

The Effects of E-Sports Courseware for Teaching Psychomotor Skills

Wong, C.K., Shariffudin, R.S., Mislán, N. and Julia Guan, C.H.⁺

Faculty of Education, Universiti Teknologi Malaysia, Malaysia

Abstract. Computer Aided Learning (CAL) is no more an uncommon phenomena in the education arena of Malaysia today. This instructional approach had been used in the process of teaching and learning for many school subjects but there is very little application in Physical Education. The purpose of this study was to investigate the effects of E-Sports courseware developed by using the Simpson's Psychomotor Domain Taxonomy for teaching psychomotor skills. The E-Sports courseware was developed for the topic of Triple Jump in Physical Education syllabus. This descriptive type of study comprised of 60 samples from a secondary school in Johor Bahru District. The instruments of the study were questionnaires to evaluate the courseware, a Pre-test and Post-test analyzed using t-Test for students' performance. The data were also supported by interviews and observations. The significant value of 0.000 showed that there were differences before and after learning with the courseware. This means that there is an increase in knowledge of skills in triple jump. The result of the study also showed positive effects on level of achievement in Simpson's Psychomotor Domain Taxonomy. As a conclusion, the development of E-Sports courseware is able to trigger positive effects towards students' psychomotor skills learning and hopefully it may assist in identifying young sport talent later.

Keywords: multimedia courseware, physical education, psychomotor skills, Simpson's Psychomotor Domain Taxonomy.

1. Introduction

Computer technology and multimedia have long been applied in the teaching and learning processes with its promising advantages. Utilizing the right combination of multimedia elements will influence the way students learn, increase their interest, enhance their performance and affect the learning environments [6]. In the Education Development Master Plan (PIPP) 2001-2010 the Ministry of Education in Malaysia has been making efforts to widen the usage of ICT in all national schools by assuring all schools be equipped with infrastructures, tools, software and well-trained teachers with computer mastery skills. A variety of multimedia courseware was developed for use in teaching and learning but mostly on academic subjects such as languages or science and mathematics.

Physical Education is a compulsory course taken during primary and secondary education that encourages learning of psychomotor skills in a play or movement exploration setting [2]. It is an educational process that integrates the development of physical, intellectual, social and spiritual for each student [5]. It aims to impart a life long impact on student as building psychomotor skills and participation will lead to positive behaviour towards long term commitment for physical activities to build a healthy body. The Physical Education curriculum stresses on three main domains, which are cognitive, psychomotor and affective domains. According to Simpson's Psychomotor Domain Taxonomy, the psychomotor domain includes physical movement, coordination, and use of the motor-skill areas. There are seven major skill categories, from the simplest behaviour to the most complex, and development of these skills requires proper practice and is measured in terms of speed, precision, distance, procedures, or techniques in execution.

⁺ Corresponding author. Tel.: +6 016 715 1978
E-mail address: alwaysjulia@hotmail.com.

Proper guidance and instruction from the Physical Education teachers are very much needed to avoid unnecessary accidents. However, it is difficult for a Physical Education teacher to make sure all students acquire the right movement patterns to fit every particular situation or specific problem.

Furthermore, part of the traditional teaching method is not sufficient as the students' interest in Physical Education become more and more deteriorated due to the lack of variety in teaching aids and creativity of the teachers [4]. Thus a multimedia courseware may be a solution as the students can learn independently and repeatedly in an interactive environment and in a meaningful way. Most of the presently used courseware for sports were developed based on general learning theory and did not consider psychomotor skills learning theories.

Prior to conducting this research, a preliminary survey involving 10 Physical Education teachers from different secondary schools in Johor was carried out to identify the difficult sports skills that the students commonly face. The survey indicates that the most difficult sports skill to learn is the Triple Jump as it requires high level skills. In the effort to assist the students in mastering the Triple Jump skill, this current study designed and developed a courseware, namely E-Sports based on Simpson Psychomotor Domain theory. The content of the courseware was designed in accordance to Simpson's Psychomotor Domain Taxonomy namely perception, set, guided response, mechanism, complex overt response, adaptation, to originality. The effectiveness and usability of the courseware were also evaluated to determine whether there is a significant difference on the students' achievement in Simpson Psychomotor Taxonomy Domains in learning the Triple Jump using E-Sports and by traditional teaching method. Five aspects of the courseware were evaluated: The fulfilment of teaching objectives, courseware user-friendliness, students' interest, aid for Physical Education teachers and courseware content.

2. E-Sports Courseware

E-Sports courseware is developed on the topic of Triple Jump for Physical Education syllabus at the secondary level. Figure 1 shows the topics covers in the courseware. The ADDIE model was used as the instructional design model. Multimedia elements such as text, graphic, video, audio and animation were integrated in developing the courseware so that students may experience a real situation of practicing the Triple Jump. Figure 2 shows some of the slides in E-Sports courseware.

