Learning Model for Integrated Living Skills in Virtual Workshop Environment

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ABSTRACT

This paper discusses the development of learning model in virtual workshop environment (VWE) for Integrated Living Skill subject using 3D modeling. Teaching and learning ILS involves theoretical and practical lessons that expose students to a variety of hand tools and materials such as wood, PVC and iron. Therefore, the use of physical workshop is able to support the theory learned. This study discusses the development of a learning model in Virtual Workshop Environments (VWE) for ILS subjects. Existing studies indicate that existing computer aided learning (CAL) applications are more teacher-centered, no interaction, static and does not emphasize aspects needed of students as consumers. Thus, to develop a dynamic learning environment a virtual workshop can enhance the practical aspects of the physical workshop without being bound by time and places. Virtual reality technique was found suitable to be implemented in this environment. It implements the concept of learning by doing where students can explore in a workshop environment and conduct experiments by installing virtual objects in the workshop. This learning model comprises four phases; identifying the needs of students through interview techniques and questionnaires; designing VWE learning model based on user requirements specifications; development of workshop objects model and finally, testing the acceptability of actual users. The learning model can be use as a guideline in designing and evaluating virtual workshop. To validate the learning model, factor as easy to use, efficiency and satisfaction are used as the benchmark of the usability factor in virtual workshop.

Keywords: Learning model, user requirement, user interaction

I  INTRODUCTION

Teaching is a process of conveying ideas to students. Good teaching means more effective communication (Jonassen & Land, 2012). Learning and teaching ILS subject has gone through various phases in terms of teaching methods. The quality of education received by students depends on the quality of teaching. Learning ILS emphasizes constructivist teaching pattern which teachers serve as mentors and facilitators to the students to solve a problem (Buntat & Yusof, 2010). Constructivism emphasizes the importance of the active involvement of learners in constructing knowledge, and building new ideas based upon current knowledge and past experience. In cognitive theories, information is processed, stored, retrieved and applied. It involves understanding of short term memory and long term memory.

In ILS subjects, to consolidate what has been learned in class, practical workshops will be conducted. All the theories and concepts learned in class applied again and indirectly promote problem-solving skills among students and it involves both learning theories.

In developing a learning model for ILS, constructive and cognitive learning theories are applied. By creating a learning environment which focuses on enriching and extending learning through a variety of perspectives, resources, and representation may help through the learning process. Computing tools such as simulations and virtual worlds allow learners to visualizes and experience complex representations of concepts, thus adding to the richness of perspectives available on the subject (Jonassen & Land, 2012). The externalized virtual workshop learning environment representations enable new form of discourse and engagement in ILS subject.

II  STUDY OBJECTIVES

The development of computer technology especially multimedia technology has been a major factor in impacting the current trend of education worldwide. Accordingly, the research on the use of computer in learning involving computer-based multimedia has attracted considerable interest (Salleh, Mohd Ayub, & Zainal Abidin, 2011). This subject is of interest because of the on problem found by student and teacher in conventional technical education especially ILS subject in understanding on the practical process. Based on early observation, CAL for the ILS subject had already used, however on a
number of factors, such as personality obstacles, obstruction of duty, technological barriers and obstacles had caused CAL not popularly used among technical teachers (Mohamed, 2011). Existing CAL software more theoretical as well as its use was focused on the subject teachers. Moreover it has drawbacks in terms of display and interaction. VWE is developed as a new teaching approach in technical education. Activity in VWE is based on interactive workshop with the objective to enhance the understanding of technical as well as to provide skill for students to conduct the activity given. The concept of ‘learning by doing’ using the computer while doing practical in workshop enabling tools and the material reacts based on the activities. The learning simulations can create curiosity in the learning environments. The VWE will reduce cost such as time in workshop, lack of tools and material used. In addition, student and teacher can do the activities as long as they want and avoid the student from using dangerous material.

There are many CAL applications that had been developed, but emphasis on the user interactions element are still low, because of the development was not following the need of the real users (Ghazali, 2008; juang Wang, 2010). User interactions that consist of navigation elements, manipulation and control system have been identified as suitable components to be incorporated in the education model of virtual workshop.(Veen, Lam, & Taconis, 1998). Navigation element was an exploration of the VWE helps users in exploring the environment easily. Manipulation was an element of interaction that could view the object from right, left, top, bottom view and so as control system was crucial to attract user to use the application.

Thus, by involving user in developing learning simulation model can help fulfill the requirement that is suitable for the user. Malaysian student in age 13 years old will be the focus of this simulation workshop. The objectives of this study are:

- To identify users requirement to create learning simulation model
- To design learning simulation model based on the preferences and requirement given by the user.

Section 3 in this paper provides a method in developing. Section 4 discusses the finding from the method implementation, this include the learning model. The last section is the summary of this paper and the future work.

### III METHODE IN DEVELOPING OF LEARNING MODEL

Figure 1 show the method employed in the development of virtual workshop learning model of which takes into consideration the user interactions. The two phases involves are:

a)Initial investigation: Preliminary study is done based on existing application of CAL application to identify research problems.

b)Data collection: the collection of data is done through interviews and questionaires to acquire the user requirement and suitable application.

