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Development of Die Sinking EDM E-Learning Module for Online Learning

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Abstract

Electronic modules known as e-learning module is the development of printed modules in digital displays which are widely adapted from printed modules. However, there is still the issue of a few students having difficulty getting complete and conducive notes. Therefore, this study aims to develop an e-learning module for the topic of EDM Die Sinking. The main software that is Google Sites has been used to produce this e-learning module. In this study, the researcher used the ADDIE model as a guide and reference throughout the development process of this e-learning module. This study involved five experts consisting of four lecturers from Universiti Tun Hussein Onn Malaysia and one teacher from Batu Lanchang Vocational College. The expert verification form was used as an instrument by the researcher in this study. The expert evaluation of this e-learning module includes two aspects that need to be evaluated, namely the e-module design and content. The evaluation is analyzed through expert verification to obtain functionality, The results of the study show that a large number of items evaluated from these two aspects have the approval of more than 80 percent of this e-learning module can be used in the teaching and learning process.

1. Introduction

The use of teaching aids better known (ABBM), guided by Abdelhamid, et al. (2018), is increasingly widely used among students and lecturers. ABBM refers to teaching materials used to teach such as whiteboards and projector slides. According to Abdelhamid, et al. (2018), the importance of ABBM in various teaching and learning methods is a method to make teachers always creative in the knowledge delivery session that is easy for students to understand and able to make students distinguished.

Referring to ABBM and the implementation of PAK 21, the online e-learning module learning method is now very widespread and there is no limit to its use. This matters because its use is very easy to use, and it can also be used at any time when needed. In addition, this e-learning module is not only focused on one field of education, but it is widespread in the field of education and is suitable for use in today's learning methods.

Looking at the use of e-learning learning methods today is increasingly developing, but conventional learning methods are still used by lecturers and students. Because of this, students are easily bored, and the reflection session fails to be achieved. According to Kamarudin et al. (2018), the use of simple devices is increasingly widely used by today's society, but the beliefs held by educators are still comfortable using conventional methods, resulting in limiting opportunities for students to learn effectively

1.1 Problem Statement

Developments in the world of education in the conventional context in terms of the teaching and learning process have changed a lot to digital form. This can show that conventional learning methods are still prevalent among students and need to be changed to interesting and interactive activities (Wibawa et al, 2019). This problem also persists because engineering students still use practical papers and power points as a method for learning and reviewing.

Next, the incomplete current notes make it difficult for students to refer to the notes. The notes provided should be complete and creative Abdelhamid et al. (2018). So, by creating this e-learning module, it is easier for students to use it as a learning medium because it is easy to access and has a more attractive display. Huck et al. (2020) stated that education in an online approach is highly encouraged nowadays. Additionally, developers can also see that there is a lack of online learning materials. Online learning materials that do not allow the use of technology as a reference source are relatively underutilized. Therefore, the developer felt it was necessary to develop an e-learning module application related to EDM Die Sinking based on the e-learning module for the basic topic of the EDM Die Sinking machine

1.2 Objective

There are two objectives in the study. The objective of this study is to cover aspects such as:

1. To Designing an Industrial Machining Learning Website Based on the EDM Die Sinking Topic.
2. To Developing an Industrial Machining Learning Website based on the EDM Die Sinking Topic.
3. To Testing the Functionality of the Industrial Machining Learning Website based on the EDM Die Sinking Topic

2. Methodology

To guarantee that the production of this e-learning module product goes completely and smoothly, careful planning and organization are necessary. High-quality and helpful products are the result of careful research and user planning. The method used greatly affects the results produced. The stages of model design, Gantt charts, and research tools are covered in this chapter. These factors act as a determining methodology and have an impact on the results.

2.1 ADDIE Model Procedure

Research This ADDIE model is used by researchers because it is compatible with the level and level used by machining students. Figure 1 shows the construction process of the graphic model used by the researcher using the ADDIE model by Rosset (1987). In the meantime, this ADDIE model is also very suitable in terms of criteria for creative thinking skills and independent skills. Among the five phases found in the ADDIE model are analysis, design, development, implementation, and evaluation.

