



# “SolveMe” Website Development using Problem-based Learning Approach in Technical and Vocational Education

Wan Hassan, W.A.S.<sup>1</sup>, Ariffin, A.<sup>2</sup>, Ahmad, F.<sup>3</sup>, Mohamad, N.<sup>4</sup>, Anuar, R.<sup>5</sup>

<sup>1,2,3</sup> Faculty of Technical and Vocational Education, Universiti Tun Hussein Onn Malaysia  
wanazrulshafuan@gmail.com

## ABSTRACT

The SolveMe website was developed to provide students with the opportunity to conduct self-directed learning for students taking 3D courses. Students can learn how to model in 3D courses online using a problem-based learning approach. SolveMe also provides students with the convenience of accessing from everywhere and facing the constraints of having no time and money. This SolveMe website is developed in accordance with ADDIE methodology and uses Notepad ++ software as a platform for development. Fifty-six (56) students of the Faculty of Engineering and Vocational Education (Creative Multimedia) at Universiti Tun Hussein Onn Malaysia University (UTHM) who took 3D courses were involved in the development of the SolveMe as respondents of the study. The evaluation of this application was done using the questionnaire form. Overall, this website managed to achieve the goals and objectives set out in the analysis phase despite its own weaknesses..

**Key words:** Website Development, Teaching and Learning, Problem-Based Learning

## 1. INTRODUCTION

In developed and developing countries, the Teaching and Learning (T&L) methodology should be focused on skills and technology as time goes by. The availability of Technical and Vocational Education (PTV) has proven to produce skilled graduates in the field and meet the industry requirements [1]. Unfortunately, this PTV field is often the last option for furthering studies as the national education system has long emphasized the academic achievement, rather than enhancing individual potential and value [2]. In addressing this problem, many efforts have been made such as transforming PTV. Therefore, many steps that have been taken to improve public perception of PTV have been implemented such as transforming PTV to knowledge, technological advances and global mobility [3].

The development of the national education system that can be seen as the age and technological growth of the border are unending. Traditional R&D methods using traditional

approaches have diminished. The revolution in the application of computer education as well as the use of computers in education have grown from day to day and the concept of online learning based on technical standards have been introduced to provide education to students in an effective way [4]. According to [5], online technology-based learning should be a key pedagogy for all institutions of higher learning in Malaysia. In the [6], one of the perks in achieving system aspirations and student aspirations is the global learning using online orientations as Malaysia is the seventh highest Asian nation in the internet usage [5]. Therefore, educators can leverage this internet usage through online learning methods in higher education institutions.

## 2. PROBLEM STATEMENT

According to [7], the production of 3D animation in Malaysia is far behind the foreign countries. 3D Beans such as Beans produced by the local industry are far behind the 3D animations like Sherk, Final Fantasy and Toy Story. In addition, [8] also stated that institutions of higher learning do not produce capable and skilled graduates. Thus, many of the results produced are less attractive. He also noted that many animation publishers complained about the level of knowledge of graduates who are trained only in animation technology. Nevertheless, they should be noted as animation graduates who have just graduated with lack knowledge in basic animation, storytelling, cinematography, acting, and editing.

Conventional teaching that involves using textbooks and writing methods has made students less likely to learn by using the blackboard alone [9]. However, it is not wrong to teach using blackboard but if only this method is used by the teacher from the beginning of the year till the end of the year, then, students will be easily bored in the classroom [10]. In addition, most teachers do not pay attention to the problem-solving skills of students because they are too focused on completing the syllabus and mastering techniques for answering the exam questions. This is supported by the study of [11] who found that the development of teaching practice in problem-solving skills in the classroom is still low. The study by [12] prove that students' ability to solve problems is still not satisfactory.

### 3. METHODOLOGY

The study involved descriptive statistics whereby the data analyzed was obtained from the questionnaire form distributed to the respondents. This method is used because it is easy to collect, effective, economical and practical data which can save cost, energy and time [13].

#### 3.1 Sample and Population

The sample involved in this study was randomly selected for the purpose of testing the functionality and evaluating the design of the developed interface application. The target population included 66 students from the Faculty of Engineering and Vocational Education (Creative Multimedia) at the Universiti Tun Hussien Onn Malaysia (UTM) who took the 3D course. According to the schedule of [14] the sample of the study involved 56 people in total.

#### 3.2 Instrument of Study

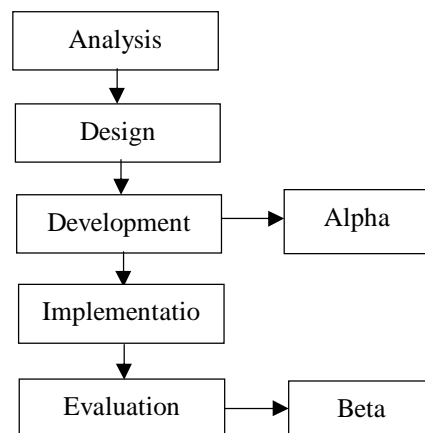
The research instrument used in this study is questionnaire. Likert scale measurement was used to measure the student consent in relation to the website developed. The developer created a questionnaire containing five (5) sections, as shown in Table 1.

