets the content and needs of users while ensuring that there is continuity between the design and multimedia elements that will be included.

Next, interface and presentation of the multimedia element. The interface is as the transmission of information obtained from humans to the product. The interface design used in the digital teaching kit for this foundation topic based on instructional videos uses multimedia elements such as text, audio and video. Multimedia elements such as text are used to describe learning content related to foundation topics. In addition, video recordings were used to present the elements for the construction steps of the pad foundation, strip foundation and raft foundation one by one. The background music is also included in the video. Those elements are used to engage students in the use of the E-kit. Furthermore, the use of a landscape presentation technique was chosen by the researchers to make the surface wider and more convenience to look at. Adjustment of bright light is used so that students feel interested in watching the instructional video.

The development phase includes the analysis and design phase to produce a complete product. Starting with the production of the script in the analysis phase then followed by the design phase where the researchers has designed the storyboard. With the sketched storyboard, the researchers develop a real instructional video by performing the video filming process until the improvement process using the main hardware and software requirements that have been identified, which is Adobe Premier Pro and Audacity software. After that, an expert evaluation from three experts appointed using an expert evaluation form was conducted to obtain input for improvement in terms of content and usability in the development of Teaching E-Kit for Foundation Topic. Figure 2 shows the detail process of video development.
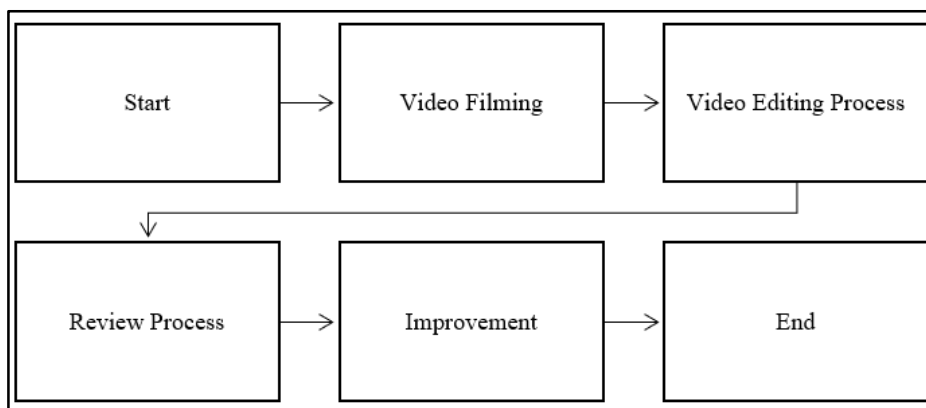

Figure 2: Steps in video Development

2.2 Research Procedure

The research procedure is the steps that are carried out throughout the study. The study procedure was designed by using the flow chart as shown in figure 1 that can be used as a guide to researchers while making it easier for researchers to see how far the development process of the video -based digital teaching kit is going. The development of this product is based on the ADDIE model and is connected using arrows. Figure 3 shows the flow chart for E-kit that follows the ADDIE model that has been

