Interactive e-Learning system for Thalassemia: a Case of University Hospital in Thailand

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Abstract: Though most medical students are from top of the classes, it is no secret that gaining real-life work experience and advancing their careers require years of practical and hand-on experiences. To address the perceived skill and to bridge gaps, a first-hand solution is launched in the form of a prototype being developed that take a unique spin on e-Learning system with interactive content. The tool is tested with domain expert and various levels of medical students and their anonymity. The preliminary result is shown to be satisfactory for more coverage.

Keywords: e-Learning, Interactive Content, Prototype, Medical Studies, Anonymity

Introduction

E-Learning not only support a richer but also a more engaging educational experience than is the normal classroom. In this context it is tailored to additionally build key competencies experienced, medical professionals need to progress in their careers. Unfortunately, the subject contents are difficult to comprehend in today dynamic conditions. The traditional Learning Management System (LMS) is being complimented with the deployment of interactive content so that medical student level of accomplishment is increased apart from personal faculty guidance and peer-to-peer and student-to-faculty discussion community. To name a few, students may obtain practical experiences through scenario-based learning, guidance from general physician, an online discussion community and possibly volunteer mentors. As a blended learning, especially the newly qualified doctors, this can assist them to gain more insights to the topics in need as perceived by Goh *and Clapham (2014). Back and* et al. (2014) further complement this through his study finding that blended learning approach does improve teaching in a problem-based learning environment in orthopedics. Therefore, interactive content as part of a blended learning is to help students rapidly gain the profession that will help enhance not only their cases experience and their ability to apply new skills thereby enhancing performance and contributions.

Based on methods surveyed, this paper presents four underlying concepts used in the development of this prototype with emphasis on instructional design are (a) attention- arouse curiosity and sustain interest; (b) relevance- make tasks relevant to learner's needs and interests; (c) confidence- build on success and gain self-efficacy; and (d) satisfaction- provide extrinsic and intrinsic rewards. This paper omits the requirement elicitation, system development life cycle and other system related engineering aspects of the software development process and emphasized only on e-Learning methodology.

1.1.1 Instructional Design

A nine-step model proposed by Gagne (1985) help ensure effective learning. Those events of instruction include (a) Capturing learner's attention, (b) Informing learners of objectives, (c) Stimulating recall of prior learning, (d) Presenting the content, (e) Providing learning guidance, (f) Eliciting performance, (g) Assessing performance and (i) Enhancing retention and transferring to job. Later, Kearsley & Shneiderman (1999) offered the engagement theory stating that student have to be engaged meaningfully in the activities related to learning through interaction with others and worthwhile tasks facilitated and enabled by technologies. Norman (2004) argued that by engaging in the course where fun and pleasure are elusive concepts where there is no consensus (Monk *et al*., 2002). Thus, it is dependent on the context of the subject and per Gibbs (2004) effectiveness in designing devices and software so that they are more affective.

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1.1.2 Usability Principles

According to Constantine & Lockwood (1999), five aspects of usability to be considered are learnability, the ability to remember, efficiency in use, reliability in use, and user satisfaction. An example of a successful design can be found on Csikszentmihalyi (1990) called a flow state where learners are so focused on what at hand and that they are unaware of the time. There are other issues, for instance, detraction, feedback (Keller, 1983), internationalization and localization; British and American English, and student differences; age, gender, background or disabilities.

1.1.3 Selection of Media

Since the selection of media is the heart of a well-designed e-Learning course. Horn (1998) refers visual language to the tight integration of words and visual elements, including animation, cartoons and diagrams. As an important principle in the e-Learning design, graphics and interactive elements should be purposeful and aid in learning. Per Tufte (1990, 1992), visual representations are very powerful at conveying information as can audio and video. Based on learners' access to and familiarity with e-Learning, Roblyer & Ekhaml (2000) offers a rubric for assessing interactive qualities called the Media Selection Matrix. Though, Moss (2002) provides guidelines and suggestions to design to increase learning, particularly the exercises, this work is carried out based on instructions obtained from domain expert in the design of exercises.

1.1.4 Evaluation

Specifically, the evaluation is used to inform the design or revision of a product. There are, generally, series of steps are applicable in most forms of evaluation. They are (a) Evaluation criteria, (b) Data collection, (c) Data organization, (d) Data analysis, (e) Reporting and (f) Refining. In this section of this article, emphasis is given on usability evaluation and is already covered in the five usability principles outlined in the preceding section. Testing all these guideline ensures that learners can be successful. Therefore, no matter diverse set of technical skills learners may have, a well-designed and robust technology application will prove to be useful and usable for them.

