Efficacy of Multimedia Set on Acquisition Clinical Skills, Views of Medical Students in UMS

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Abstract

Undergraduate training in Ear, Nose and Throat (ENT) surgery is often challenged by the short posting and limited patient contact. Multimedia is an useful tool in medical education to enhance clinical skills training. However, there is limited research on the development of such tools. We describe the development of an innovative multimedia set, where Mayer's principles for designing multimedia were followed in preparing an interactive CD-ROM. The developed set integrated basic sciences and clinical applications. The views of a sample of fourth year medical students and general practitioners were explored about the usefulness of this developed multimedia in facilitating the acquisition of clinical skills. The instructor led the live demonstration for the clinical examination. Then, students interacted with the multimedia set in a ratio of 4 students to 1 computer. Immediately afterwards, they practiced the technique of clinical examination of the nose. End of the session feedback revealed that most of the students found the innovative set had simplified the difficult techniques and rated it very good to excellent. Shortcomings in producing a perfect media tool are related to unavailability of media professionals in the institute. However, the prototype product was found effective in acquisition clinical skills and enhancing cognitive outcome. The continuous development of multimedia materials will improve the skills of the crew and the quality of the multimedia product.

Key Words: Multimedia, Mayer's principles, integrated, clinical skills acquisition.

Introduction

Undergraduate clinical training in Ear, Nose and Throat (ENT) surgery faces several challenges. Short training in the ENT posting and limited direct contact with the patients may reduce junior doctors' confidence in clinical practice. Medical educators introducing alternative methods in clinical teaching have stated that "the instructional multimedia may improve efficiency and may promote higher level processing during practice of the techniques in a supervised setting" (Russell, 2011). In Universiti Malaysia Sabah (UMS) we developed a multimedia-set (M-set) on ENT examination. Mayer's principles were used to develop an effective multimedia tool in a form of CD-ROM.

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Methodology

Development of M- set
M-set was presented as an interactive CD-ROM and hand-out booklet which allowed "just-in-time-learning". A user friendly software was developed using Adobe Flash multimedia, which is a plug and play program that works offline. The applied anatomy of ENT was recapped in separate files and integrated with clinical tips. According to the cognitive load theory, only related information were scripted to avoid confusion of the recipient. Video recording, diagrams, symbols, mannequins and animation were used extensively to clarify the learning objectives. A file titled the gallery was created, where the user could navigate hundreds of spot diagnosis cases and diagrams. This brain storming gallery overcame the problem of limited contact with the patients during the short training period. Another file titled self-assessment was included in the M-set. 10 groups of multiple choice questions (MCQ) were prepared and categorized according to a common theme. MCQs were formulated in different styles to activate different levels of learning such as

recalling and problem solving. A hand-out booklet was printed to highlight the tips of the examination technique. It explored the basic facts and steps of examination to assist quick reference and revision of the topic. The M-set was designed to coup with variety of students' attitudes and characters.

This set was used in teaching fourth year medical students and enhancing general practitioners' awareness. After demonstrating the clinical examination of the nose, the students used the M-set in consolidating the clinical skills of examination and practiced it. At the end of the session, we used a feedback questionnaire to assess users' perceptions on the efficacy of the M-set in acquisition of clinical skills.

Results

Users reported that the M-set had simplified the difficult techniques and facilitated acquisition of clinical skills in examining the nose (Figure 1). As students were used to face to face teaching by a teacher/instructor during their clinical skills training, they regarded the innovative approach as supportive to face to face mode. Users felt that this method integrated the basic science subjects and the clinical sciences. Accordingly, M-set also enhanced users' cognitive abilities.

*Figure 1: Psychomotor skills enhancement with using M-set*
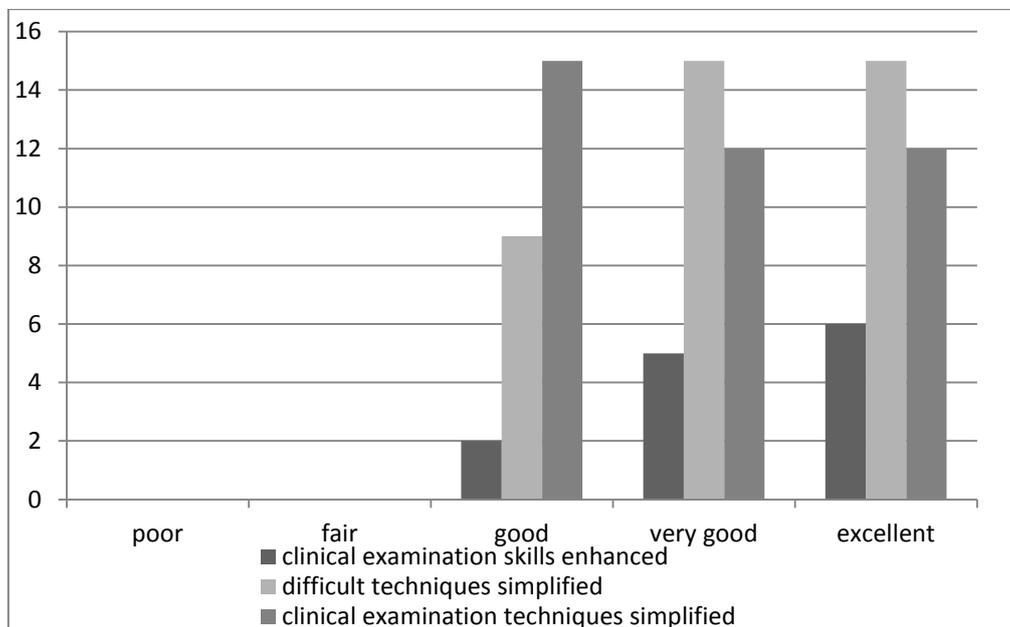
Discussion

