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Digital Learning Resource for Basic Movement Therapy Course: Blended Learning Approach

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ABSTRACT

This paper is aimed at examining the use of blended learning and how it affects students' score in examination. Basic Movement Therapy (BMT) Digital Learning was constructed and developed based on multimedia design guidelines. A quasi-experimental design using two groups with pre-test post-test approach was used. A total of 103 students from the Universiti Kuala Lumpur, RCMP (Royal College Medical, Perak) were divided in two groups. The Control group received standard teaching sessions (N=51). The Treatment group received the same standard sessions but additionally used BMT Digital Learning application (N=52). Written test on basic movement therapy was done by students before and after intervention. Statistically significant better scores for the treatment group were noted. The results suggest that the use of BMT Digital Learning application was suitable for practical procedure purposes.

Keywords: Basic movement therapy, blended learning, digital learning resource, education, therapy

INTRODUCTION

Despite the development in education using digital media, there is insufficient evidence to support blended learning. Blended learning provides a unique balance in the teaching and learning approach because the method offers the convenience of e-learning without losing face-to-face contact (Vernadakis et al., 2012). Therefore, current higher education does not foster recent needs in teaching and learning process. Many issues need to be reconsidered in designing effective application for optimal

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learning environments. Currently, teaching and learning approaches are merely based on lectures, collaborative learning, group discussion, practice in tutorial sessions and practical in the physiotherapy exercise room without the use of technology. Technology-mediated teaching and learning in physiotherapy education appear to be less than satisfying with limited research available on the appropriate use of technology-enhanced learning environments (Rowe, Frantz, & Bozalek, 2012). Teaching and learning skills in physiotherapy are inadequate to promote learning. Self-study is required for students after completing class. However, lack of learning resources and materials is an impediment for effective learning. Azer et al. (2013) also found that for many years, students relied on their teachers as one of their main sources for learning practical skills because they do not have structured resources for references.

E-learning environment increases flexibility and provides opportunity for students to self-regulate learning for better performance regardless of space and time issues, while face-to-face learning permits immediate and spontaneous feedback from instructors. In this study, e-learning resource is defined as additional learning material in which computers are used for learning and to assess student response. According to the constructivist perspective, learners must construct knowledge from constructive activity so each learner individually (and socially) constructs meaning when he or she learns. Hence, a constructivist individual student works with instructional material on his or her own time, without direct supervision or guidance from instructor. Learners are independent in terms of self-instruction. Self-instruction is the most appropriate approach and suitable for learners with different levels of knowledge on the same topic.

Table 1
Multimedia guidelines for e-learning design (Clark & Mayer, 2012)

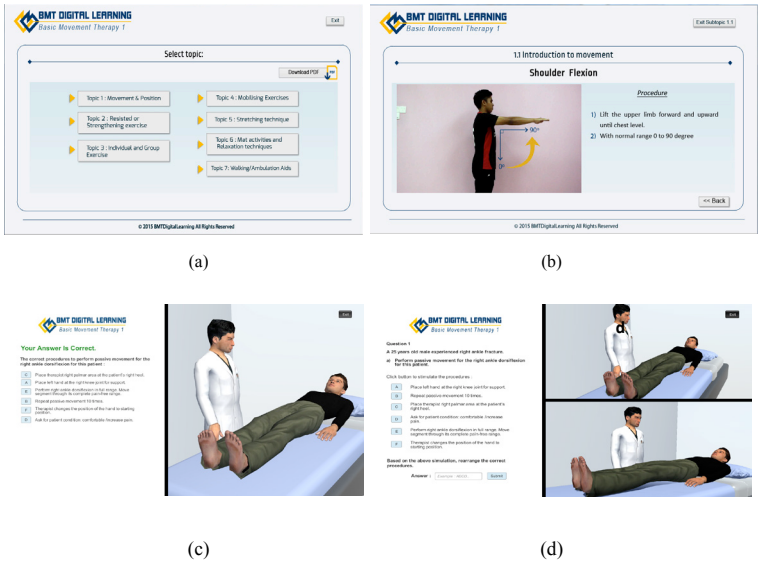
Design guidelines for e-learning	
Multimedia and Modality Principles	To communicate content, learner uses relevant graphics explained via audio narration
Exception to Modality Principle	To maintain information that learner needs time to process, use text on the screen (e.g. direction to tasks)
Temporal Contiguity Principle	Do not separate visual and audio that describes the visual
Redundancy Principle	When using graphics on the screen, do not present words as both onscreen text and narration
Coherence Principle	Avoid irrelevant video, animations, music, stories, and lengthy narrations
Personalization Principle	Use conversational style using first and second person for audio scripting
Segmentation Principle	Break content down into small chunks using continue or next button
Pre-training Principle	Teach important concepts and facts prior to procedures or processes