![Figure 1. Method of Learning Model Development.](image)

#### A. Initial Investigation

The observation of existing applications is carried out in initial investigation to determine the research problems.

i. **Observation**

The researchers had conducted observation by doing comparisons on existing CAL application for ILS subject. Three schools in Alor Setar Kedah had been selected. The user interaction in CAL application is at low level. Application used are teacher centered and there are none workshop activity done. In fact most of the application is in text based and the graphical image is poor.

ii. **Analysis and findings**

Table 1 shows the problem statement identified through observation technique.

<table>
<thead>
<tr>
<th>School</th>
<th>Initial Investigation</th>
<th>Problem Statement</th>
</tr>
</thead>
<tbody>
<tr>
<td>School A</td>
<td>1. Limited user interaction</td>
<td>1. Teacher centred</td>
</tr>
<tr>
<td></td>
<td>2. Quality of images low</td>
<td>2. Text based explanation and</td>
</tr>
<tr>
<td></td>
<td>3. Text based application</td>
<td>less graphical</td>
</tr>
<tr>
<td></td>
<td>1. No computer application is used in</td>
<td></td>
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</table>

Table 1. Problem Statement of Research.
As shown in Table 1, the development of existing CAL application is not based on user requirements such as element of user interactions, graphical interface design and usability of an application. From the problem statements that have been formulated, the researchers have determined the need of the user through data collection such as interview and questionnaires.

B. Data collection

In the data collection phase, the questionnaire technique is used to obtain the need of the users in developing virtual workshop. The question is a close ended question. In addition, interviews were also carried out with the ILS teacher.

i. Questionnaire

The questionnaire is done in the school computer lab and it involves 20 form one students from secondary school in Alor Setar. They were given instructions to access two type of CAL, one is the existing ILS application and the others were simulation learning application. Then the student need to answer the question based on their browsing experience on both applications. This questionnaire consists of tree parts user navigation, manipulation and system control.

ii. Interview

The interview session was conducted with the ILS teacher with teaching experience more than five years in teaching ILS subject. The finding from the interview is the requirements content of the virtual workshop which are the topic from the Basic Pipe section and practical activities in the topic. Objectives are given and stated clearly during the interviews session.

iii. Analysis and finding

Table 2 shows the finding of user requirement through questionnaire technique.

<table>
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<tr>
<th>Interaction</th>
<th>Student need</th>
<th>Usability Factor</th>
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The table 2 shows that navigation, object manipulation and control system are the elements that are required in the development of the virtual workshop. Figure 2 shows the percentage of the finding.

The figure shows that the manipulation on object consists of 68% of total requirement. Then the navigation on environment 64.5% while function development 55%. The finding of this study found that the elements of user interaction are needed in developing virtual workshop. Virtual Environment (VE) technique has been identified as a technique that can be used in the development of simulation learning model workshop. VE technique was determined to be used in the study because it can present a real workshop in the form of virtual reality and allows users to interact in 3 dimensions with the...
objects. Implementation of this technique can save time, cost and safer.

IV RESULT

Result from this research is development method and technique used to formulated learning simulation model in virtual workshop environment using geometric modeling. There are several advantages through the implementation of geometric modeling which it can explicitly represent the shape and structure of an object and from these, one can deduce what features will be seen from any particular viewpoint and where they are expected to be and determine under what circumstances a particular image relationship is consistent with the model. It also can provide interactive environment with rich sense of present.

This learning model is useful as a guideline to designing and evaluating virtual workshop. The user interactions which consist of manipulating system, navigation and control system are the main issues that contribute to usable application on virtual workshop. The learning model was formulated based on result from initial investigation and data collection. Figure 3 shows the model which illustrated various components and their relationship:

- The input are from user requirement involving student and teacher
- Virtual reality technique, using geometric modeling is identified as a suitable technique in developing virtual workshop
- User interaction is the main component that should be applied in developing virtual workshop.
- The validation of the learning model: factors such as easy to use, efficiency and satisfaction are used as the benchmark of the usability factor in virtual workshop.

This paper has discussed the development of education simulation model for ILS subject. The model consists of three main items; situation, user interaction and output. Virtual reality technique is used in the model. There are three main component in user interaction which is object manipulation, navigation environment and function development. Easy to use, efficiency and satisfaction are used as the benchmark of the usability factor. Future related research will be development of virtual workshop based on this model and usability of the prototype simulation for virtual workshop environment to validate the model.

V CONCLUSION

This paper has discussed the development of education simulation model for ILS subject. The model consists of three main items; situation, user interaction and output. Virtual reality technique is used in the model. There are three main component in user interaction which is object manipulation, navigation environment and function development. Easy to use, efficiency and satisfaction are used as the benchmark of the usability factor. Future related research will be development of virtual workshop based on this model and usability of the prototype simulation for virtual workshop environment to validate the model.

REFERENCES