The effectiveness of using multimedia in improving clinical training has been described since the 1990s (Coughlan, 2011). Using instructional multimedia across disciplines has increased with the access to educational technology (Russell, 2011). In spite of multimedia effectiveness, little research has been done into the development of such tools. The theory of multimedia (dual-coding theory) learning states that, the human memory system is stimulated by verbal and pictorial stimuli (Nabil, 2011). General principles of designing learning material also highlight that 'Learning is better from words and pictures than from words alone', which is known as multimedia principle. In 2006, Richard E Mayer set out "Ten Principles for Multimedia Learning". These principles aim to build a mental connection between verbal and pictorial response as graphics, animation or movies. Roxana and Richard (2000) recommend having words in audio format instead of visual text on screen (modality principle). They highlighted that the learning process is enhanced, when corresponding words and pictures are presented near rather than far from each other on the page or screen, (spatial & temporal contiguity principle). According to the coherence principle, learning is better when extraneous words, decorating pictures, and background sounds are excluded rather than included. In the M-set we avoided presenting the text on screen in association of animation and running narration (Redundancy principle) as shown in figure 2.

Figure 2: Presentation of M-set according to Mayer's principles
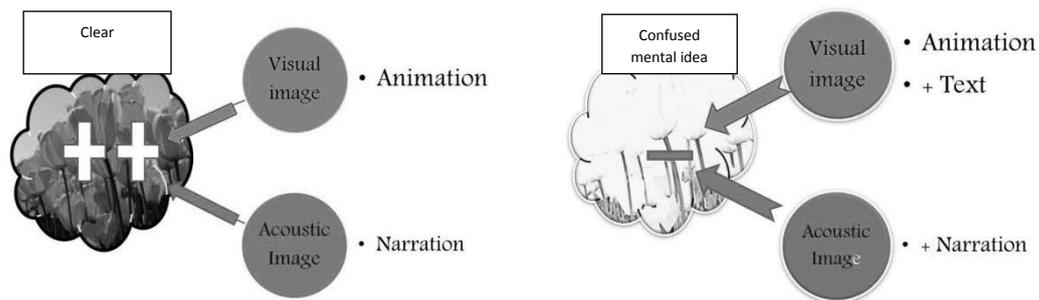
In M-set, the narration was in simple, with a clear accent and conversational style according to personalization and voice principles (Eric, 2008). The speaker's image appeared only during demonstration of clinical skills, ensuring the main focus on the procedure itself (image principle). Segmentation principle in designing multimedia, favours presentation of multimedia in learner paced segments (distributed) rather than as a massed unit.

However, individual variations play a crucial role in the efficacy of multimedia in learning. It has been reported that design effects are stronger for low-knowledge learners than for high-knowledge learners. Students with high-spatial abilities get stronger effects than low-spatial learners.

This M-set enhanced the 3 stages of clinical skill acquisition (Speelman, 2005). The *cognitive stage* was enhanced via writing a well-structured script and following Mayer's principles in editing the multimedia-set. The *associative stage* is strengthened and consolidated as the availability and easiness in operating allows continuous practicing, revising and self-assessment. Intermittent practice guided by M-set enhances the clinical skills as an *autonomous* habit.

Although none of the team who developed the M-set were multimedia experts, we tried our best to follow Mayer's principles in developing it. In view of the positive feedback from users, we assume that continuous production of multimedia sets will improve the quality of products on the long term.

Throughout a more long term process the educators may acquire new experiences and multimedia sets will be more organized. The endurance and enthusiasm in producing effective multimedia are important steps towards achieving the curriculum's learning objectives.

Conclusion

Applying and mastering Mayer's principles in producing multimedia tools are crucial to produce effective multimedia sets. Continuous production and using of comprehensive multimedia tools facilitates acquisition of clinical skills and improving cognitive outcomes.

Acknowledgment

Conflict of interest

The authors would like to declare that there was no conflict of interest as the project was sponsored by the UMS. This multimedia software had been awarded a Silver medal in Korea (SIIF 2010), (ITEX 2010-KL) and (PEREKA 2010). Copyright of this software obtained in December 2010.

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