Academics' Attitudes Toward Using Digital Games for Learning & Teaching in Malaysia

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ABSTRACT

Digital (or computer) games have been extremely attractive to gamers of all ages, especially the young ones. They spend much time playing such games for pleasure and entertainment. Harnessing digital games for education has been attempted in some advanced countries where teachers seemed to be receptive to the idea. In Malaysia no major study has been undertaken about the university teacher's attitudes towards using digital games in their classrooms. And so the purpose of this study is to investigate university teachers' perception of utilizing digital games in classroom in Malaysian universities and colleges. It seeks to answer a fundamental question: do university teachers in Malaysia have favorable or unfavorable perceptions toward using digital games in their teaching efforts? And how do they differ in their views about digital game potential according to the influence of variables such as age, gender, academic discipline and others sets of independent variables? For answering these fundamental questions an online questionnaire-based research surveyed 273 teachers in 5 Malaysian universities. The method was conventionally tested for validity and the data analyzed in order to draw some conclusions. Overall the results show that the majority of Malaysian university teachers have favorable attitudes using digital games in their classroom. Less than a majority, but a sizeable number of teachers have not formed any opinion for or against using digital games in the classroom. Gender, age, years of teaching, teaching discipline and other variables do not influence the respondents' positive or negative attitudes toward using digital games in the classrooms. Playing digital games, as a lifestyle habit, by respondents shows an association with positive attitude. In other words, those who play digital games themselves are more likely to have favorable attitudes toward using those games for education.

Keywords: *Digital Games; Learning; Teaching*

INTRODUCTION

Nowadays, education is thriving with many touted new theories and practices promising to offer solutions to learning difficulties. They are mostly based on the proliferation of the digital and communication technologies. Included among these learning solutions are: blended learning, m-learning, v-learning to name only a few. They have emerged as a result of the digital revolution. But approaching learning through amusement is probably the most effective way of imparting knowledge and teaching skills. And so using digital games (video or computer games or other similar terms) to directly or indirectly achieve educational purposes could become an increasing educational effort in the 21st century (Prensky, 2001b; Torrente, del Blanco, Marchiori, Moreno-Ger & Fernández-Manjón, 2010).

Many studies have shown that playing digital games has become an integral part of the contemporary youths' life activities; and digital games are popular among children, adolescents and even adults (Wan Rozali, Hamid, & Sabri, 2007). Jenkins (2002) reported that 88% of MIT freshmen (N = 650) had played

videogames before the age of 10 and 75% of them still play (cited by Adams & Burke, 2009). Moreover, according to Johnson, Adams, and Cummins (2012), Trip Wire Magazine reported that in 2011 about 61.9 million people were engaged in online games; an increase of 9 million from 2010. These gamers were aged between 20 and 34 years. Interestingly, the Federation of American Scientists, who usually put their concerns on nuclear weaponry and government secrecy, did not miss the potentials of using digital games claiming that they will change the current education landscape (Feller, 2006). New York University in 2008 established GFLI (Games For Learning Institute) for the purpose of studying the features that can make games useful for education (Ulicsak & Wright, 2010).

Many aspects of digital games can serve education; Denis and Jouvelot (2005) reported that with the use of digital games, students "are experienced to learn by doing". Scaffolding is another important aspect found in digital games (Federation of American Scientists, 2006). Furthermore, every learner has a different learning style. But, the traditional education system may not be able to accommodate all the learning styles suited to all learners. Digital games offer learning experience that can meet a variety of learning styles (Federation of American Scientist, 2006). Furthermore, Watson, Mong, and Harris (2011) have shown that students' negative attitudes toward difficult subjects such as math or boring subjects such as history can be changed through using digital games by making them easy or fun to learn.

Despite all these digital game benefits touted by researchers, many people in the education field are against the idea of involving digital games in traditional classroom activities. This opposition according to De Aguilera and Mendiz (2003) stems from the fact that the opponents have not experienced digital games in their lives. That simple fact does not allow them to appreciate the potential benefits of these games.

Therefore, this study is aimed at exploring and investigating university teachers' perception of utilizing digital games in Malaysian university and college classrooms to answer a fundamental question: do university teachers in Malaysia have favorable or unfavorable perceptions toward using digital games in their teaching? And do they differ in their views about digital games potentials by the influence of such variables as age, gender, academic discipline and others sets of independent variables? For answering these fundamental questions we implemented an online questionnaire-based research surveying 273 teachers in 5 Malaysian universities. The method was conventionally tested for validity and the data analyzed in order to draw some conclusions.

Problem Statement

Based on a review done by Hwang and Wu (2012) of articles published from 2001 to 2010 in several journals, there is a scarcity of studies related to the use of digital games for learning in Malaysia, the Middle East Arab countries, and generally speaking underdeveloped countries. Such observation raises the question: where do university teachers in Malaysia stand with regard to the idea of blending teaching and learning in higher education with the usage of digital games? It is a very important question because according to L. Chen, T. Chen and Liu (2010) many studies indicated that digital games will reshape learning and teaching methods in higher education in advanced countries. Marquis (2011) declared that "in the next several years we are going to have an expectation that gaming will be a part of the college curriculum and if higher education does not adapt to meet this demand, it may find itself in even deeper trouble than it already is as potential students seek alternative paths to have their interests satisfied". Foreman (2003) and other analysts (Derryberry, 2007) have envisaged that next generation education will rely heavily on using digital games. And thus it is very important for higher education institutions to be receptive to the idea of trying to integrate digital games into tertiary learning (L. Chen, T. Chen & Liu, 2010; Ertzberger, 2009). Exploring teachers' attitudes toward digital games will help to address many issues in the developments, introduction and utilization of digital games to serve learning and teaching at all levels of education and training. For instance, if the teachers do not believe in the usefulness of digital games to learning, they would not be enthusiastic in employing them in their teaching.

