

Web Development for HVAC Water Treatment Module

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Abstract: Website is a platform used to obtain information whether in terms of learning, entertainment or purchase purpose. The importance of developing this website is to facilitate students to learn HVAC Water Treatment course. The purpose of this study is to design, develop and test the functionality of Digital Learning Content (DLC) base on teaching aids using a website platform. The design model of this study uses the ADDIE design model. The model has five phases which is analysis, design, development, implementation and evaluation phases. The development of this open system water treatment website uses the wix.com website as the software to produce this website. Wix.com was chosen because this online site has a variety of attractive template designs. Data were collected through evaluation of three experts from related field. Experts showed a positive respond regarding content and design of the developed website.

Keywords: Website, DLC, Learning Aid, HVAC Water Treatment

1. Introduction

Digital learning content (DLC) is a learning system based on teaching that is based on the use of electronic resources and media (Hoppe, 2003). DLC is one of the learning aids that uses ICT in its development. Therefore, DLC is one of the facilitators in the learning process that can help students to learn. According to Najib (2017) E-learning or DLC makes learning more flexible to use. This is because the use of DLC can be accessed by anyone, anywhere and anytime. This means a variety of tools can be used to access lesson content using the device at any time. Based on the benefits that have been mentioned, it is appropriate to use DLC in the learning process regardless of education level. DLC can be used as an alternative to help instructors attract and facilitate the delivery of knowledge to students.

The use of learning aids is important in learning because it helps instructors to ensure the smooth delivery of knowledge and attract students. The increasing use of learning aids in learning is dependent

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on the rapid advancement of technology. In this case, DLC can be used as learning aids in line with the growing technological advancement. Therefore, the use of learning aids should be used as much as possible in learning to ensure the smooth delivery of knowledge. According to Suhaimi (2017) instructors need to play an important role in operating and managing learning aids in learning because it acts as a learning assistant that will stimulate students' knowledge and intelligence. In this regard, the instructor plays an important role in ensuring that the use of learning aids is appropriate for the subject to be taught. The effectiveness of learning aids can also be enhanced through creative thinking to create learning aids that can change the way learning is done.

Technical and Vocational Education and Training (TVET) is education that provides specialized training that is based on technical skills and some similar skills. In line with the growing demand for a skilled workforce, TVET was created to prepare individuals for the technical skills -guided work environment of today (Jalil, Noor and Annas, 2015). Therefore, the effectiveness of TVET is important to meet the needs of the industry while improving the quality of the industry in Malaysia. In this regard, the administration and instructors of TVET need to ensure that students can deepen their knowledge effectively in their field.

The learning aids that have been developed to some extent helps students to understand the content of the subjects studied. According to Suharyanto (2018) E-learning method can provide wide access to students about information about the content of learning. The lack of use of DLC in learning is a disadvantage because the advantage of using DLC in learning makes it easier for students to find information. It doesn't mean the existing learning aids doesn't have good functionality but what it does mean is that if the DLC is used optimally then the learning can run smoothly.

Every student has a different way of learning. To facilitate the learning process, visual, auditory and kinesthetic learning styles (VAK) need to be involved in the learning process (Julianto, 2017). The learning strengths of each student are different for each individual. Therefore, the instructor needs to find an appropriate way so that each student is able to understand the subject being taught. It is a big challenge for instructors because not all learning aids that have been produced include all VAK.

HVAC Water Treatment module is a newly developed module and has less exposure about it. In relation to that, the reference sources are also less difficult for teachers to convey knowledge, especially using traditional methods of learning in teaching. Additionally, learning aids which is easily accessible by students outside of learning time is less making it difficult for students to review lessons. The use of books as a reference requires a purchase process where not all students can afford to buy them.

In addition, there are some problems faced by students in following learning because every human being has a different learning style. This is because not all learning aids that have been produced include all VAKs. The lack of suitable learning aids is also a factor in attracting the interest of learning students. Failure to engage students will result in students not focusing on undergoing the learning process. Hence the importance of the use of learning aids to keep students focused during learning. This study was conducted to help instructors and students to understand the HVAC Water Treatment course. It also aims to design, develop and test the functionality of DLC based learning aids using a website platform.

2. Methodology

The researcher uses the ADDIE design model for design process. The design of this study aims to plan the development of a website as a learning aid for the subject of HVAC Water Treatment. The researcher has decided to use the ADDIE model which has five phases namely analysis, design, development, implementation and evaluation. Researchers chose this model because it is suitable for product development such as learning aids.

In analysis, researchers were able to identify the Edhead.org website used for the purpose of online science delivery. The researcher found that the elements used in this website are able to provide

understanding to its users through the training provided. This is because the training provided in this site is in the form of a game. This element is able to attract its users to engage in training. the researcher was able to identify the YouTube website used for the learning purpose. Researchers found that videos posted on YouTube are able to give users access to refer to them at any time. But the use of YouTube requires good internet access to post quality videos. This is because effective learning depends on diverse learning styles. the researcher was able to identify the sciencekids.co.nz website used for learning purposes. Researchers found that this website is useful for students because it has sufficient functionality to provide material for students in a subject. Among the functions provided by this website are lesson material space, game space and additional fact space. In the opinion of the researchers, this website is very useful to students because students do not have to search for references and learning materials on various platforms.

