Research Journal of Applied Sciences, Engineering and Technology 4(23): 5285-5297, 2012
ISSN: 2040-7467

Submitted: May 21, 2012 Accepted: June 23, 2012 Published: December 01, 2012

Usage Pattern, Perceived Usefulness and Ease of Use of Computer Games among Malaysian Elementary School Students

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Abstract: ICT and computer games for academic purposes are aggressively promoted among school children in Malaysia. However, no study has investigated the use of computer games among primary school children and whether ease of use and perceived usefulness affected the actual use of computer games. Thus, the purpose of this study was to investigate the usage of computer games among elementary school children in Malaysia by location, school type and gender. Also investigated was whether ease of use and perceived usefulness effected the use of computer games following the prescriptions of the TAM model. The survey method was employed to collect the data and a questionnaire was administered to 201 primary school students from the National, Chinese and Tamil Schools in Penang. Data was analyzed using one-way ANOVA and Pearson correlation. The findings found that computer ownership and internet access by type of school, location and gender were high and were almost equal by percentage. However, the findings revealed that playing of computer games were at low levels among National school students and also by location and gender. In contrast, more than 50% of SKRJC and SKJRT students reported playing computer games at the medium and high levels. Also, students reported low overall perceptions towards perceived usefulness and ease of use of the games towards their academic performance and there were no significant differences in perceived usefulness and ease of use between the groups by demographic factors. However, further analysis by construct revealed that there was a significant difference in perception towards social value by location with students from urban schools reporting higher means, indicating that urban school students were playing the games as part of their social activities. Finally, following the predictions of the TAM model, it was found that Ease of use was significantly correlated to Perceived usefulness and that both ease of use and perceived usefulness were significantly correlated to actual use of the computer games. Thus, the study found that the government ICT policy was successful and that the adoption of computer games for academic purposes could be explained by the TAM model.

Keywords: Computer games, ease of use, elementary school, perceived usefulness

INTRODUCTION

Games have been used as part of learning and teaching processes throughout the ages (Ericsson, 2006). Even very young children can learn through play (Verenikina *et al*., 2003). At the college and corporate levels too instructors recognize the value of simulations and games in training specific skills (Cameron, 2001).Video games are generally excluded from this kind of treatment in education because educators often think of the negative influence on children who use them. The usage is often seen as developing into negative social effects leading to addiction to the medium. On the other hand, studies using games in classroom settings have shown that children often treat games as a social activity of sharing ideas and strategies for success (Lee *et al*., 2004). A research conducted by Schwartz (1988) revealed an optimistic perspective of computer games and in conclusion he found that almost all students enhanced their reading comprehension test scores after training. Some researchers believe that computer games can be used as influential tools to supporting learning. They recognized computer game as worthy of application and investigation in education (Dempsey *et al*., 2002; Kirriemuir and McFarlane, 2004).

Sutton-Smith (2001) considered the role of all types of games and play in children's development and concluded that computer games can accelerate some aspects of children's development such as individual and social development. Based on a study, it was found that children who played games as part of their classroom activities were more likely to select other recreational activities during their recess period (Rosas *et al*., 2003). Video games including computer games used as a complementing tool to traditional education, have the potential to help teachers and engage learners in a whole new way.

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LITERATURE REVIEW

The history of the computer game is related to the chronicle of technology development. The computer game needs to be capable to technology for managing and representing great amounts of data. As we see, from the beginning, computer games have been developed and changed simultaneously with development of computer science and technology. Although at the outset the computer game was designed for military and scholastic points, today it is the motive power in developing of a great deal of hardware such as 3D pictorials.

Seeing as a long time, Games have been a component of human culture and with this up-to-the-minute growth of computers, there has been a change in tendency of individual's concentration on computer based games. Therefore computer games have seen many developments from console games to 3D graphic systems, which are more modern and technologic.

Regardless of the diversity of computer games' types and their different regulations, nowadays computer games have taken hold the notice of researchers. Although most of the educationalists close their eyes to the educational potential of gaming and have focal point on the social consequences of game play, there are so many researchers that examine the effects of computer games and especially educational games. They investigate the effects of computer games on various aspects of students' life. These researchers ascertain the computer games as a powerful opportunity for educational media.

Via studying computer games, the impression of technology on personalities and societies, can be better comprehended by instructional technologists and they can understand better how to hold up digital atmospheres through locating them in well-to-do communal frameworks.

Computer game as an entertainment: A number of instructors have defined game factors that might be used when designing games in order to make learning settings more appealing (Bowman, 1982; Bracey, 1992; Driskell and Dwyer, 1984; Malone, 1981). Malone (1981), during a string of observations, surveys and interviews, discussed some elements that make computer games enjoyable, challenging, fancy and inquisitive. He also discussed how educational games are supposed to encompass appropriate goals that students will attain meaningfully. These goals should be measurable so that players can comment on their steps forward. Educational games can also include various complexities and levels in order to modify the game according to difficulty levels, learner skills and include elements of surprise. These games may also have emotionally temptation, whimsical or metaphorical elements related to the game skills.

One concern of the game designer is how to create the games and their contents at runtime. These endeavors are aimed at making computer games more fascinating and enjoyable for players (Jilani *et al*., 2010). According to Jilani *et al*. (2010), computational intellect techniques can be used to develop aspects of amusement in computer games. They used a pair of games from two different genres of games which were board based games and the killer /prey type games for empirical analysis. To measure amusement they defined a set of metrics that were offered on the basis of different theories of entertainment in computer games along with different comparable dimensions of game, which included duration, challenge, intelligence and usability.

Educational computer games: In recent times, computer and video games have been receiving widespread attention as a powerful tool for learning. Educators embrace computer games and are using them in education. They also consider how this fundamental development of media and technology, affect learning and schooling. Gee (2003) has claimed that computer games are possibly the best representation of present-day cognitive science theory, particularly positioned learning theory. They also claim that games make players learn through acting and creating. Squire (2005) believes that learning is individually significant and it is the reflective of purposes and ambitions of learners. He states that we become skilled at a specific field, by making choices and examining the consequences of those choices. These choices are evident in computer games!

Based on Gee (2003), Squire (2005) and Steinkuehler (2006) computer games players are interactive and competitive in nature and this shows that learning is social. They also believe that measurement of learning is accomplishment through multiple modalities, in the perspective of performing and in the service of learning.From the "Games, Learning and Society group" game play is profoundly prolific. Through gaming, playerscan solve problems and share their solutions, develop, test and share strategies and even maintain identities represented through games and other media.