selected from the beginning and the end of the development process so that it can be developed more systematically.
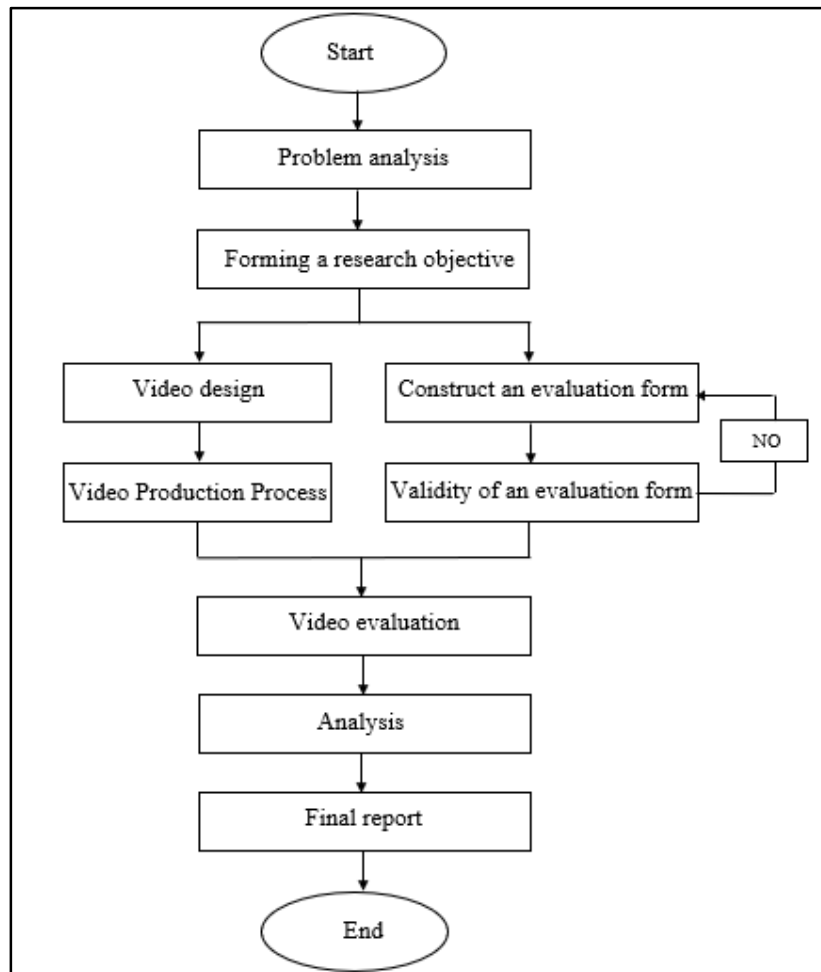

Figure 3: Research procedure

2.3 Research Instrument

Research instruments are one of the tools used for researchers in conducting research. Research instruments are used as a basis for data collection and expert validation to obtain data as required by the researchers in achieving the objectives of the study. The instrument used by the researchers is an expert evaluation form to obtain feedback related to the Teaching E-Kit for Foundation Topic.

The expert evaluation form needs to go through the instrument validity stage from three lecturers in the field of Measurement and Evaluation to gather information and feedback on the developed product. Miller et al., (2013) emphasize that content validity should be measured by expert evaluation, not just through numbers itself, other than aiming to validate the items on the test that represent the construct to be measured. This expert evaluation form is distributed to three expert evaluators who will verify the suitability of the content and usability of the Teaching E-Kit for Foundation Topic. Experts also provided reviews and comments for improvement on the developed products.

There are four sections in the expert evaluation form which is section A, section B, section C and section D. Section A consists of the demographics of the respondents. Part B consists of evaluation items on the suitability of the content of the Teaching E-Kit for Foundation. Topic Part C consists of Teaching E-Kit for Foundation Topic usability evaluation items as a teaching aid tool while part D is comments and suggestions for improvement of Teaching E-Kit. 4 Likert Scales are used in section B and C. The description of the Likert Scale is as in the Table 1.

Table 1: 4 Likert Scale

Scale	Description
1	Strongly not agree
2	Not agree
3	Agree
4	Strongly Agree

By this 4 Likert Scale, the data obtained are analyzed and expressed in terms of frequency and percentage. The researcher produced the results of the analysis of the study in parts B and C by categorizing the scale into three categories as stated in table 2.

Table 2: Table of Percentage Level

Percentage (%)	Level
71-100	High
51-70	Medium
20-50	Low

(Source: Najib, 1999)

3. Results and Discussion

The evaluation performed by the experts refers to the expert evaluation form that has been distributed. Through the testing and evaluation process implemented, researchers can find out the suitability of the contents of teaching E-kits and the usability of these teaching E-kits as teaching aid. The study involved three persons who were appointed as experts consisting of teachers and lecturers who teach in the field of building construction.

3.1 Analysis of content suitability as teaching aid for Teaching E-Kit for Foundation Topic.

This analysis is to determine the suitability of the contents of the Teaching E-Kit for Foundation Topic as a teaching aid for building construction course. Most of the items in the content of E-kit are at a high level which is at 100%. The items are item 1, item 2, item 4, item 6, item 7 and item 9. Experts agree that the content of this E-kit can help students to master the foundation topic well because of the introduction of the components in Teaching E-Kit, the concept of adaptation, clear and arranged presentation of content assists teachers in delivering foundation topic lessons to students effectively. Meanwhile, item 3, item 5, item 8 and item 10 recorded a medium percentage level of 66.7%. This analysis shows that experts agree the use of E-kit is still at a medium level in conveying and strengthening students' knowledge in foundation construction. For the difference in the percentage range, the experts who voted agree was 73.36%, where only 13.32% of the experts who voted agree and 86.68% who voted strongly agree. Overall, the analysis shows that the suitability of the content of the Teaching E-Kit for Foundation Topic is at a high level.