Furthermore, the researcher performed an analysis of the website development guide for the purpose of the lesson. The researcher interpreted the referenced guidelines to be appropriate to the study developed. Researchers used a book written by Jennifer Niederst Robbins (2012) entitled 'Learning Web Design: A Beginner's Guide to HTML SCC, Javascript, and Web Graphics'. The researcher is working on this book so that the development of this website can be developed successfully. This is because the researcher used the ADDIE development model to develop this study. Therefore, researchers need to apply this guideline in the ADDIE model. In design, planning to develop this website can be done by producing a website development storyboard. In addition, the production of video as one of the contents in the website must also be planned. Therefore, storyboard researchers also need to produce storyboards for video production.

In development, the website is developed using online software resources on the wix.com website. Wix.com is a website that provides facilities for users to develop their own websites. There are several functions provided in this site such as search bar application. The development of this open system water treatment website requires several elements for the completion of the website. Among the elements are video, infographic and exercises. In implementation, the researcher consults an expert to ensure that the study to be produced has the stated functionality. This is because the study conducted by the researcher needs to first check its functionality so that the study given to the respondents has the functionality as stated. Experts will also give suggestions as improvements can be made by the researcher. Researchers need to improve based on checklists and views provided by experts. The importance of this expert validation is to get the researcher's consent to distribute the website to the respondents.

In evaluation phase, the analysis performed by the researcher was based on questionnaire evaluation and expert validation. The experts selected to evaluate this study were three lecturers from the Faculty of Technical and Vocational Education. The three lecturers consisted of two lecturers majoring in refrigeration and air conditioning and one lecturer majoring in creative multimedia. The selection of experts was based on the expert's mastery of the elements to be assessed in this study. This analysis is conducted using Guttman's scale and percentage.

2.1 Research Procedure

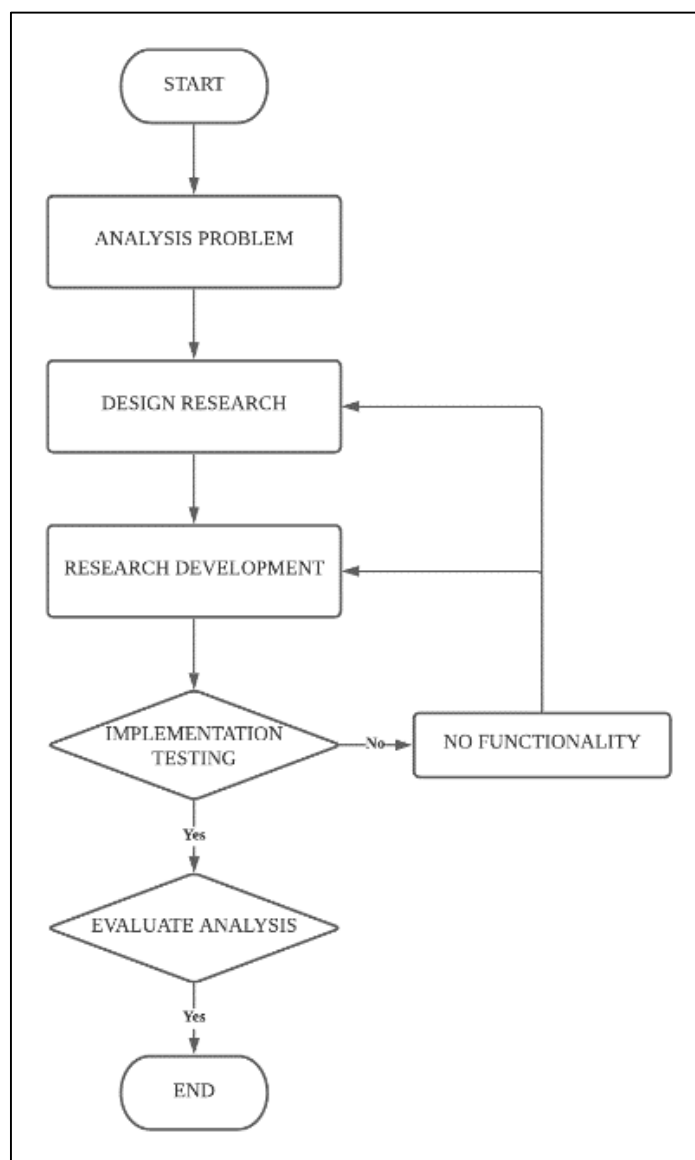


Figure 1: Website development flow chart

Based on figure 1, the study began by analyzing the problem. In this process the researcher analyzes the development of the DLC that has been produced. Next, the site planning is generated. Then, website development is done by researchers and tested by experts. if the functionality of the study is not achieved, the researcher needs to return to the design and development process. Finally, the study will be distributed to the respondents to obtain data. The data received are analyzed and discussed to find out the study achieves the objectives or not.