Related studies: Whitto (2007) justified the importance of computer games and its usefulness as an educational tool because students find them motivating more than the traditional learning methods. The study highlights the main assumption by examining the motivational potential of using computer game-based learning with students in higher education. A series of twelve in-depth interviews were carried out to explore individuals' perceptions of and motivations for, game-playing for leisure and learning. These interviews were followed by a larger-scale survey, examining student motivations to play games and to learn with games. Data from 200 students were collected and analyzed. The results of this study indicated that a large proportion of the students who took part in the study do

not find games motivational at all and that there is no evidence of a relationship between an individual's motivation to play games recreationally and his or her motivation to use games for learning. Thus, Whitton (2007) concluded that employing games for their motivational benefits alone is not a justification for their use.

Srinivasan *et al*. (2008) reported the development of computer games and aspects of time usage and enhancement of teaching and learning. According to Srinivasan *et al*. (2008) the current utilization of traditional instructional methods is found to be unsuitable for the current and future generation of learners. Their study concluded that using games in learning could provide a potential for those who are interested in games. The study also stated the existing issues of the empirical data on the student's learning performance, particularly in a formal educational setting at the college level. The study initiated the results from a pilot project to develop an educational game prototype on the subject of basic digital design, to be used in various digital systems courses at the undergraduate level. The finding insisted on using game that has the potential to improve student learning and attitude.

Serrano *et al*. (2009) described the main concept of using games in learning and how it enable learners to learn easily and interact with the game elements, which captivate and engage learners for the acquisition of skills and knowledge in a pleasant way. This study supported the effectiveness of using computer games in learning as the main motivation source in some environments. The study presents two scenarios of utilizing computer and video game consoles for educational purposes in order to perceive the learner opinion about games in learning. The study proposed a comprehensive learning system designed and based on module for use both in schools and at home that contains interactive and reusable educational games or activities. The result showed that computer games have effects on student ability to learn. The ease of use and usefulness of these games were also estimated.

Mensch and Ali (2009) explained the experience of a particular department in integrating digital video games into a service learning project and its effects on the level of learning. This study conducted in the department of Technology Support and Training program (TST) at Indiana University of Pennsylvania (IUP), which initiated the integration process of the learning materials into computer games in a certain course. Furthermore, the study took into consideration the different number of initial ideas for the selection of the service learning projects and the methods of their implementation. The study proposed a theoretical feedback on service learning projects and the steps that led to select this idea for a service project. The study found that using computer games enables learners to learn easily by following the game instruction.

Bourgonjon *et al*. (2010) introduced the reliability of video games and its effects on learning. The study clarified the prime arguments towards video games, which found to be appealing to contemporary students. Meanwhile, the study justified that video game acceptance cannot be taken for granted. This study presented a new path model to examine and predict student acceptance of video games during their learning journey and empirically tested by involving 858 secondary school students. The results show that students' preference for using video games in the classroom is affected directly by a number of factors: the perceptions of students regarding the usefulness, ease of use, learning opportunities and personal experience with video games in general. Gender effects are found as well, but appear to be mediated by experience and ease of use.

Federico and Hélène (2011) presents new game and analyzes its impact on operations management education. In this study, Data were gathered from 100 teams include 4-5 undergraduate students in business administration. The evolution of different types of mistakes that were made by students in successive rounds of play was analyzed to assess learning, instead of relying solely on an overall performance measurement. Results of this paper were shown simulation games are more effective when students have to develop decision-making abilities for managing complex and dynamic situations.

David and Karen (2011) present a paper to evaluate the suitability of 'The Ward' as a simulation game to promote students understanding of decision making, critical thinking and team work in clinical practice situations. A qualitative study using a questionnaire ($n = 76$) and four focus groups. Results of this paper were shown 'The Ward' proved to be well received as effective in addressing learning issues related to clinical skill practice, nursing practice knowledge, medication knowledge. It also was offered valuable learning in the areas of decision making.

THEORETICAL FRAMEWORK

The theoretical framework for this study is based on the Technology Acceptance Model (TAM) which was developed by Davis *et al*. (1992) to explain how individuals make a decision to accept and use a particular technology. The Technology Acceptance Model for this research is shown in Fig. 1. Perceived Usefulness and Perceived Ease of Use are the key

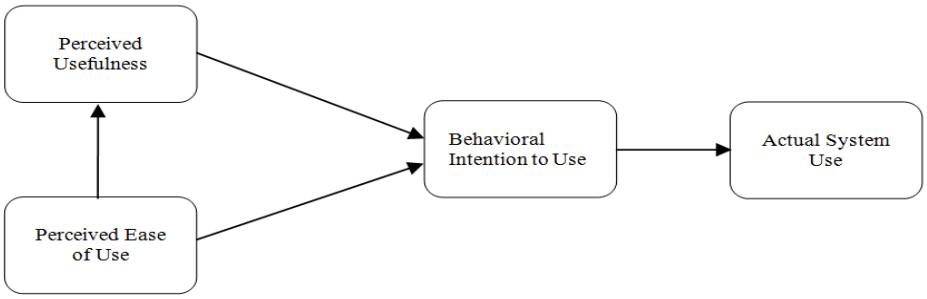

Fig. 1: Technology acceptance model as the theoretical framework

elements of this model.TAM is a revision of the Theory of Reasoned Action (TRA) in the area of Information System (IS). TAM considers that an individual's intention to use a system will be verified by perceived usefulness and perceived ease of use of that system. TRA and TAM presume that when someone develops an objective to perform, that they will be free to execute without restraint. Although some of limitations such as limited skill, time, environmental or organizational limits and unconscious habits will limit the liberty to take action.

This model implies that when a new software package is given to the users, Perceived Usefulness and Perceived Ease of Use will impact their determinations about how and when they will use the new software. Various studies have been carried out by using the TAM in order to investigate the usage of IT. Davis *et al*. (1992) examined the Theory of Reasoned Action (TRA) with TAM to find out "combination factors of the two models with the purpose of being delivered more complete sight of what will determine the users' acceptance."

Information systems use, takes a variety of theoretical perspective. Of all the theories, the Technology Acceptance Model (TAM) is considered the most influential and commonly employed theory for describing an individual's acceptance of information systems. TAM, assumes that an individual's information systems acceptance is determined by these major variables (Appendix A):

- Perceived Usefulness (PU) which in this study is measured by students' responses towards learning value, social value and individual development
- Perceived Ease of Use (PEOU) which in this study is measured by students' responses towards how easy and simple it was for the students to use computer games
- Usage Pattern (UP) which in this study is measured by students' responses towards availability of computers Internet and computer games and their frequency of use.