Table 3: Suitability of content for the Teaching E-Kit for Foundation Topic

Item	Description	Not Agree		Agree		Level
		SNA (1)	NA (2)	A (3)	SA (4)	
	1 = Strongly Not Agree (SNA) 2 = Not Agree (NA) 3 = Agree (A) 4 = Strongly Agree (SA)					
1	The content of this E-kit can help students to master foundation topic better.	0%	0%	0%	100%	High
2	The description of the content of E-kit allows students to identify	0%	0%	0%	100%	High

	the raft foundation, pad foundation and strip foundation.					
3	This E-kit can explain the correct basic construction steps to students.	0%	0%	33.3%	66.7%	Medium
4	The introduction of the components in this E-kit helps students visualize the actual building structure.	0%	0%	0%	100%	High
5	This E-kit helps in strengthening students' existing knowledge on raft foundation, pad foundation and strip foundation.	0%	0%	33.3%	66.7%	Medium
6	This E-kit assists teachers in delivering the content of the syllabus of foundation topic effectively.	0%	0%	0%	100%	High
7	The adaptive concept shown in E-kit ease the delivery of content in a step -by -step manner.	0%	0%	0%	100%	High
8	The use of E-kit helps to provide a visual picture of the foundation installation process at the construction site.	0%	0%	33.3%	66.7%	Medium
9	The presentation of content in E-kit for foundation topics is organized.	0%	0%	0%	100%	High
10	The components shown have characteristics that resemble the structure of actual building materials on a construction site.	0%	0%	33.3%	66.7%	Medium
	Average	0%	0%	13.32%	86.68%	High

3.2 Analysis of usability as teaching aid for Teaching E-Kit for Foundation Topic.

Table 4 showed that the whole item was at a high level by recording an overall percentage of 83.35%. The highest percentages were obtained from item 1, item 2, item 4, item 5, item 8, item 9, and item 12 which was 100%. The analysis shows that the items for the use of Teaching E-Kit for Foundation Topic can help teachers and make the teaching and learning process more interesting, increase students' curiosity and easy access is at a high level of 100%. Items for e-kit display and audio quality also showed high levels. Experts agree 100% that the use of text, images and audio simultaneously helps students in remembering but the use of appropriate text is only at a medium level of 66.7%. For item 3, item 6, item 7, item 10, item 11, item 13 and item 14 recorded a medium level with a percentage of 66.7%. The analysis shows that experts agree that the use of e-kit for students' self -learning is still at a medium level, as well as the use of language and visual display shown in this Teaching E-Kit for Foundation Topic. The use of e-kit helps in stimulating student motivation as well as saving teachers time in providing further information also recorded a medium level of 66.7%. For the difference in the average percentage range, experts who voted agree was 66.70%, where only 16.65% of experts who voted agree and 83.35% who voted strongly agree. The overall analysis shows that the level of usability of Teaching E-Kit for Foundation Topic is high.