**Table 1:** Student Questionnaire

Section	Aspect	Number of question
A	Respondent's information	4
B	Content design	9
C	Interaction design	6
D	Interface design	6
E	Comments and suggestions	1

#### 3.3 Application Development

The development model in this study uses the ADDIE model as shown in figure 1. This model is chosen because the ADDIE model is often used to illustrate a systematic approach to teach development [15]. In addition, [16] stated that the choice of the ADDIE model was based on several considerations, namely that the ADDIE Model is a generic learning planning model that provides a planned process for the development of lesson materials that can be used both for face-to-face and online learning.



**Figure 1:** Model ADDIE [17]

Therefore, the choice of ADDIE model is very suitable as it is for the development of an online PBM website that is in line with the quality of education. It is related to the learning process that will determine the learning outcome. All citizens are aware that education is a very important part of the humanitarian process in a cultured society [18]. Because the learning process is still weak, it will also indirectly affect the quality of education. Figure 2 shows Partially Content SolveMe website.

### 4. RESULT FINDINGS

Summative assessments were conducted using the four-choice Likert scale, which are Strongly Agree (SS), Agree (S), Disagree (TS) and Strongly Disagree (STS). The collected data were analyzed discretely to see the mean score of each tested item. Table 2 shows the scale of interpretation used for the mean of this study.

**Table 2:** Interpretation Mean Scale

Mean Value	Interpretation Mean
1.00 – 2.33	Low
2.34 – 3.67	Moderate
3.68 – 5.00	High

Source. [19]

#### 4.1 Content Design Analysis

The analysis of the content design aspect of the website 'SolveMe' found that the overall mean score was 3.66 which can be categorized as simple. In general, all the students agreed with the designed features that have been developed. Content design suitable for 3D course learning and learning approaches is also compatible with the Problem-Based Learning (PBL) method implemented on the website. Table 3 shows the analysis results for the content design aspects.