Problem statement: Malaysian children are exposed to various kinds of computer games. These games may come in different formats and with different contents and they are always added to the collection of available games. School children are inquisitive and interested to take part in these new games. Regardless of attractive elements such as colorful graphics, the fantastic music and the intriguing and exciting plots, there are so many discussions and a large amount of research has been done.

Many researchers have done studies about negative social, personal, psychological, educational and recreational effects of computer games on children. Unwarranted time spending with computer games could harmfully impact on schoolwork (Griffiths, 1996). As Clark (2003) observes, computer games can amuse from learning as players focus on the objective of completing the game rather than using them as a learning tool. The games, in which characters and environments have a propensity to be aggressive and have stereotyped, can encourage negative and socially intolerable behaviors such as violence and aggression (Cooper and Mackie, 1986)."Time spent in front of a screen could instead be spent, for example engaged in a sport or social activity" Stoll (1999) suggests. Some games which are extremely appealing and motivational can become addictive (Anderson and Ford, 1986) and direct to social separation, (Selnow, 1984) low self-esteem and poor social interaction skills.

On the other hand, other studies in the opposite direction have been conducted. These researches suppose that computer games and particularly educational games can affect in the positive way. Rosas *et al*. (2003) pointed out positive effects of educational computer games on motivation and classroom dynamics. Educational computer games can have positive effects on the students' attention and concentration (Garris *et al*., 2002) and on their approaches towards learning and self-esteem (Lou *et al*., 2001). Other findings have a look on computer games as a precious research for promote two-way learning (Williamson and Facer, 2004).

Many studies have investigated computer ownership and internet usage among Malaysians but No study has investigated the usage of computer games among primary school children in Malaysia by location , school type and gender and ease of use and perceived usefulness their effects on actual use of computer games following the prescriptions of the TAM model.

Studies employing TAM have shown the effects of PU on attitudes towards using and intention to use as well as the effects of eou on pu and attitudes towards using. However, Park *et al*. (2007) found that there were significant effects of ease of use on PU and behavior intentions towards use but there were no direct significant effects of eu and pu on actual use. They found that the mediating factor for actual use was Evaluation of Functions.

The use of computer game among the children is almost inevitable, thus there is aneed to look for the strategies to encourage students to play useful or educational games. Therefore, it is necessary to study the current patterns of the usage of computer games, perceived usefulness and ease of the use of computer games and whether the ease of use and perceived usefulness have significant effects on actual use of computer games following the prescriptions of the TAM model.

Significance of the study: A meticulous study seemed vital as far as Malaysian elementary school students are concerned, in order to carry out such an important study. So this descriptive study was organized to see children from various types of schools such as SK, SRJKC and SRJK schools, school locations such as Urban and Rural and also Gender how are exposed to the computer games. Also in order to investigate how much time and resources are used to play computer games by them and to see how ready they are to continue to play computer games and to see their perception regarding the computer games.

So that we can assist teachers, parents and game designers to formulate rules and procedures related to the use of computer games. To see how exposed the children from various types of schools such as SK, SRJKC and SRJKT and school locations such as rural and urban are to games.

- To see how much time and resources are used to play computer games by them
- To see how ready they are to continue to play computer games
- To see their perceptions regarding the computer games and their effects on the use of computer games.
- So that we can assist teachers, parents and game designers to formulate rules and procedures related to the use of computer games

Research questions: The Research Questions for this study are as follows:

- What is the state of Computer ownership and Computer games usage pattern of Malaysian elementary school students?
- How do the Malaysian elementary school children perceive usefulness of computer games in terms of social value, learning value and individual development by:

° Types of schools
° School location
° Gender?

- How do the Malaysian elementary school children perceive usefulness and ease of use of computer games by:

° Types of school
° School location
° Gender?

- Are perceived ease of use and usefulness of the computer games significantly correlated to the actual use of the games?

RESEARCH METHODOLOGY

In this study a survey method was employed to collect data. A survey questionnaire was administered to 201 primary school students from the National, Chinese and Tamil Schools in the State of Penang were selected by the Penang Education Department to participate in half day MSC Malaysia Cyber Games Festival @ Penang on the 20th of June 2010. The Cyber Games Festival is an initiative to support promotion and nurturing of the multimedia and creative industry in Malaysia, targeted at school children, gamers' community and the industry players, including MSC Malaysia companies.

A questionnaire was developed as data collection instrument. This questionnaire was designed to elicit information, in order to describe and analyze the elementary school students' usage pattern, perceived usefulness and ease of use of computer games. The questionnaire includes four sections and the items employed a Likert scale of 1-4 was with the following breakdown:

Table 1: Computer ownership by type of school

		Type of school			
		SK	SRJKC	SRJKT	Total
Owning computer	Yes	48 (98%)	16 (88%)	16 (94%)	180
	No	2 (2%)	2(12%)	1 (6%)	5
Total		150	18	17	185

Table 2: Computer ownership by school location

		Location of school		
		Urban	Rural	Total
Computer ownership	Yes	176(97%)	20(100%)	196
	No	5(3%)	0	5
Total		181	20	201

Table 3: Home Internet access by type of school

		Type of school			
		SK	SRJKC	SRJKT	Total
Home Internet	Yes	137 (91%)	11 (61%)	14(82%)	162
	No	13 (9%)	7 (29%)	3 (18%)	23
Total		150	18	17	185

Table 4: Home Internet access by location of school

		Location of school		
		Urban	Rural	Total
Home internet	Yes	159 (88%)	18 (90%)	177
	No	22 (12%)	2 (10%)	24
Total		181	20	201

Table 5: Number of hours a week playing computer games by types of school

No. of hours of playing computer games	Type of school		
	SK	SRJKC	SRJKT
less than 5 h	93 (63.0%)	8 (44.0%)	7 (41.0%)
6-10 h	34 (23.0%)	6 (33.0%)	7 (41.0%)
11-15 h	11 (7.4%)	0	0
16-20 h	5 (3.3%)	1 (5.6%)	2 (12.0%)
More than 20 h	5 (3.3%)	3 (16.7%)	1 (6.0%)
Total	148	18	17

Table 6: Number of hours a week playing computer games by school location and Gender

	location of school		Gender	
	Urban	Rural	Male	Female
< 5 h	101 (56%)	15 (75.0%)	70 (59%)	46 (56%)
6-10 h	47 (26%)	4 (20.0%)	28 (23%)	23 (28%)
11-15 h	12 (6%)	0	5 (4%)	7 (8%)
16-20 h	10 (5.6%)	1 (5.0%)	8 (6%)	3 (3%)
> 20 h	9 (5%)	0	7 (5%)	2 (2%)
Total	179	20	118	81

- Strongly disagree
- Disagree
- Agree
- Strongly agree

The questionnaire comprised demographic information of participants, covering their schooling level, location of their school, gender and age, computer Ownership and Usage pattern of Computer Games which has eight items, Perceived Usefulness of Computer Games that consists of three constructs, namely, learning value (4 items), social value (4 items) and individual development (8 items) and Ease of Use of Computer Games that includes 5 items. The overall reliability index for the questionnaire was Cronbach $\alpha = 0.85$.