Table 4: Analysis of Usability for Teaching E-Kit for Foundation Topic

Item	Description	Not Agree		Agree		Level
		SNA (1)	NA (2)	A (3)	SA (4)	
	1 = Strongly Not Agree (SNA) 2 = Not Agree (NA) 3 = Agree (A) 4 = Strongly Agree (SA)					
1	E-kit can help teachers smoothen teaching and learning process of foundation topic.	0%	0%	0%	100%	High
2	The use of E-kit can help increase students' curiosity towards the construction of raft foundations, pad foundations and strip foundations.	0%	0%	0%	100%	High
3	E-kit is suitable for self - learning materials for students.	0%	0%	3.3%	66.7%	Medium
4	The use of E-kit makes teaching more interesting.	0%	0%	0%	100%	High
5	The simultaneous use of text, images and audio in this E-kit helps students in remembering better.	0%	0%	0%	100%	High
6	The use of language in E-kit is appropriate to the context of students' understanding.	0%	0%	33.3%	66.7%	Medium
7	The use of E-kit helps to stimulate student motivation in substructure topics.	0%	0%	33.3%	66.7%	Medium
8	This E-kit can be accessed at any time	0%	0%	0%	100%	High
9	The quality of the visual display in E-kit helps to convey foundation topics effectively.	0%	0%	0%	100%	High
10	The use of E-kit can save teachers time in providing further information.	0%	0%	33.3%	66.7%	Medium
11	The visual display shown in the E-kit video is clear in conveying the foundation construction information	0%	0%	33.3%	66.7%	Medium
12	The audio quality in E-kit is good	0%	0%	0%	100%	High
13	The background music used in E-kit is suitable in increasing the teaching mood.	0%	0%	33.3%	66.7%	Medium
14	The use of text in E-kit is appropriate in presenting the content of teaching to students.	0%	0%	33.3%	66.7%	Medium
	Average	0%	0%	16.65%	83.35%	High

Table 4 showed that the whole item was at a high level by recording an overall percentage of 83.35%. The highest percentages were obtained from item 1, item 2, item 4, item 5, item 8, item 9, and

item 12 which was 100%. The analysis shows that the items for the use of Teaching E-Kit for Foundation Topic can help teachers smoothen and make the teaching and learning process more interesting, increase students' curiosity and easy access is at a high level of 100%. Items for E-kit display and audio quality also showed high levels. Experts agree 100% that the use of text, images and audio simultaneously helps students in remembering but the use of appropriate text is only at a medium level of 66.7%. For item 3, item 6, item 7, item 10, item 11, item 13 and item 14 recorded a medium level with a percentage of 66.7%. The analysis shows that experts agree that the use of E-kit for students' self -learning is still at a medium level, as well as the use of language and visual display shown in this Teaching E-Kit for Foundation Topic. The use of e-kit helps in stimulating student motivation as well as saving teachers time in providing further information also recorded a medium level of 66.7%. For the difference in the average percentage range, experts who voted agree was 66.70%, where only 16.65% of experts who voted agree and 83.35% who voted strongly agree. The overall analysis shows that the level of usability of Teaching E-Kit for Foundation Topic is high.

3.3 Comment and Suggestion

In the suggestion and comment section, all the experts agreed that Teaching E-Kit for Foundation Topic can be used as a teaching aid and suitable for the foundation works module. However, they also give construction suggestion to improve Teaching E-Kit such as creating a manual in the E-kit as a guide for the use of construction items or components that have been built, adding other features or parameters that can be demonstrated such as concrete mixing and site preparation and also improve the pile section for future development.

3.4 Discussions

The results of the study obtained from three experts have found that the development of digital teaching kit has met the objectives of the study which is to design and develop Teaching E-Kit for Foundation Topic for building construction courses and evaluate the usability of the Teaching E-Kit as teaching aids. This E-kit has been designed and developed to facilitate students to understand the topic of substructure, especially pad foundation, strip foundation and raft foundation as well as the components involved in the construction process. This E-kit can also be used as a teaching aid tool by teachers in delivering the content of the lesson effectively. All planning before starting work is carried out carefully to avoid any difficulties and facilitate the development process of Teaching E-Kit for Foundation Topic. After going through several phases, finally this e-kit was successfully developed.

4. Conclusion

This study was implemented with the aim of developing a teaching aid which is Teaching E-Kit for Foundation Topic for building construction courses. The use of the ADDIE model as a guide during the development of e-kit based on this teaching video facilitates the development process according to each phase more systematically in achieving the goal of developing Teaching E-Kit for Foundation Topic. As a result of the study based on the expert evaluation form distributed to experts, it is found that this digital teaching kit has achieved the objectives and answered the research question of Teaching E-Kit for Foundation Topic. Based on the discussion, it can be concluded that the content of this E-kit is appropriate and can be used as a teaching aid tool in building construction course. It is clear that the development of this video- based Teaching E-Kit for Foundation Topic helps teachers in delivering lessons effectively based on the set goals.

Acknowledgement

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