Based on the previous studies, e-learning for physiotherapy education has employed video-based learning that simulates patient-therapist activities, which have been used effectively in clinical education (Weeks & Horan, 2013). The use of video-based learning provides students

with learning experience to construct new knowledge. Furthermore, video resources offer students flexibility in terms of learning as well as offer self-regulated learning. Video-assisted in teaching health professionals, specifically clinical practice, can make learning more enjoyable and engaging (Weeks & Horan, 2013). The proper e-learning design is essential for learning to occur by applying appropriate multimedia guidelines when using audio and visual modes (Clark & Mayer, 2012).

MATERIALS AND METHODS

Key topics and subtopics were identified for the content development. The learning material can be accessed using a hyperlink in non-linear format to ensure that key topics and sub topics are connected. The digital learning material consists of printed materials and electronic materials. A printed material is provided for long reading information whereas an electronic material contains video learning and 3D simulation assessments. The design phased used guidelines adopted from Clark and Mayer (2012) to develop the digital learning material. The main interface includes buttons to access topic 1 until topic 7 in a nonparallel way (Figure 1(a)). Adobe Captivate 8 was used as the main authoring software in this project. Learning contents using video-based learning demonstrate the procedures in left layout, while in right layout space text are used to highlight the procedures. Body landmark, pointing arrows and degree of movement information in the video provide information about procedures (Figure 1(b)). For learning assessment 3D simulation are provided in every topic to assess students' comprehension (Figure 1(c)). The character modelling was developed using 3Ds Max software and Unity 3D was used for coding and programming the interactivity works. Experienced therapists were used to demonstrate the procedures and to create a precise movement of the 3D simulation, motion capture equipment was used.



(a) (b)

(c) (d)

Figure 1. (a) Main menu interface; (b) video-based learning; (c) 3D simulation assessment; and (d) assessment feedback

The study employed quasi-experimental with two groups using pre-test/post-test approach. The research design is as follows:

Table 2
Research design

	Pre-test (Rubric Test)	Treatment	Post-test (Rubric Test)
Experimental group	X	X	X
Control group	X		X
	Week 7	Week 8 – Week 14	Week 15

Participants' characteristics such as gender, age, self-motivation, previous knowledge, computer literacy and learning styles were reviewed (Muijs, 2004). The study population consisted of 104 students in year 1 who had basic movement therapy course for the current semester. Students were assigned randomly into two groups of practical class where the researcher did not have any involvement. There are 15 weeks in one semester; from the first week until week 7, both groups attended class as usual. On week 7, pre-test was done to collect baseline data on students score performance before the treatment begins; from week 8 until week 14, the experimental group were exposed to blended learning. The instructor and students were handed DVD consisting of learning materials in exe format. The instructor used the digital learning material in lab practical session as a strategy to get students to use the learning material as additional references post class. The control group were exposed to teaching and learning via face-to-face method only. On week 15, post-tests were done to collect data on students' score for both groups after intervention.

RESULTS AND DISCUSSION

Data was analysed using statistical analyses using Statistical Product and Service Solutions (SPSS), version 23. The following hypotheses are tested in this study:

H1: The use of BMT digital learning in blended learning intervention will not show improvement in students' achievement from the pre-test score to post-test score.

H2: The use of BMT digital learning in blended learning intervention will show improvement in students' achievement from the pre-test score to post-test score.

The independent variable is the BMT digital learning application, and the dependent variable is students' achievement. The experimental group completed the basic movement therapy course using BMT digital learning, while the control group used conventional learning method only. It was generally anticipated that the blended learning would yield improved learning outcomes and that generally higher student post-test scores were expected when compared with group whose lessons incorporate conventional teaching method only. If the null hypothesis was rejected, the use of BMT digital learning would statistically show a significant difference between the different scores of the groups. Therefore, it could be reasonably expected that the control group would perform less well than the experimental group.

