Framework for Learning PC Assembling Through Virtual Reality

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Abstract: Virtual Reality (VR) is one of the new technology that has huge potential for widely usage in Malaysia educational system. Amongst are provides and facilitates teaching aids in three dimensional (3D) objects, supports learning from first person view perspectives, visualisation and encourage learning through self-exploration. At the moment, teaching and learning process of pc assembling is mostly in explanations and demonstrations method. Consequences of using these methods are at low levels of understanding amongst the student, increment in computer maintenance cost and more on teacher centred learning rather than student centred learning. This study proposes a new framework to be implemented using VR technology in teaching and learning pc assembling, part of ICT subject in secondary schools. A set of quantitative questionnaire has been developed for students in order to collect the initial data while qualitative interviews for teachers were conducted in order to develop this proposed framework. Findings reveal that students and teachers showed very high perception of the necessity using VR in ICT teaching and learning process. The use of virtual reality expect to become effective teaching aids for teachers as attraction for the students to improve their understanding and achievement of excellence in education primarily in ICT subjects.

Key words: Virtual Reality • Teaching Aids • PC Assembling

INTRODUCTION

Information Technology and Communication or Information and Communication Technology (ICT) has been said since long ago. Technological advances and enhancements generally help in various ways of learning [1]. In the context of education, much emphasis on who, for whom, where and how learning takes place. The traditional way of learning is no longer effective reliably because it will restrict the freedom of learning a more effective way. However traditional way of learning is still needed because technology is not a substitute for teachers or education but is just an aid mechanism for education. Furthermore, with the combination of vibrant technological conveniences such as mobile phones, internet and more social and humanitarian media are able to provide the right choice of learning patterns from time to time.

The use of ICT in life is widespread and this makes ICT very important to be mastered in this challenging life. The use of ICT in Teaching and Learning was introduced by the Computer Unit in Education of the Education Ministry's Curriculum Development Center. Minister of Higher Education (MOHE). ICT is used for tutorial learning, exploration learning, as an application tool and communication facilitator tool. Recognizing the importance of ICT to education, MOHE has introduced ICT subjects as an elective subject to high school in 2006 in English.

The explosion of computing technology in the education world is undeniable as part of a factor that also contributes towards progress and performance among teachers and students. The use of computer technology in the field of education can be divided into three main parts, namely administrative tools, research tools and instructional media [2]. It is evident that widely used computers can help to administer and manage teaching and administrative processes more effectively.

Referring to the situation in Malaysia, until now there is still no study that studies the use of virtual reality in high school ICT subjects. But so much research on virtual reality in various disciplines of education. Zainuddin [3], in his study on the use of interactive video virtual painting courses have found that the majority of
respondents were interested and agreed to use the video for virtual reality as an additional aid to learn painting courses. Drawing on virtual reality video gives students the art of new experiences in the learning process.

**Literature Review:** Some definitions of virtual reality are interpreted, but in general, virtual reality refers to a deep and interactive experience based on graphic images in 3 Dimensions (3D) generated by computers, in other words, it is a simulation generated by the computer, as if the matter real or just an imaginary world. Another definition, defining virtual reality is a computer interface that allows users to interact in real time, in certain scopes generated by computers, using their feelings and experiences, through special devices [4].

Virtual reality (VR) can be defined as a computer user interface that involves real-time simulations and interactions through multiple sensorial channels such as visual, auditory and touch [5]. In other words, VR allows users to immerse themselves in the virtual world of computers by providing techniques for user orientation in this world. In general, VRs can be classified in various ways. Due to advances in computer technology, the VR desktop has become increasingly popular. Lower costs than tools have made the VR desktop preferred choice in education [6] as it does not have to rely on complex and expensive equipment.

Che Soh. *et al.* [7] in the study of the potential and implications of animal cell learning found that virtual reality is best used to produce animal cell visualization tools, getting positive feedback among trainees. Visualization tools with virtual reality technology can also serve as an alternative static model that is particularly suited for distance learning. This statement was agreed by Cendan, J. *et al.* [8], informing visualization tools based on virtual reality technology to be more widely used in life sciences such as medicine and biotechnology.