1. Analysis

The analysis phase is the main or first step in planning and designing the form of a mobile application guided by the ADDIE model. The section on analysis requires some decisions and methods of problem solving which should be completed or completed by development. In fact, in creating and building an e-learning website application module for the manual user operating EDM die-sinking machine for machining students 2, development must first know and understand all the criteria that are required. Also, every part of the requirements collected by the development is very important and so is every single piece of data analysis for proceeding to the next step. In addition, several analyses have been carried out by the researcher to reveal confusion related to the selection of this title, including an analysis of lecturer needs, an analysis of student needs, and an analysis of the needs of users. The researcher's analysis phase uses an observer approach, which is for the analysis phase the researcher found that previous learning only uses the printed material found on the machine and slide notes given by the lecturer. Researchers can observe, guide or the reference used as a guide to use EDM Die Sinking is printed by the technician of the Precision Machining laboratory workshop at the Faculty of Engineering Mechanical (FKMP). Furthermore, there is only one guide using an EDM Die Sinking machine observed by the researcher. Because of that, students in a class need to share in observing references manual for the machine. If to use the machine, 34 only one student was given the printed material for the guide handling machines.

2. Design

This design phase is the process that produces software e-learning module applications or technology tools that meet the requirements of today's users or students. The purpose of this phase is to translate user needs into the form of display through the requirements obtained from the analysis process performed. In fact, in the design phase, this is aimed at developing an interactive learning e-learning module application using Google Sites as a platform that

can be used as a reference during learning sessions in the lecture room or outside the lecture room, guided by following the flow of technology today. Next, the development of this website is based on the concept of atmosphere outside the classroom as well as outside the home. In this phase, the researcher emphasized the manual use of EDM Die Sinking in which the researcher examines each step process to be easy to understand for users or students and visible. Therefore, designing a storyboard is very important for the development of this website application. This matter is caused by the design of the story and should be easy to understand because it is referred to as a researcher reference guide and facilitates the software development process of the application.

3. Development

The development phase is built based on the analysis phase and also the design phase. Product development should require specifications in terms of the design set to develop. In this phase, all the main elements or requirements are considered and used to develop teaching materials. Process to developed by using reference sources such as storyboards which have been designed to facilitate the development of website applications the said. This process will also be translated based on the display of the story (storyboard) that has been developed after being reviewed. Based on the story display (storyboard) that has been built, the process The development of the application interface website should start at this phase. In this phase also the researcher has developed website application software using multimedia components such as text, graphics, and audio. The arrangement in the design is based on the guided interface predefined storyboards.

4. Implementation

While in this implementation phase, developers will redesign, carrying out the process of editing and updating the site application on the web. The purpose is that this website application does not have any problems or defects and is easy to use for users. In this phase as well, the developer will identify the problems found on website applications as well as problems that cannot be detected now the development process is ongoing. In the meantime, this website application too developed and implemented using web applications only, which can be searched using laptops and smartphones through Search Google and supports the Google Sites operating system without having to load or download any application.

5. Evaluation

During this evaluation process, the finished web application will be evaluated in all aspects, among which are aspects in terms of content, graphics, audio, and interface. This testing will be carried out by 2 or 3 experts, and engineering students to ensure that the application products of this website are suitable for use. While this product is being evaluated by supervisors, developers will provide a Boring expert assessment and questionnaire to find out the state of the application this website either needs improvement or can continue without any problem. The assessment used is very important in meeting the objectives that have been set.

2.2 Research Instrument

Measuring tools are referred to as instruments when determining data and information obtained. The following techniques were used as a research tool for the creation of an e-learning module website based on the topic of EDM Die Sinking.

i. Expert Checklist Form

ii. Expert Verification

3. Result and Discussion

Product developers go through the results of analysis done by developers during the product testing and evaluation phase. The purpose of testing and evaluation is to measure the usability and functionality of EDM die-sinking topic learning. Based on the e-learning module built using the Google Sites platform, several expert reviews were conducted. Each result obtained will be presented by the developer in the right way and easier to understand, and the results of the analysis can determine the extent to which the objectives of the study can be found.

3.1 Expert Checklist Form

This form is distributed to all professionals so that they can get the findings of the study. Each of these questions requires an expert answer to determine the frequency of analysis. Table 1 is a list of the five components of this expert checklist.

Table 1 *Expert checklist form*

Details	Lecture	Lecture	Lecture	Lecture	Lecture
Gender	Female	Male	Male	Male	Female
Age	41 to 50 years	41 to 50 years	51 years above	31 to 40 years	20 to 30 years
Education Status	PHD	Degree	Degree	Master	Degree
Work Experience	16 Years	27 Years	20 Years	9 Years	1 Years
Specialization	IT and Network	Multimedia	Information Technology and Multimedia	Mechanical Engineering and Manufacturing	Industrial Machining

3.2 Content Design Analysis

This form A content design assessment is carried out to ascertain the veracity of the content utilized in this interactive application. In Table 2, the expert evaluation of the content design analysis is provided.