2.2 Research Instrument

To conduct this study, the researcher used a cumulative measurement scale. The instrument used to collect research data is through online questionnaire. Table 1 is the sections found in the questionnaire. Based on table 1, the table states the sections of the questionnaire and has a total of 20 questions. There are 4 parts that need to be answered by the respondents in the questionnaire of this study, namely part A, part B, Part C and part D. Part A has items based on the demographics of the respondents. Next, section B is an item on the content of teaching. Part C, on the other hand, covers items about appropriate designs for DLC. Finally, Part D is an item on VAK -based learning design.

Table 1: Items contained in the questionnaire

Section	Item
A	Respondent Demographics
B	Learning Content Functionality
C	Website Design Functionality
D	VAK based learning design

3. Results and Discussion

The researcher chose to use a questionnaire based on answer choice and the Guttman scale. The Guttman scale is an item measured through one dimension and uses a cumulative measurement scale (Van Schuur, 2003). The Guttman scale is suitable for questionnaires that require elemental data to test the functionality of a study. The researcher chose to use the answer choices for part A and the Guttman scale for part B and part C. These parts have only 2 answer choices namely 'YES' and 'NO'.

3.1 Results

The data that has been collected is converted in the form of percentages. the results of the study obtained are as follows.

Table 2: Result of learning content functionality

No	Item	Percentage (%)	
		Yes	No
1.	The content on the website uses easy to understand language	100	0
2.	The information is organized in an orderly manner	100	0
3.	Information is easily understood by users	100	0
4.	The examples provided help students' understanding	100	0
5.	There are no spelling errors in the information presented on the website	100	0

Table 2 shown the data that has been collected in part B which is the evaluation of the content of the website lesson. Based on this table, the researcher found that 100% of the respondents agreed that the website uses an easy -to -understand language barrel. In addition, 100% of respondents agreed that the information contained in this website is organized and understood by users. In addition, the researchers found that 100% of the respondents felt the examples provided helped students 'understanding. Based on the table, the website had no spelling errors on the information to be conveyed and it was agreed by 100% of the respondents. The results of this data collection can be summarized as the appropriateness of the content is appropriate based on the respondents' assessment.

Table 3: Result of website design functionality

No	Item	Percentage (%)	
		Yes	No
1.	Attractive screen design	100	0
2.	The text is clear and legible	100	0
3.	The icons used are interesting	100	0
4.	Appropriate color selection	100	0
5.	Users can easily explore the website	100	0

Table 3 shown the data that has been collected in part C which is the evaluation of website design. Based on this table, the researcher found that 100% of the respondents agreed that the website has an attractive screen design or interface. In addition, 100% of respondents agreed that the information in

the form of text is clear and readable. In addition, the researchers found that 100% of the respondents felt the icons used in the website were attractive. Based on the table, the site has a selection of appropriate colors agreed by 100% of the respondents. Finally, 100% of respondents agreed that the site is easy to explore. The results of this data collection can be summarized as the design of this website is attractive and facilitates the work of browsing it based on the respondents' evaluation.

3.2 Discussions

The researcher also developed this website which has multimedia elements. Among the elements found in this website are video, infographic and training elements. All three websites are related to the learning style that is VAK. According to Gholami and Bagheri (2013), VAK provides a variety of comprehension and explanatory perspectives for individuals with different methods of thinking. This means that the variety presented in the website helps the individual to understand according to the individual's own method of thinking and learning.

The first assessment is the content of the lessons presented in the website. This website was developed for the HVAC Water Treatment subject. Based on the questionnaire data distributed to the respondents, namely experts, the content of the lesson in the website can be well understood. The data shows that 100% of the respondents answered 'YES' for the functionality of all the items in section B. This indicates that the content available in the website works well. Additionally, the researcher has recruited two experts related to the majors of refrigeration and air conditioning. Both experts say that the study is suitable for use for teaching. According to Zaidatun and Zuriyati (2010), a website that contains games and interesting and interactive elements makes it a dynamic website. This means that the website has interesting design elements to increase user understanding.

The second evaluation is website design. Based on the respondents feedback who are experts, the website design has an attractive design. The data shows that 100% of the respondents answered 'YES' for the functionality of all the items in section C. This indicates that the content available in the website works well. Additionally, the researcher has recruited an expert related to the creative multimedia major. The expert says that the site has a neat arrangement. According to Salziana (2020), the appropriate design based on color, image and others for a publication on each graphic design, the result of a combination of certain elements can be a force to the target group. This means that a well -designed website is able to attract users to browse the website.

The third assessment was the VAK learning design. Based on the questionnaire data distributed to the respondents, the website has an element of VAK. The data shows that 100% of the respondents answered 'YES' for the functionality of all the items in section D. This indicates that the VAK elements found in the website work well. Additionally, researchers have recruited two experts who serve in the field of education. One of the experts said that the site has a layout and multimedia elements that are suitable for learning. This means that the site is suitable for use by users from a variety of learning styles.

4. Conclusion

Overall, the development of this open system water treatment site achieved the set objectives. This is because this study received expert validation in terms of the functionality of this website. Experts are also satisfied with the development of this study. In addition, the researcher also hopes that the development of this website can have a positive impact in learning the subject of HVAC Water Treatment.

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