Zaleha. *et al.* [9] conducted a study on the use of virtual reality in mathematical subjects. In his study, the respondents analyzed the understanding of virtual reality and their use in education, the problems faced by students in Calculus II (Graph Function / Relationships in Three Matra and the suitability of using virtual reality in the topic of Function Graph / Relationships in Three Matras, his study found understanding of virtual reality and its use in education showed that the average mean is at a high level of 4.04 This clearly showed that the respondents' understanding of virtual reality and its use in education is at high level. Then in the study it shows that respondents feel that virtual reality is indeed suitable to be applied to the topic.

In building knowledge and learning skills, virtual reality learning programs can be infused with multimedia elements that include text, audio, graphics, animation and video. Kayaoglu. *et al.* [10] found that there was a significant increase in the students who used animation in their learning. Hence, this study supports the idea of integrating multimedia applications in virtual reality as one of the alternatives that contributes positively to the learning environment in the classroom and motivates students.

According to Clark [11] Virtual Reality can be used for learning more fun and exciting with the aim of improving motivation and attention, reduce costs when using an objective and real environment simulation, no matter how expensive it is. It is also possible that the situation is impossible to explore in the real world can be done, for example: exploring planets like Mars, exploring the human body, making exploration of the submarine, in a cave, visiting places that are too small to be seen (molecule) and very expensive or too far away, as well as a long history of somewhere.

ICT subjects are one of the elective subjects introduced by MOE since 2006 in the examination system in Malaysia level as known as Malaysian Certificate of Education or Sijil Pelajaran Malaysia (SPM). These subjects are expected to produce skilled workers in the field of ICT. However, the lack of suitable reference sources for these subjects makes it difficult for students to review their lessons. Students also cannot prepare early on what will be learned in the next class due to the absence of references. As is known, the intelligence and ability of each student are different. One way to deal with this problem is to use virtual reality usage. It is therefore hoped that the use of this virtual reality will enhance understanding among students as students are free to learn according to their ability. Indirectly motivation for learning will also increase.

ICT subjects are subjects that are difficult for most students. Thus, it is common for students to pass in the exam by memorizing the algorithm only, but fail to build the knowledge and understanding of the ICT Foundation concept. One of the titles that lead to a drop in grade A achievement in ICT is on the Construction Component of Computer Components which is one of the key disciplines in ICT subject matter. Typically, Computer Assembling constructs and most of the structures and procedures are interconnected and complex. This causes it to be difficult to be taught and studied and devoted only 12 times.
* GPMP = Average Grade Points - The larger the number is getting worse the performance (Source : Panitia ICT SMK 2)

Fig. 1.1: Post Mortem SPM 2016 Achievement Information and Communication Technology (ICT)

Computer Assembling Constructs Are One of the Main Topics: Compulsory Computer Systems and passing exams by high school students taking ICT, the weakness of students in this subject will impair the students' skills as professionals when entering the workforce. Students are less skilful in linking between topics with other topics or between sub-topics and other sub-topics as well as between concepts and other concepts. Understanding the relevance of these concepts and topics needs to be seen as the knowledge of the constructing of this Computer Building is a hierarchical knowledge of an easy-to-understand understanding of abstract forms. The disadvantages of using inappropriate teaching and learning techniques reinforce overall student achievement.

Research Methodology: This study aims to identify the needs and perceptions of students on the use of teaching aids based on virtual reality in ICT learning in secondary school, especially for the topic of PCAssembling. In the process of seeing the development needs of the virtual reality model, requirement analysis is the first step identified in the study problem, determining the solutions and objectives and determining the system requirements specification. In the first stage, document analysis comprising post mortem SPM 2015/2016 analysis among the two selected schools references shows the following:

Figure 1.1 shows, 1 person gets grade A (5 percent), grade B is 2 (10 percent), grade C is 9 (45 percent), grade D is 4 (20 percent) and data shows 4 people get E grades representing 20 percent of students. From the post-mortem committee found that several interrelated issues such as students were paying less attention to these subjects because of their easy graduation, there were still students who did not complete form 4 course work due to their delayed attitude, no textbooks and less reference books and hardware practice no provision. Improvements need to be taken as the need to attract students by leveraging the teaching and learning method. The study was conducted at four schools in the district of Besut, Terengganu offering SPM level ICT subjects. Respondents involved in this study will attend for the SPM examination in 2017 and they have studied the topics in ICT. Most of these students never learn and install computer components at home or at school for certain constraints. This was identified through a structured interview questionnaire among students.