DATA ANALYSIS

SPSS was used to analyze the data. Mean score and One-way ANOVA were used to analyze the data. ANOVA was chosen because:

- It provides a robust statistical analysis like a t-test but can also analyze data that contain more than two groups in one process
- Doing multiple two-sample t-tests would result in an increased chance of committing a type I error. Also, Pearson correlation was employed to determine the effects of ease of use and perceived usefulness on actual use of computer games following the prescriptions of the TAM model

Two hundred and one (201) questionnaires were administered and all were returned but some were with missing values in specific sections. No action was taken to remove them as the number of questionnaires with incomplete sections was small.

Research Question 1: What is the state:

- Computer ownership and
- Computer games usage pattern of Malaysian elementary school students?

The computer ownership and internet access by types of school, location and gender are high (>80%) except for internet access for the SKJKC which reported 61% availability (Table 1, 2, 3 and 4).

Computer games usage pattern of Malaysian elementary school students. The level of playing computer games among students by type of school can be divided into Low (less than 5 hours a week), Medium (less than 10 hours a week) and High (more than 10 hours a week) which is equivalent to the time to watch programs on TV (US Department of Health and Human Services, 2011). The findings show that for SK 63% is at low level, 23% at Medium level and 14% at High level (Table 4 and 5). For SRJKC44% is at low level, 33% at Medium level and 23% at High level. For SRJKT41% is at low level, 41 % at Medium level and 18% at High level. This suggests that a growing trend as the percentage of students in the medium and high levels exceed 50% for SKRJC and SKJRT.

The result in Table 6 show that for urban school, 56% are at low level, 26% at Medium level and 16.5% at High level. For rural, 75 % are at low level, 20 % at

The result in Table 6 show that for urban school, 56% are at low level, 26% at Medium level and 16.5% at High level. For rural, 75 % are at low level, 20 % at Medium level and only 5% at High level. The findings in extent of gender shows that for male 59% are at low level, 23 % at Medium level and 15% at High level. For female, 56% are at low level, 28% at medium level and 13% at high level.

The findings suggest that the students are generally at low levels of playing computer games with the percentages of students in the medium and high levels are below 50% by location and gender.

Research Question 2: How do the Malaysian elementary school children perceive the usefulness of computer games in terms of social value, learning value and individual development by:

Table 7: Mean responses for social value, learning value and individual development by LIKERT scale

	N	Min.	Max.	Mean	S.D.
Social_value_LIKERT	196	1.25	4.00	2.83	0.60298
Learning_value_LIKERT	195	1.67	4.00	3.03	0.55613
Individual_development_LIKERT	193	1.00	4.00	2.92	0.56676

Table 8: Means, standard deviations, and results of ANOVA for Social value, Learning value, and individual development by types of school

		N	Mean	S.D.	ANOVA
Social value	SK	145	11.3241	2.33298	F (2,177) = 0.479
	SRJKC	18	11.7778	3.26398	P = 0.620
	SRJKT	17	11.7647	2.19458	
Learning value	SK	145	18.3517	3.30095	F (2,177) = 0.225
	SRJKC	18	18.0000	4.14445	P = 0.799
	SRJKT	17	18.7647	3.13308	
Individual development	SK	142	17.6620	3.22201	F (2,174) = 0.761
	SRJKC	18	17.8889	4.14287	P = 0.469
	SRJKT	17	18.7059	3.15762	

Table 9: Means, standard deviations, and results of ANOVA for Social value, Learning value, and individual development by school location

		N	Mean	S.D.	ANOVA
Social_value	Urban	176	11.4489	2.32445	F (1,194) = 5.324
	Rural	20	10.1500	2.88873	P = 0.022
Learning_value	Urban	177	18.0678	3.37031	F (1,193) = 2.582
	Rural	18	19.3889	2.78945	P = 0.110
Individual_development	Urban	174	17.5057	3.37064	F (1,191) = 0.008
	Rural	19	17.5789	3.76114	P = 0.929

- Types of schools
- School location
- Gender?

The mean responses for social value, learning value and individual development based on the likert scale are given in Table 7 on the LIKERT scale, the mean response for social value was 2.83, while for learning value was 3.03 and for individual development was 2.92. In general the responses were low, with the respondents agreeing or close to agreeing to the benefits of the computer games.

Table 8 gives the mean scores and results of ANOVA for Social value, Learning value and individual development by types of school. The mean scores for social value for SK was 11.3241 with S.D. = 2.33298, while for SRJKC was 11.7778 with S.D. = 3.26398 and for SRJKT was 11.7647 with S.D = 2.19458. The results of ANOVA gave F (2,177) = 0.479 at P = 0.620. As p>0.05, there is no significant difference in students' perception social value by types of school.

The mean scores for learning value for SK was 18.3517 with S.D. = 3.30095, while for SRJKC was 18.0000 with S.D. = 4.14445 and for SRJKT was 18.7647 with S.D. = 3.13308. The results of ANOVA gave F (2,177) = 0.225 at P = 0.799. As p>0.05, there is no significant difference in students' perception learning value by types of school.

The mean scores for individual development for SK was 17.6620 with S.D. = 3.22201, while for SRJKC was 17.8889 with S.D. = 4.14287 and for SRJKT was 18.7059 with S.D. = 3.15762. The results of ANOVA gave F (2,174) = 0.761 at P = 0.469. As p>0.05, there is no significant difference in students' perception of individual development by types of school.

Table 9 gives the mean score and results of ANOVA for Social value, Learning value and individual development by locations of school.

The mean score for social value of urban schools was 11.4489 with S.D. = 2.32445, while for rural schools was 10.1500 with S.D. = 2.88873 (Table 9). The results of ANOVA gave F(1,194) = 5.324 at P = 0.022. As p<0.05, there is a significant difference in students' perception social value by location of school. This finding suggests that urban school students reported a significantly higher perception towards social value of computer games compared to rural school students.

The mean for learning value for urban schools was 18.0678 with S.D. = 3.37064, while for rural schools was 19.3889 with S.D. = 2.78945. The results of ANOVA gave F (1,193) = 2.582 at P = 0.110. As p>0.05, there is no significant difference in students' perception towards learning value by location of school.