Table 2 *Content design analysis*

No	Item	Yes	No	Views and Reviews
1	The content of the e-Learning website is arranged according to the topic of EDM Die Sinking.	5	0	Need to break down the topics specifically
2	The use of sentences and instructions is easy to understand.	5	0	
3	The introduction to the e-Learning website is obvious.	5	0	
4	The content of this e-Learning website is suitable for machining students	5	0	The content name is not in sync with the video provided
5	The e-Learning website can provide useful input to users.	5	0	

The data that has been analyzed will be described using frequency values and feedback that has been commented on by experts to developers. The purpose of this analysis is to test the appropriateness and correctness of the contents of the EDM Die Sinking e-learning module. From the results of the analysis that has been obtained through the aspect of the content, the five experts agree (100%) with the items that have been designed by the developer such as the content of the e-learning website arranged according to topic, the use of sentences and instructions that are easy to understand and the introduction to the e-learning website is clear. However, experts are reminded to correct the information provided.

3.3 Interface Design Analysis

There are 14 questions item built to test functionality from the interface design analysis. The data obtained was evaluated and translated using frequency values and feedback provided by the evaluator. Based on the feedback obtained, four out of five experts (80%) agreed with one to fourteen question items. Meanwhile, expert 5 (20%) disagreed with question item 14, which is that the use of audio works well, and asked the developer to explain the audio presented clearly. Next, experts who agree only give comments to improve the module.

Table 3 *Interface Design Analysis*

No	Item	Yes	No	Views and Reviews
1	Use of the appropriate text font type	5	0	
2	The compilation of the buttons is appropriate.	5	0	The note menu button needs to be fixed so that the function looks good when pressed
3	The position of the navigation buttons on each page is consistent.	5	0	
4	The use of buttons is user-friendly.	5	0	
5	Use of appropriate backgrounds.	5	0	
6	Use of appropriate colors.	5	0	
7	This e-Learning website has an interesting color combination.	5	0	
8	The size of the text used is appropriate.	5	0	
9	The background interface of the e-Learning website is uniform from one page to another.	5	0	
10	Page Layout of the e-Learning website is appropriate.	5	0	
11	Appropriate combination of multimedia elements.	5	0	Image or video reference sources need to be included
12	The use of the term for each button is easy to understand.	5	0	
13	The navigation buttons used are in a consistent position.	5	0	
14	The use of audio elements works fine if any.	4	1	Audio on Youtube exposure is less clear

3.4 Interact Design Analysis

There are five question items designed by developers for expert evaluation of interaction design aspects and the data can be referred to in Table 4.

Table 4 *Interact Design Analysis*

No	Item	Yes	No	Views and Reviews
1	The navigation buttons provided in this e-Learning website work properly.	5	0	
2	The display of the provided diagrams helps the user.	5	0	There are some slightly blurred pictures
3	The provided note display button makes it easy for users.	5	0	
4	The interaction elements used work well.	5	0	
5	Use of interactions appropriate to user behavior.	5	0	

Analytical data is interpreted using frequency and response values. All the items evaluated by the experts who went through the interaction aspect were agreed upon. All experts (100%) also agree with user-developed interaction design. Because of that, for all five questions, the interaction design item achieves the functionality objective of the development of the e-learning module developed by the developer.

3.5 Discussion

While developing an e-learning module that uses the Google Sites platform, developers face several problems that slow down the development of e-learning, namely developers learning to develop websites through YouTube resources as well as learning from experienced individuals because the developers are not from the multimedia field. Therefore, the developer has developed 3 different e-learning module websites because the developer faces difficulties in use and option buttons that are difficult to understand when developing the e-

learning module website. Developers also face problems in terms of selecting appropriate multimedia materials because the focus must be appropriate in parallel with adult users. In addition, developers have difficulties in terms of using Google Sites appropriate template design and menu button positions and developers need to study and then learn it themselves.

4. Conclusion

Overall, the developers were able to formulate where the e-learning module that will be used by engineering students was successfully developed based on the research objectives described in Chapter 1 of this study. When this product is ready to be developed, the developers have made several series of improvements after receiving comments, reviews, and suggestions from experts. It aims to ensure that this e-learning module is suitable for use by users. The development of this e-learning module is one of the useful e-learning modules that can help engineering students which can encourage self-learning to students regardless of time and can be done for practice before exams.

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