Table 3
Independent t-test result

Groups	N	Mean	Std.
Blended learning (experimental group)	52	9.09	0.77
Face-to-face method only (control group)	51	8.70	0.91

An independent-samples t-test was conducted to compare students' scores for practical test in blended learning intervention and face-to-face learning method only. There was a significant difference in the scores for blended learning intervention (M=9.09, SD=0.77) and face-to-face method only (M=8.70, SD=0.91) condition; t (101) = -2.33, p = 0.022. These results suggest that blended learning does have an effect on students' scores for practical test. Specifically, the results suggest that when learning is technology driven, it could elevate students' performance.

Table 4
Mean diff, t-value and p-value

Groups	Mean diff	*t*-value	*p*-value
Before intervention (pre-test)	-.08211	-.746	.901
After intervention (post-test)	-.39052	-2.331	.022

An analysis of variance (ANOVA) was also conducted which shows that there is significant difference between achievement of students who used BMT digital learning and students who completed the course without utilising of BMT digital learning. Figure 2 shows the plot of the mean scores for each group based on the pre-test and post-test where each line represents a group. From this graph, it is clear that the experimental group performed better than the control group in pre-test and post-test.

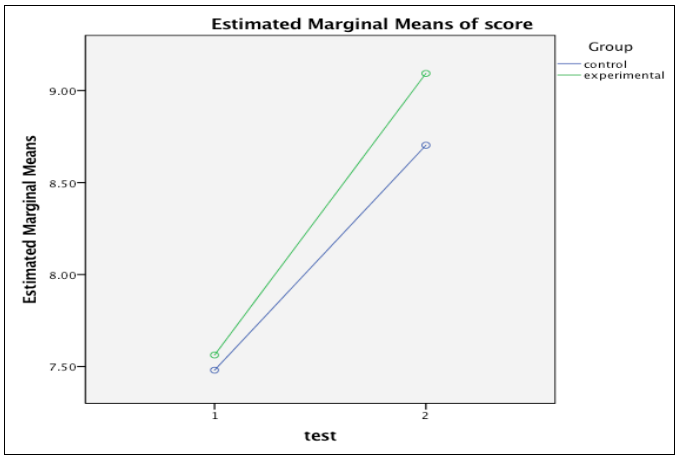


Figure 2. Plot of Means

Table 5
Difference scores (Post-test vs Pre-test)

Group	Test	Mean	Std. Error	Lower bound	Upper bound
Control group	Pre-test	7.480	.078	7.325	7.635
	Post-test	8.703	.119	8.467	8.939
Experimental group	Pre-test	7.562	.077	7.409	7.716
	Post-test	9.093	.118	8.860	9.327

Note: 95% confidence interval

The development of digital learning project takes about 1 year. A multidisciplinary team including physiotherapy instructors, instructional multimedia expert, 3D animator, programmer and new media professionals was recruited to develop this project. The inclusion of video-based learning and 3D simulation as learning materials in physical therapy training may benefit student outcome. Physical therapy requires proficiency in procedural skills to perform physical therapy activities. To acquire such expertise it demands for sustained practice in order to improve specific aspect of the performance (Kneebone, 2005). Wulf, Shea and Lewthwaite (2010) found that observational practices, feedback and self-controlled practices are influential in enhancing motor skills learning. Building on these attributes to multimedia instruction might contribute to appropriate development of e-learning material in practical skills. This results in effective learning when it permanently changes learners' capability to perform such skills through demonstration of retention and transfer skills.

CONCLUSION

E-learning has been studied as an instructional format across a range of health education topics and context for decades. However, the contents are still insufficient to support blended learning to foster current needs in teaching and learning process. This research is important because it shifts learning from standard teaching method to blended learning approach where learning can be done independently and help students to self-regulate their learning. Thus, the digital learning resource is effective in increasing students' capability to perform practical skills. Blended learning approach with the design of interactive video learning and 3D simulation for assessments make learning more interesting and engaging. Thus, through the integration of educational technology tools, teaching and learning can be addressed more effectively and learners become more accountable for their own education.

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