The mean score for individual development for urban schools was 17.5057 with S.D. = 3.37064, while for rural schools was 17.5789 with S.D. = 3.76114. The results of ANOVA gave F (1,191) = 0.008 at P = 0.929. As p>0.05, there is no significant difference in students' perception of individual development by location of school.

Table 10 gives the mean scores and results of ANOVA for Social value, Learning value and individual development by gender.

The mean score for social value for Male students was 11.5565 with S.D. = 2.59281, while for female students was 10.9753 with S.D. = 2.09747. The results of ANOVA gave F (1,194) = 2.785 at P = 0.097. As p>0.05, there is no significant difference in students' perception of social value by gender.

Table 10: Mean score and results of ANOVA for Social value, Learning value, and individual development by gender

		N	Mean	S.D.	ANOVA
Social_value	Male	115	11.5565	2.59281	F (1,194) = 2.785
	Female	81	10.9753	2.09747	P = 0.097
Learning_value	Male	116	18.1207	3.44940	F (1,193) = .122
	Female	79	18.2911	3.18310	P = 0.727
Individual_development	male	113	17.5133	3.43593	F (1,191) =.000
	Female	80	17.5125	3.37149	P = 0.999

Table 11: Mean responses for perceived usefulness and ease of use by LIKERT scale

	N	Minimum	Maximum	Mean	S.D.
PU_LIKERT	186	1.56	3.94	2.94	0.48205
EOU_LIKERT	196	1.40	4.00	2.94	0.53903

Table 12: Mean score and results of ANOVA for perceived usefulness and ease of use of computer games by type of schools

		N	Mean	S.D.	ANOVA
Perceived usefulness	SK	136	47.2868	7.26627	F (2,168) =.492
	SRJKC	18	47.6667	10.60522	P = 0.612
	SRJKT	17	49.2353	7.20702	
Perceived ease of use	SK	145	14.8345	2.43246	F (2,177) = .516
	SRJKC	18	15.4444	3.43378	P = 0.598
	SRJKT	17	15.1765	3.24491	

The mean score for learning value for male students was 18.1207 with S.D. = 3.44940, while for female students was 18.2911 with S.D. = 3.18310. The results of ANOVA gave F (1,193) = 0.122 at P = 0.727. As p>0.05, there is no significant difference in students' perception of learning value by gender.

The mean score for individual development for male students was 17.5133 with S.D. = 3.43593, while for female students was 17.5125 with S.D. = 3.37149. The results of ANOVA gave F(1,191) = 0.000 at P = 0.999. As p>0.05, there is no significant difference in students' perception of individual development by gender.

Research Question 3: How do the Malaysian elementary school children perceive the usefulness and ease of use of computer games by:

- Types of schools
- School location
- Gender?

The mean responses for Perceived usefulness and ease of use based on the likert scale are given in Table 11 on the LIKERT scale, the mean response for Perceived usefulness was 2.94 and for and ease of use was 2.94. In general the responses were low with them close to agreeing to the usefulness and ease of use of the computer games.

Table 12 gives the mean scores and results of ANOVA for perceived usefulness and ease of use of computer games by types of school. The mean gain scores for perceived usefulness for SK was 47.2868 with S.D. = 7.26627, while for SRJKC was -47.6667 with S.D. = 10.60522 and for SRJKT was 49.2353with S.D. = 7.20702. The results of ANOVA gave F (2,168) = 0.492 at P = 0.612. As p>0.05, there is no significant difference in students' perception towards perceived usefulness by types of school.

The mean scores for ease of use for SK was 14.8345 with S.D. = 2.43246, while for SRJKC was 15.4444 with S.D. = 3.43378 and for SRJKT was 15.1765 with S.D. = 3.24491. The results of ANOVA gave F (2,177) = 0.516 at P = 0.598. As p>0.05, there is no significant difference in students' perception towards ease of use by types of school.

Table 13 gives the mean scores and results of ANOVA for perceived usefulness and ease of use of computer games by location of schools.

The mean scores for perceived usefulness for urban schools was 46.9821 with S.D. = 7.70758 while for rural schools was 47.1111 with S.D. = 7.98446. The results of ANOVA gave F(2,168) = 0.492 at P = 0.612. As p>0.05, there is no significant difference in students' perceived usefulness by location of school.

The mean scores for ease of use for urban schools was 14.7303 with S.D. = 2.68818, while for rural schools was 14.5000 with S.D. = 2.83362. The results of ANOVA gave F (2,177) = 0.516 at P = 0.598. As p>0.05, there is no significant difference in students' perception ease of use by location of school.

Table 14 gives the mean scores and results of ANOVA for perceived usefulness and ease of use of computer games by gender.

The mean scores for perceived usefulness for Male students was 47.1019 with S.D. = 7.95659, while for female students was 46.8462 with S.D. = 7.41020. The results of ANOVA gave F(1,184) = 0.050 at P = 0.824. As p>0.05, there is no significant difference in students' perceived usefulness by gender.

The mean scores for ease of use for male students was 14.7179 with S.D. = 2.61246, while for female students was 14.6962 with S.D. = 2.83003. The results of ANOVA gave F (1,194) = 0.003 at P = 0.956. As p>0.05, there is no significant difference in students' perception towards ease of use by gender.

Table 13: Mean scores and results of ANOVA for perceived usefulness and ease of use of computer games by location of schools

		N	Mean	S.D.	ANOVA
Perceived usefulness	urban	168	46.9821	7.70758	F (2,168) = .492
	rural	18	47.1111	7.98446	P = 0.612
Perceived ease of use	urban	178	14.7303	2.68818	F (2,177) =. 516
	rural	18	14.5000	2.83362	P = 0.598

Table 14: Mean scores and results of ANOVA for perceived usefulness and ease of use of computer games by gender

		N	Mean	S.D.	ANOVA
Perceived usefulness	male	108	47.1019	7.95659	F (1,184) = 0.050
	female	78	46.8462	7.41020	P = 0.824
Ease of use	male	117	14.7179	2.61246	F (1,194) = 0.003
	female	79	14.6962	2.83003	P = 0.956

Table 15: Correlation coefficients between EU, PU and actual use of computer games

Correlations

		Ease_of_use	Perceived usefulness	Hours in a week playing game
Ease of_use	Pearson correlation	1	0.586**	0.208**
	Sig. (2-tailed)		0.000	0.004
	N	196	183	194
Perceived-usefulness	Pearson correlation	0.586**	1	0.250**
	Sig. (2-tailed)	0.000		0.001
	N	183	186	184
Hours in a week playing game	Pearson correlation	0.208**	0.250**	1
	Sig. (2-tailed)	0.004	0.001	
	N	194	184	199

**: Correlation is significant at the 0.01 level (2-tailed)

Research Question 4: Are perceived ease of use and usefulness of the computer games significantly correlated to the actual use of the games?