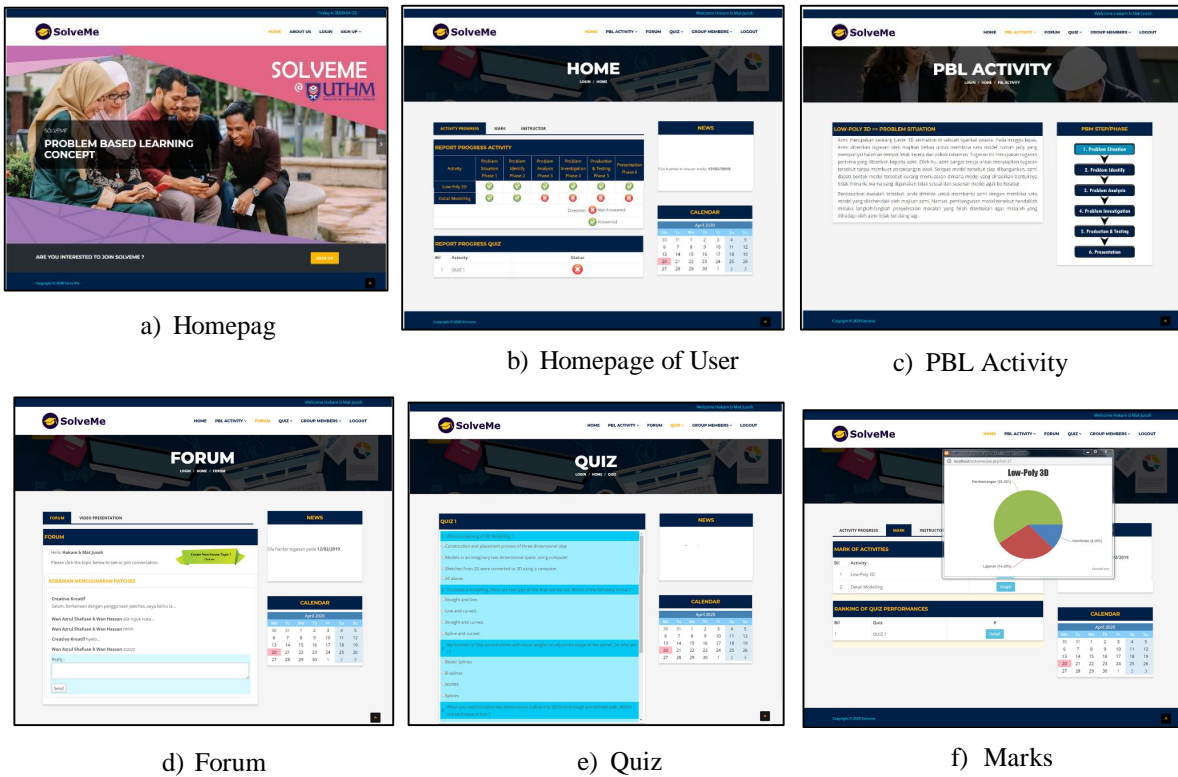


Figure 2: Partially Content the SolveMe Website

Table 3: Content Design Analysis

No	Item	Score Mean	Interpretation Mean
1.	The learning content found on the PBM website allows me to understand more easily	3.75	High
2.	The learning content found on the PBM website enables me to achieve my learning objectives	3.66	Moderate
3.	The interactive materials available on the PBM website facilitate my understanding	3.59	Moderate
4.	The problem solving steps implemented on the PBM website can help me understand this course	3.64	Moderate
5.	The order of content contained in the organized website	3.70	High
6.	The problematic paragraphs on the PBM	3.57	Moderate

	website are easy to understand		
7.	The questions found in the quiz page test my understanding	3.61	Moderate
8.	The language used in each content is easy to understand.	3.75	High
9.	The problematic situation presented is relevant to the topic of the study	3.70	High
Total		3.66	Moderate

#### 4.2. Interaction Design Analysis

This aspect of interaction design is focused on the functionality, position, shape, button size, and button links used by the web developers. Therefore, the analysis of the interaction design aspects found that the overall mean score was modest. Based on Table 4, all the students agreed that all the buttons used on the website work well together and that the icon was used appropriately for each button.

**Table 4:** Interaction design analysis

No	Item	Score Mean	Interpretation Mean
1.	The link access for each menu is easy to use	3.66	Moderate
2.	Each button works well	3.71	High
3.	I am not misled or confused when using this website.	3.71	High
4.	Menu button connects to the correct interface.	3.61	Moderate
5.	Users can easily access the information provided	3.68	High
6.	Use appropriate buttons or icons	3.64	Moderate
Total		3.67	Moderate

### 4.3 Interface Design Analysis

Each item in this section dealt with text, graphics, animations, audio, screens and a combination of multimedia elements that gave a clear picture to the users. The total mean obtained after analysis was moderate (3.67). All the students agreed that the designed features of the interface implemented on the site such as text size and color were neat and attractive.

**Table 5:** Interface design analysis

No	Item	Score Mean	Interpretation Mean
1.	The design of the PBM website interface is neat	3.79	High
2.	The size of the text used is clear	3.55	Moderate
3.	The graphics used on the PBM website are interesting	3.64	Moderate
4.	The colors used in the PBM website are interesting	3.66	Moderate
5.	The animations used on the PBM website are interesting	3.71	High
6.	The icons used on the PBM website are easy to identify	3.66	Moderate
Total		3.67	Moderate

### 5. DISCUSSION OF RESEARCH FINDINGS

Based on the findings, the researchers found that all students agreed that the content provided on the SolveMe

website complied with the learning syllabus and was ideally used as a teaching tool for students. The findings of this study is supported by [20] who argues that the content of a software or web site that meets the syllabus is important to ensure its appropriateness as a teaching tool. Therefore, the content of a software developed for teaching and learning purposes must be based on the lesson's syllabus and learning objectives so that the teaching process would be more engaging, focused, structured, and timely.

In terms of performance, multimedia elements are very important in a software as it enhances users interest and attention. In addition, researchers have emphasized this element during the development process and this is supported by the average student that a combination of text, color, images, and graphics can attract and enhance students' learning. This is in line with a study conducted [21] who found that 66.7% respondents strongly agreed and 33.3% respondents agreed that a combination of text, color, image, graphics, animation, and voice can attract and increase students' interest in learning.

The use of SolveMe websites that are interactive and user-friendly is very important because a rigid user -friendly software will cause users to get bored. This statement was supported by [22] who stated that attractive design can attract students to continue learning without feeling bored. Besides, [23] also states that interactive multimedia software promises an active and passive learning process. This is because interactive multimedia software requires user feedback to continue their learning which is also in line with the findings of this study where the overall students agree that the use of buttons and icons in the SolveMe website work well and according to the students demands.

### 6. CONCLUSION

In conclusion, website development requires detailed planning and sufficient programming language to ensure that the website developed is working properly. Furthermore, the SolveMe website has been successfully developed in accordance to the research objectives and questions. This website has its own advantages, but it also has some shortcomings that require improvement. In order to address these weaknesses, suggestions will be considered to improve the quality and functionality of the website in the future.

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