A total of six teachers teaching ICT and 114 students were selected randomly and became the respondents of this study. The results showed that the reliability of the entire questionnaire was 0.9269. The Alpha Cronbach method is used to get the reliability index of the teaching and learning questionnaire of computer assembly constructs and this explains that they really need a virtual reality method in the construct. They were randomly selected from the group of students who were in the form of 4 and 5 school sessions. Their selection is in line with their position in the final phase of ICT learning where those who have been assessed already have the majority of basic knowledge and skills as a student who will take SPM exams later. From the data collection, the final framework was proposed as the following section.

Propose Framework for Learning PC Assembling Through VR: Conceptual frameworks are built to ensure systematic study follows procedures and steps to be followed in this virtual reality-based computer component Assembling model. The framework of the study can also
be interpreted as the methods and techniques of forming, collecting and analyzing the data so as to produce evidence that can support a study. The conceptual framework also explains the way a problem is investigated and the reason for a particular method and technique is used. In addition, the conceptual framework also helps to understand more broadly or in more detail about the application of the method by making a description of the research process being carried out. The conceptual framework of this study can be referred in Figure 1.2. This study involved five phases namely the analysis phase, design phase, development phase, implementation phase and formative evaluation and summative evaluation phase.

RESULTS AND DISCUSSIONS

Based on the initial findings of questionnaires conducted from the schools involved, this study was conducted to identify the need for virtual reality use in high school ICT subjects. At the same time, the framework proposed was validated from the expert, teachers and students. A total of 14 items were used to examine students’ perceptions on the construct of Computer Assembling. Figure 1.3 illustrates the analysis that students have a high perception of the need to understand ICT teaching and learning.

Figure 1.3 shows the findings related to the teaching and learning of Computer Assembling constructs. Only 2.22 percent of respondents stated that they were not interested in the topics and practices of Computer Assembling. While 15.56 percent that learning interest will disappear when encountering problems or difficulties in understanding the Assembling of Computers. 93.33 percent of respondents stated the importance of ICT SPM on Assembling of Computer Components, while 6.67 percent stated the non-interest in the title.

The findings also showed that 97.78 percent of respondents are constantly working to pass the Computer Assembling Amalgamation test. 60 percent of students stated that they had difficulty in relying solely on teachers and modules and the rest 40 percent stated that they did not face difficulty depending on teachers and modules provided at school. Regarding how students only learn Computer Assembling theoretically explain 77.78 percent say yes and 22.22 percent say that the
learning pattern is not theoretical only. The findings also showed that 73.33 percent of respondents faced difficulty in installing components due to weakness in basic computer knowledge. Accordingly, 82.22 percent of respondents need more explanation and examples to complete the Computer Assembling construct.

As many as 86.67 percent of respondents stated that they were easy to understand the construct of Computer Assembling if teachers diversified their visual use. This is supported by Siti Fatimah and Ab. Halim [12] found that a teaching material based on multimedia technology that involves visual sensory in teacher's teaching can stimulate and inject student's interest in the learning and delivery style of teachers in the classroom. This statement was supported by Che Soh [7] in his study found that virtual reality is suitable for producing animal cell visualization tools which can support learning principles based on constructivism and cognitive theory.

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Therefore, it can be concluded that the use of virtual reality in ICT teaching in secondary schools will be able to have a great impact on the improvement of knowledge and skills, motivating students and diversifying the teaching-learning experiences. The study's findings, observations and interviews say they are very much agreeable as suggestions for improvement to use virtual reality applications in learning. The implication of this study that can be applied in ICT learning is to use visualization tools generated with virtual reality technology as an alternative to the use of static models. Visual equipment with virtual reality technology is also expected to be used as a complement to experiments/practices on computer assembly skills.

CONCLUSION

This study explains the importance of virtual reality technology to realize the outstanding achievement of ICT subjects in its special high schools and takes into account the needs and understanding of ICT-related knowledge generally. There are various aspects that are essential to the success of a goal of achieving educational excellence through the use of today's technology and learning tools in order to build a complete, quality, appropriate and user-friendly educational package that is applicable to the target audience. The information, findings, suggestions and views of this research study are expected to give an idea especially to the development of the virtual reality technology needs of the general population of education, teachers, students and parties involved directly and indirectly in addressing the problems of students in mastering basic concepts and troubleshooting Computer Assembling based on the proposed framework. Hopefully, the virtual reality-based learning concept of students can be practiced and guides students that knowledge will not come alone without the desire and high learning skills. This study will continue in
the future by studying the effectiveness of the model and implementation of virtual reality applications that will be developed.

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