Table 15 reports the Correlation values between EU, PU and actual use of computer games.Ease of use is significantly correlated to perceived usefulness (r = 0.586 at p = 0.000) and actual use of computer games (r = 0.208 at p = 0.004). Also PU is significantly correlated to actual use of computer games. So the findings of the study are consistent with the predictions of the TAM model.

Summary of findings:

- The findings revealed that:
  - Computer ownership and internet access by types of school, location and gender were high
  - The National school students reported low levels ofplaying computer games while more than 50% of SKRJC and SKJRT students reported playing at the medium and high levels
  - The students were generally at low levels of playing computer games by location and gender with the percentages of students in the medium and high levels were below 50%.

- On the LIKERT scale, the mean responses for social value, learning value and for individual development were low, with them agreeing or close to agreeing to the benefits of the computer games.
- For social value, urban school students reported a significantly higher perception towards social value of computer games compared to rural school students but there were no significant differences in students' perception social value by gender and by types of school.
- There were no significant differences for learning value and individual development the by types and location of school as well as by gender.
- The mean response for perceived usefulness based on the likert scale was 2.94 (close to Agreeing) and there were no significant differences for perceived usefulness the by types and location of school as well as by gender.
- The mean response for ease of use based on the likert scale was 2.94 (close to Agreeing) and there are no significant differences for ease of use by types and location of school as well as by gender
- Following the TAM model, it was found that Ease of use was significantly correlated to Perceived usefulness and that both ease of use and perceived usefulness were significantly correlated to actual use of the computer games.

Discussion of the findings: Computer use and Internet access are a necessary condition for the development of the digital proficiency required of today's learning value, which, on a most basic level, must consist of the use of multimedia technologies to recuperate, evaluate, produce, present and exchange information. The expansion of online resources and computer games has made the accessibility of computers to today's students possible. The popularization of computers has translated to the presence of these resources in multiple contexts in students' lives, the most relevant of these being at school and at home. Therefore, this study founds to examine how Malaysian elementary school

children perceive usefulness and ease of use of computer games in terms of learning, social and individual development by types of schools, school locations and gender.

Computer ownership and computer games usage pattern: Reports of computer ownership by location of school for 2008 showed a huge discrepancy favoring the urban schools (Malaysian communication and multimedia commission 2008). In comparison, the findings of present study found that computer ownership and internet access by types of school, location and gender were high and almost equal in percentages. The gaps are now very small indicating that the drive for ICT adoption by the government through agencies such as Mycore has been successful. Mycore encourages and promotes content/games developed by local MSC Malaysia companies nationwide as well as PC ownership through the games industry and indirectly supported the nation's broadband adoption push.

The digital multimedia content development strategy in Malaysia is imbedded within the context of a holistic ICT strategy and has propelled the country towards becoming a knowledge-based economy This ICT strategy is anchored under the National Multimedia Super Corridor Project (MSC) launched in 1996 and has produced good results among schools and school children.

The findings of this study also found that there was a growing trend towards playing computer games as the percentage of students in the medium and high levels exceeded 50% for SKRJC and SKJRT. But the findings reveal that the students were generally at low levels of playing computer games by location and gender with the percentages of students in the medium and high levels were below 50%.

This can be consistent with general belief regarding computer games in Malaysia and other parts of the world. Also, parents' beliefs towards computer games can be very influential at several levels. Firstly, parents' negative beliefs are listed as one of the main arguments reported by teachers who do not want to use video games in the classroom (Williamson and Facer, 2004). Secondly, parents' beliefs about video games and the rules about playing at home have a profound impact who reported that on how the students perceive video games in the context of learning and instruction (Scharrer and Leone, 2008). Thirdly, parents' beliefs have served as an argument used by public policy makers for restricting children's access to video games with potentially harmful content (Nije Bijvank *et al*., 2009; Olson *et al*., 2008). Therefore it is remarkable that parental acceptance of video games is not higher on the research agenda, certainly in relation to digital game-based education. However, things are starting to change since the 2009 BECTA study "Computer games, schools and young people" marked parental acceptance as an important domain for further educational research.

Other studies report that parents actively distinguish between both desirable and undesirable effects of media and video games (Nikken and Jansz, 2006; Skoien and Berthelsen, 1996). Besides acknowledging that games can have positive effects, like enhanced cognitive thinking skills, parents express concerns about

- The balance between the children's video game play and other activities
- The content of games
- The potential harmful effects
- Mediation strategies (Olson *et al*., 2008)

Their strategies to watch over the game playing habits of their children more or less resemble traditional mediation techniques, ranging from downright disapproval and restriction, over rule setting, to co-playing and talking about games (Nikken and Jansz, 2006; Scharrer and Leone, 2008; Skoien and Berthelsen, 1996).

The low percentages by gender maybe because the games offered were not appealing to the girls. This finding is consistent with Tribune (2010) news report that only 40 percent of video game players in the world are female. Howeve, Bourgonjon *et al*. (2009) reported that the differences between gender for preference for video games were mediated by ease of use and experience playing the games and not gender characteristics . Thus new efforts are be to incorporate the interests of girls into games and Mycore's initiatives towards developing gender free educational games and healthy competitions will slowly improve the participation of girls in computer games.

Perceived usefulness of the computer games: On the LIKERT scale, the mean responses for social value, learning value and for individual development were low, with them agreeing or close to agreeing to the benefits of the computer games. For social value, urban school students reported a significantly higher perception towards social value of computer games compared to rural school students but there were no significant differences in students' perception social value by gender and by types of school. There were no significant differences for learning value and individual development the by types and location of school as well as by gender.

The mean response for perceived usefulness based on the likert scale was 2.94 (close to Agreeing) and there were no significant differences for perceived usefulness the by types and location of school as well as by gender. The findings suggest that the students did not think that the games were useful for them. The questionnaire focused on items that connected the games to educational relevance, academic performance and individual developments .The low overall

perception of the games towards educational relevance, academic performance and individual developments indicate that the students did not engage in the game for academic purposes. Whitton (2007) found that the importance of computer games and its usefulness depends mostly on the student motivation in using these technology .Games are traditionally developed for recreation (McCormick, 2001). He states that the recreational and entertainment value of playing is very high to players. Furthermore, the money that the players spend on the games and on computer equipment is helping to fuel a huge expansion in technology that has and will continue to have a variety of other benefits.