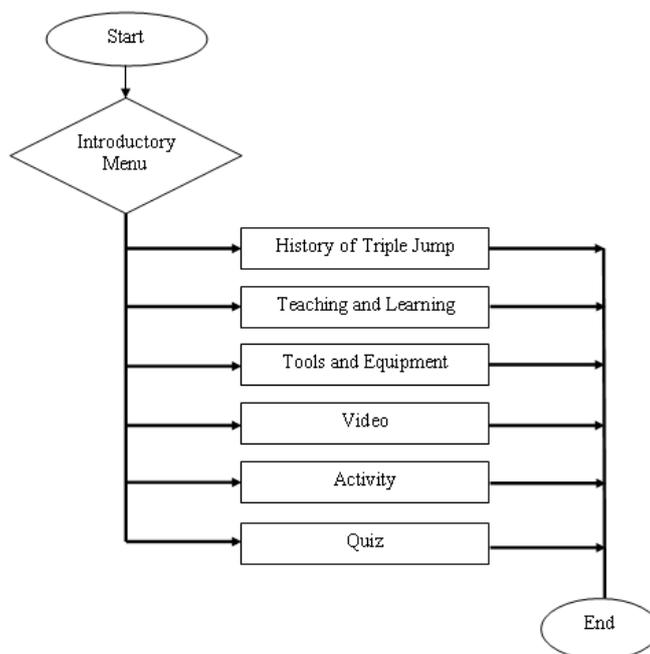


Fig. 1: Flow Chart of E-Sports



Fig. 2: Slides of E-Sports Courseware

3. Methodology

A quasi-experimental research design was used in this study as the researcher could not randomly assign participants to comparison groups due to their time table and syllabus restraints. 60 students were assigned into two groups. Lessons relating to Triple Jump were taught using E-Sports courseware by Physical Education teachers. Students from this group were compared with those in control classes where Physical Education teacher taught the lessons by notes, demonstration and drill practice. The study was conducted for one month by using E-Sports, pre-test (test question relating to Triple Jump), post-test (test question and observation) and interview. Table 1 shows the questions used in pre-test and post-test to evaluate the students' understanding level related to Triple Jump. After the post-test, the students demonstrated their Triple Jump skills and were evaluated using observation and interview.

Table 1: Questions in Pre-test, Post-test and Observation

Stages of Simpson's Psychomotor Domains Taxonomy	Pre-test and Post-test		Observation	
	No. of questions	Example of test question	Skills	Aspect of observation
Perception	1, 4, and 17	Q1: List two differences between Triple Jump and Long Jump.	Awareness	Tested in Pre-test and Post-test
Set	2	Q2: State the benefits of warm up activities for Triple Jump.	Readiness	1. Is the student ready?
Guided Response	3, 8, 5 and 9	Q3: List out the rules for Triple Jump.	Trying	1. Carry out the warm up activities in E-Sports courseware. 2. Measuring the running steps in phase approach. 3. Checking the landing area.
Mechanism	6, 10 and 18	Q10: In the step phase, the competitor should ... A. incline the body to the front, knee held high B. straighten the body, knee held high C. incline the body to the back, knee held low D. straighten the body, knee held low	Basic Skills	1. Demonstrate the Triple Jump phases correctly.

Complex Overt Response	12	Q12: Match the phases in Triple Jump with the given situation movements.	High level skills	1. Carry out Triple Jump with well controlled body coordination for each phases? 2. Improve movement after jumping?
Adaptation	13, 14, 15 and 16	Q14: A Triple Jump competitor must have a controlled _____ so that he will not fall easily when practicing the activity.	Adaptation skills	1. Improve and adjust running steps for jumping? 2. Body coordination stable and smooth?
Originality	7 and 11	Q11: What are the improvement steps for a competitor to increase his Triple Jump distance?	Creativity skills	1. Improve on jumping technique? 2. Able to do the jump with well controlled body confidently?

4. Results

Students performed better in mastering Triple Jump skill in E-Sports group than in control group with the mean score of 40.13 compared to 38.27. Table 2 and 3 show that there were differences before and after learning process with the significant value of $p < 0.000$ for both experimental and traditional group. The significant differences in the increment scores for both groups implied that learning in both groups had indeed taken place. No significant difference between the mean scores of control group and experimental group in pre-test and post test score as shown in Table 4 with the significant (2-tailed) value of $p = 0.59$ and 0.4 which are greater than $\alpha = 0.05$. Observation result showed that 86.67% of the control group students and 73.33% of the experimental group students were able to master stage 6 (Adaptation skill) in Triple Jump skills.

Table 2: T-Test Result for Experimental Group

Experimental Group	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pre test – Post test	-1.80	10.25	1.87	-21.83	-14.17	-9.620	29	.000

Table 3: T-Test Result for Control Group

Control Group	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pre test – Post test	-1.94	7.00	1.28	-22.05	-16.82	-15.20	29	.000

Table 4: T-Test Result between Control Group and Experimental Group in Pre-test and Post-Test

Control group – Experimental group	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Pre - test	-3.30	9.18	1.68	-6.73	0.13	-1.97	29	.590
Post - test	-1.87	11.97	2.18	-6.34	2.60	-0.85	29	.400

5. Conclusion

The findings of the study supported the effectiveness of the E-Sports courseware. The courseware, which adopts the constructivism approach, has been proven to be useful and effective through the significant improvement made by the experimental group students. The benefits of E-Sports include: it helps the students to overcome the difficulties and challenges faced by students when mastering the Triple Jump skills,

students may learn the courseware anytime and anywhere at their own pace, and it also helps to reduce the teachers' burden by reducing the time taken in the teaching and learning sessions. The experimental students also had given a fairly high evaluation and satisfaction of the courseware. The study is in line with other studies that had used multimedia courseware for the purpose of teaching and learning Physical Education [1, 3, 7, 8].

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