1.1.5 Support for Learners

Anderson et al. (2001) pinpoints that students need to understand the importance of time management and distraction control. In most cases as described by Galusha (1997), the lack of student preparedness and support are major drawback. Technical barriers must be made a non-issue. By selecting the intuitive and flexible technology tools, coupled with technical training, it can reduce technical barriers. Moreover, students need to acquire more than a basic understanding of the use of the technology itself—they need to understand how to use it efficiently to support their learning tasks. For example, with a wealth of resources available with varying degrees of reputability, students need to learn good research skills, including good Internet search skills. Guidance may be needed on where to look for information (e.g., recommended data repositories) and to develop the ability to critically assess the information they find. A tutorial with an affiliated library service can help students hone these skills, and embedded links to reputable and relevant data resources can point students in the right direction for research projects. LeBaron and Miller (2004) identify the use of scaffolding in training students with use of technology tools. They describe the design and implementation of an icebreaker exercise for an online course. Lin (1999), who found that practice time to acquire skills needed in an online course had positive impacts on self-efficacy, interest, and commitment, advocates this kind of initial training. The reference to the group work is not discussed in this paper as the context for this preliminary work aims at individual and anonymity study.

Materials and Methods

A prototype is produced based on user requirement and detailed instruction. Initially, three scenes based on the general inquiry in order to screen the patient of a Thalassemia disease are constructed using Adobe ® Flash technology and form part of existing e-Learning system available in university hospital's intranet system. Present works are being carried out using Blender® attaching to MySQL database in order to replace the Adobe ® Flash technology and more scenes

are added. Figure 1-4 below and on next page depict screenshots of scene from a developed system. Audio provided as a background responses are not able to reproduce in this paper but are available as part of the interactive system.

The newly developed system is used to complement the existing Learning Management Systems with contributions in the area of interactive responses and subject matter comprehension.

Figure 1. Scene 3: Meet the doctor.

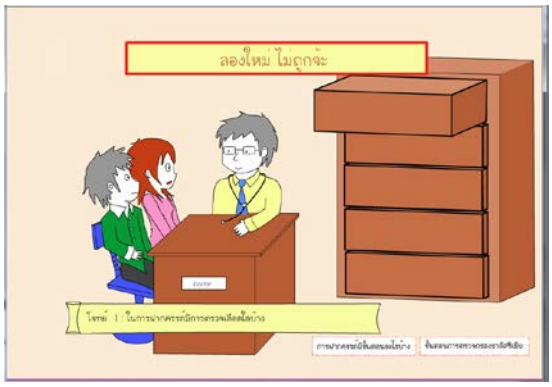

Figure 2. Scene 4: Question answered with a negative result.

Each scene requires users (in this regard, medical students) to interact with a system, and waits for a system response to do next. Provided that the student is keen on the general knowledge of the disease, the system will allow the student to proceed to next scenes. Otherwise, student will be asked if they would need any assistance or condensed materials to be read and understood before moving on to the next step. Initially the design is based on a gaming concept that offers a rewarding point for collection and future redemption. To avoid the pitfalls, typically most medical students will try to serve their challenging need, such motivation is given in the form of recognition through applauding sound instead.

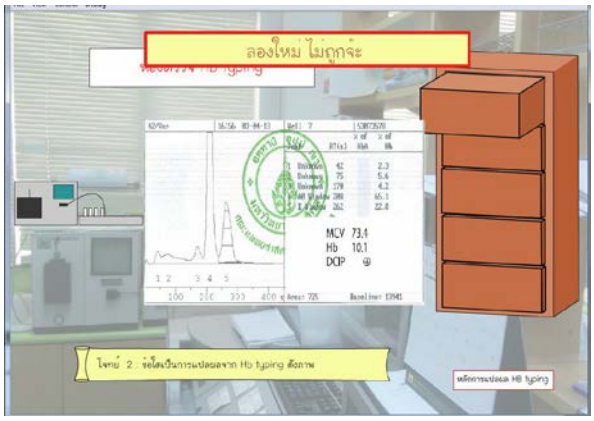

Figure 3. Scene 7: Question answered with a negative result.

Figure 4. Scene 11: Question needs an answer.

Results and Discussion

Another domain expert was invited to review and comment on a finished prototype with comments on a concern regarding intonation because the recorded voice was quite flat. The technical aspect for general inquiry, counseling and early diagnosis are in line with the given requirements. Three different groups of people were brought in for working with the interactive content. They are a Thalassemia nurse, an officer at Thalassemia unit and a fifth-year medical student. It was found through close observation that out of ten minutes target time for the three scenes, each made use six minutes without using any system help, fifteen minutes with system help and eight minutes without system help, respectively. Each one expressed his and her enjoyment by using this guided screening. At this stage, the formal evaluation is not carried out due

to the fact that more comprehensive and complete scenes are needed. Works in progress are nearly completed for official evaluation scheduled during August 2014.

Conclusions

The preliminary result is found to be quite satisfactory by both the users and the team. Further testing on all fifth year medical students is scheduled during incoming August 2014 intake so that a complete work on Thalassemia screening topic can be produced and implemented as part of the LMS. Also, gradually, bundling the interactive content with other internal medicine subject is possible using this proof of principle prototype. Since the work is constructed based on Blender ® which is available on most platform except for iOS system which runs on iPhone, iPad and McIntosh related operating system, the author and a team plan to have this work ported to such platform in the near future. By using this interactive as part of the blended learning system, the aim is to provide hand-on experiences through case-based reasoning and there might be rare cases that they are not being covered by the system.

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