Educational games that are available are not directly related to the contents or lessons in the classrooms or schools don't have the best image for adapting change towards using computer games (Egenfeldt-Nielsen, 2007).This is shown in the interviews conducted with developers in Simon study. Simon *et al* labeled teachers as lacking the necessary skills to use games and also the ability to differentiate good from bad game-based learning. They also state that there is a huge problem, because like any area there will be good and bad products. If teachers are not aware of the difference they may conclude from a less optimal learning experience that game-based learning in general is not working (Egenfeldt-Nielsen, 2004; Becker and Jacobsen, 2005).

However, another extensive worry that has also considered about the use of game-based learning is the transformation of the teacher's role which is challenged when using computer games. Teachers perceive that they may need to change their role from classroom teaching into for example a more student-centered learning form. Some teacher believes this may not be the best way for them to continue. In relation to computer games this is exacerbated by many teachers perceiving themselves as lacking in knowledge of computer games. So, even if teachers are increasingly accepting computer games as valuable for education it may often not match their own beliefs and values in relation to teaching. Furthermore, they may not feel competent in taking it on. Indeed, there are still teachers that complete reject them (Egenfeldt-Nielsen, 2007).

Perceived ease of use: The mean response for ease of use based on the likert scale was 2.94 (close to Agreeing) and there are no significant differences for ease of use by types and location of school as well as by gender.

The findings suggest that the students did not think that the games were easy to use for them. The finding of this study towards the ease of use computer games is supported by Venkatesh (2000) research results which indicated that perceived ease of use is an important factor influencing user acceptance and usage behavior of computer games, while still anchored to the general beliefs regarding computers and computer use, Venkatesh found that up to 60% of the variance in system-specific perceived ease of use, which is twice as much as student understanding (Venkatesh, 2000).

Also the finding of Bourgonjon *et al*. (2009) supported the present study finding by examining and predicting student acceptance of computer, based on the technology acceptance model. Perceived ease of use and usefulness of computer games to create useful learning experiences and to gain better school results was revealed a good fit between the data and the technology acceptance model. In addition, this finding argued that gender does influence behavioral intention, although only indirectly through ease of use and experience (Bourgonjon *et al*., 2009).

Other studies such as Proost (1997) argued that perceived ease of use and usefulness partially depends on the gender and school type, he investigated the effects of gender on perceptions of and preferences for computer based learning environments. His results indicated that women had a significantly more negative perception of computer based technology and a preference for traditional methods than men. He also found that women have a stronger preference for social contact than men (Proost, 1997).

Bourgonjon *et al*. (2010) research finding shows that student's preference for using computer games in the classroom is affected directly by usefulness, ease of use, learning opportunities and personal experience depending on their gender, which add an extra support to our study finding.

The questionnaire focused on items that connected the games to the computer and the Internet:

- The games are difficult because the steps are complex, games are not accurately rated by age, only for classification by types and other features and also there are no instructions and manuals on how to play the games. Students usually learn from friends or by trial and erro
- The PC is not fully equipped with 3D cards, high quality monitors,proper game playing devices and makes playing the game difficult – played with keyboard and mouse, easier with joystick or game devices which are usually not available to students easily.
- Because they need to go to Internet to play online

Use of the computer games: Following the predictions of the TAM model, it was found that Ease of use was significantly correlated to Perceived usefulness and that both ease of use and perceived usefulness were significantly correlated to actual use of the computer games. These findings suggest that only useful and easy to use games will be chosen by the students. The

findings of the study are supported by Yayla and Hu (2007) who found that TAM have adequate explanatory and predictive power to explain technology acceptance behaviors and use. This model thus strongly states that when a new game package is given to the students, "Perceived Usefulness" and "Perceived Ease of Use" will impact their determinations about how and when they will use the new game.

Limitation of the study: It is important to note that the sample of the present study was only students who are already active players of computer games and selected by the Penang Education Department participated in the study and they may not represent the characteristics of the whole population of students outside Penang. The number of students representing SRJKC, SRKJT and rural school are small and they may not represent the true population of students from these schools. The generalizability of this study is limited as the conclusions are based on the evidence from this study, where the participants were male and female students from the respectively.

The results of the study should also be used with caution because student views and opinions may differ from the period of using computer in solving their tasks. This is mainly because students may not have been exposed to the expectations and challenges of using computer technologies in actual school settings.

Suggestions for future research: The research confirmed the relationship within the technology acceptance model (TAM) that ease of use and usefulness contributed positively towards use of computer games and that urban school students were using computer games as social activities. It provides estimates of the research model and suggests which components of the adoption item will get more successful in another area. The research models are being pursued in the adoption of technology acceptance model to succeed.

This study recommends observing the advance level of the attitudes and self-efficacy on using computer games among Malaysian school students. In the dynamic environment of educational development in Malaysia, the further studies have to look up the latest technology adoption in the schools toward using computer games among different level of students.

Finally, in our view, these skills are so important for the information age, that their relative presence or absence will have a significant effect on an individual's learning performance. In this respect we see the development of these skills as so important.

REFERENCES

Anderson, C.A. and C.M. Ford, 1986. Affect of the game player. Pers. Soc. Psychol. B, 12(4): 390.

Becker, K. and M. Jacobsen, 2005. Games for learning: Are schools ready for what's to come? Conference Proceedings, DiGRA 2005 Conference: Changing Views-Worlds in Play.

Bourgonjon, J., M. Valcke, R. Soetaert and T. Schellens, 2009. Exploring the acceptance of video games in the classroom by secondary school students. Proceedings of the 17th International Conference on Computers in Education, Asia-Pacific Society for Computers in Education, Hong Kong.

Bourgonjon, J., M. Valcke, R. Soetaert and T. Schellens, 2010. Students' perceptions about the use of video games in the classroom. Comput. Educ., 54(4): 1145-1156.

Bowman, R., 1982. A Pac-Man theory of motivation. Tactical implications for classroom instruction. Educ. Technol., 22(9): 14-17.

Bracey, G.W., 1992. The second bracey report on the condition of public education. Phi Delta Kappan, 74(2): 104-108,110.

Cameron, D., 2001. Playing serious games in journalism classes. Asia Pac. Media Educ., 1(11): 11.

Clark, J., 2003. A History of Australian Baseball: Time and Game. U of Nebraska Press, Lincoln, pp: 179, ISBN: 0803264402.

Cooper, J. and D. Mackie, 1986. Video games and aggression in children. J. Appl. Soc. Psychol., 16(8): 726-744.

David, S. and L. Karen, 2011. The ward: A simulation game for nursing students. Nurse Educ. Prac., 11(1): 20-25.

Davis, F.D., R.P. Bagozzi and P.R. Warshaw, 1992.Extrinsic and intrinsic motivation to use computers in the workplace. J. Appl. Soc. Psychol., 22(14): 1111-1132.

Dempsey, J.V., L.L. Haynes, B.A. Lucassen and M.S. Casey, 2002. Forty simple computer games and what they could mean to educators. Simulat. Gaming, 33(2): 157.

Driskell, J.E. and D.J. Dwyer, 1984. Microcomputer videogame based training. Educ. Technol., 24(2): 11-17.

Egenfeldt-Nielsen, S., 2007. Third generation educational use of computer games. J. Educ. Multimed. Hypermed., 16(3): 263-281.

Egenfeldt-Nielsen, S., 2004. Practical barriers in using educational computer games. Horizon, 12(1): 18-21.

Ericsson, K.A., 2006. The Influence of Experience and Deliberate Practice on the Development of Superior Expert Performance. In: Ericsson, K.A., N. Charness, P.J. Petrovich, *et al*. (Eds.), the Cambridge Handbook of Expertise and Expert Performance. Cambridge University Press, Cambridge, pp: 683-703.

Federico, P. and G. Hélène, 2011. The impact of a simulation game on operations management education. Comput. Educ., 57(1): 1240-1254.

Garris, R., R. Ahlers and J.E. Driskell, 2002. Games, motivation and learning: A research and practice model. Simulat. Gaming, 33(4): 441.

Gee, J.P., 2003. What video games have to teach us about learning and literacy. Comput. Entertain., 1(1): 20-20.

Griffiths, M., 1996. Computer Game Playing in Children and Adolescents: A Review of the literature Electronic Children: How Children are Responding to the Information Revolution. National Children's Bureau, London, pp: 41-58.

Jilani, A.A.A., M. Usman and Z. Halim 2010. Model transformations in model driven architecture. U. J. Comput. Sci. Eng. Technol., 1(1): 50-54.

Kirriemuir, J. and A. McFarlane, 2004. Literature Review in Games and Learning: A Report for Nesta Futurelab. Retrieved from: http://telearn.archives-ouvertes.fr/docs/00/19/04/53/PDF/kirriemuir-j-2004-r8.pdf.

Lee, J., K. Luchini, B. Michael, C. Norris and E. Soloway, 2004. More than just fun and games: Assessing the value of educational video games in the classroom. Proceeding of CHI EA '04 CHI '04 Extended Abstracts on Human Factors in Computing Systems, ACM New York, pp: 1375-1378.

Lou, Y., P.C. Abrami and S. d'Apollonia, 2001. Small group and individual learning with technology: A meta-analysis. Rev. Educ. Res., 71(3): 449.

Malone, T.W., 1981. Toward a theory of intrinsically motivating instruction. Cognitive Sci., 5(4): 333-369.

McCormick, M., 2001. Is it Wrong to Play Violent Video Games? Department of Philosophy California State University, Sacramento, CA, USA.

Mensch, S. and A. Ali, 2009. Using digital video games in service learning projects. Issues Inf. Sci. Inf. Technol., 6: 809-815.

Nije Bijvank, M., E.A. Konijn, B.J. Bushman and P.H.M.P. Roelofsma, 2009. Age and content labels make video games forbidden fruit for youth. Pediatr., 123: 870-876.

Nikken, P. and J. Jansz, 2006. Parental mediation of children's videogame playing: A comparison of the reports by parents and children. Learn. Med. Technol., 31(2): 181-202.

Olson, C.K., L.A. Kutner and D.E. Warner, 2008. The role of violent video game content in adolescent development: Boys' perspectives. J. Adolescent Res., 23: 55-75.

Park, N., K.M. Lee and P.H. Cheong, 2007. University instructors' acceptance of electronic courseware: An application of the technology acceptance model. J. Comput. Mediat. Comm., 13(1).

Proost, K., 1997. Effects of gender on perceptions of and preferences for telematic learning environments. J. Res. Comput. Educ., 29(4): 370-384.

Rosas, R., M. Nussbaum, P. Cumsille, V. Marianov, M. Correa and P. Flores *et al*., 2003. Beyond nintendo: Design and assessment of educational video games for first and second grade students. Comput. Educ., 40(1): 71-94.

Scharrer, E. and R. Leone, 2008. First-person shooters and the third-person Effect. Hum. Comm. Res., 34(2): 210-233.

Schwartz, S., 1988. A comparison of componential and traditional approaches to training reading skills. Appl. Cognitive Psych., 2(3): 189-201.

Selnow, G.W., 1984. Playing videogames: The electronic friend. J. Comm., 34(2): 148-156.

Serrano, M.G., M.G. Rodríguez, J.E.A. Garzón and H.S. Santamaría, 2009. Learning Experiences by using Video Game Consoles. Retrieved from: www.formatex.org/micte2009/book/640-645.pdf

Skoien, P. and D. Berthelsen, 1996. Video Games: Parental Beliefs and Practices. Retrieved from: http://www.aifs.org.au/institute/afrcpapers/skoien.html, (Accessed on: March 14, 2003).

Squire, K., 2005. Changing the game: What happens when video games enter the classroom innovate. J. Online Educ., 1(6): 25-49.

Srinivasan, V., K. Butler-Purry and S. Pedersen, 2008. Using video games to enhance learning in digital systems. Paper Presented at the Conference on Future Play: Research, Play, Share Toronto, Ontario, Canada.

Steinkuehler, C.A., 2006. Where everybody knows your (screen) name: Online games as "third places. J. Comput. Mediat. Comm., 11(4): 885-909.

Stoll, H., 1999. Microstructure: The Organization of Trading and Short Term Price Behavior. Hans, R.S. (Ed.), Edward Elgar Pub, London.

Sutton-Smith, B., 2001. The Ambiguity of Play. Harvard University Press, Cambridge, MA.

Venkatesh, V., 2000. Determinants of perceived ease of use: Integrating control, intrinsic motivation and emotion into the technology acceptance model. Inf. Syst. Res., 11(4): 342-365.

Verenikina, I., P. Harris and P. Lysaght, 2003. Child's play: Computer games, theories of play and children's development. Paper Presented at the Proceedings of the International Federation for Information Darlinghurst, Australia.

Whitton, N., 2007. Motivation and computer game based learning. Paper Presented at the Proceedings of the Australian Society for Computers in Learning in Tertiary Education.

Williamson, B. and K. Facer, 2004. More than'just a game': The implications for schools of childrens computer games communities. Educ. Comm. Inf., 4(2-3): 255-270.

Yayla, A. and Q. Hu, 2007. User acceptance of e-commerce technology: A meta analytic comparison of competing models. Proceedings of the 13th European Conference on Information Systems (ECIS 2007), June 7-9, St. Gallen, Switzerland, pp: 179-190.