Literature Review

What are Digital Games?

The late 1960s witnessed the development of the first computer game (Whitton, 2007). Not long after that the idea of using digital games to support learning has been employed especially since the 1970s (Felicia, 2011). So the idea of using digital games for education is not very recent. However, the tremendous advances in computer and communication technologies made it possible to produce very sophisticated digital games that allow high interactivity and rich multimedia all of which can enhance teaching and learning. Indeed, researchers have been very enthusiastic about investigating the effects of using digital games on learning (Sanchez, 2011).

There is no one certain universally acceptable definition for digital game-based learning (Dziorny, 2007). However, a definition was attempted by Prensky (2001a) in his book, Digital Game-Based Learning. He said that all games in digital versions fall under the term digital game based learning (Dziorny 2007). Kirriemuir and McFarlane (2004) said that the meaning of the term differs from one author to another and also over time; yet these days the terminologies such as computer games, video games and digital games are used interchangeably.

If a single definition of digital game is not universally recognized, still there is a general understanding in the academic community what a digital game is; and there are many varieties of them which researchers have classified in different categories. According to Herz (1997), cited by Kirriemuir and McFarlane (2004), there are "action games" where the characters are involved in shooting, chasing and other type of action reactions; "adventure games" where the player has to go through puzzles and experiences to achieve progress in the game; "fighting games" where the player fights with other games characters; "role-playing games" in which players take on roles such as elf, wizard or a famous person in the game narrative; "Simulation games" where the player is engaged in a simulated environment or situation such as a mayor of a city controlling financial outlay and building works; "Strategy games" with players planning for action such as commanding armies in wars or battles; and "sports games" such as football or basketball. Finally there is a category of "puzzle games" where players have to think logically to solve a given problem. Connolly, MacArthur, Hainey, and Boyle (2012) reviewed 129 articles and found that simulation games are the most used type followed by puzzles games.

Despite the various digital game genres found today, all digital games could be classified into two broad categories. The first category includes games that are created to serve certain learning objectives or outcomes with some features of entertainment or fun. Such games are now called 'edutainment games', a title first introduced in the eighties. The development of 'edutainment games' was partly based on behaviorist theory where reinforcements or elements of reward or punishment are built in the game. The player in 'edutainment games' is accomplishing learning by doing exercises presented in the game. These kinds of games were very popular at the beginning. However, they lost their popularity in the nineties and since then they are mostly used for young and pre-school children (Mireilla, 2005). Another term appeared under the same category is called "serious games" (Coller & Scott, 2009; Sørensen and Meyer, 2007; Beggs, O'Neill, Virapen & Alexander, 2009; Connolly et al., 2012 ; Michael and Chen, 2006) or instructional games as other researchers called them (Kebritchi, Hirumi, & Bai, 2010; Guerrero, 2011). Even though these terms fall under the same definition and some researchers use them interchangeably, other researchers differentiate between "edutainment games" and "serious games". Michael and Chen (2006) said "Serious games are more than just 'edutainment'" (p. xv). They explained furthermore that edutainment is a subset of serious games. Edutainment games are meant to be for preschool and young children and approach the learning and teaching through teaching fact and memorization; in contrast, serious games target all young and adult learners and approach learning though teaching, training and informing. Dimenxian is an example of first category of games where it was created to teach algebra (Cohen, 2006). Another example of serious game is seen in the game "America's Army". According to Michael and Chen (2006), the game is created by the United States Army as a recruiting tool that trains players to test the environment for mission rehearsal, intelligence skills, first aid and survival training and other skills beside the fun experience of playing as a soldier.

The second category is called commercial-off-the-shelf (COTS) games or mainstream video games as

Mireilla (2005) and Kirriemuir and McFarlane (2004) called them. These games are created completely for entertainment purposes (Connolly et al., 2012). Their creation did not involve consideration of any learning outcomes for any school subject. Despite that, researchers such as Ritzhaupt, Gunter and Jones (2010) and Van Eck, (2006) claimed that COTS games can be harnessed for learning; Kirriemuir and McFarlane (2004) said that there has been interest in using such games in the classroom. An example of COTS game is seen in the "Sam & Max" adventure game where two characters try to solve a mystery or a crime. The game was created for entertainment purposes but because it contained a lot of English dialogs with subtitles, researchers such as Howard and Wendy (2010) have used it in the English learning classroom.

There has been a debate trying to answer the question: which of these categories of digital games is more beneficial to learning? Of course serious games and educationally designed are most useful for learning. However, Becker (2007) also argued that COTS games are useful because they follow principles of learning theories. Those things, educators say, that are important in the design of effective instruction have already been put to practice in "good" commercial games. "Good" here is a bit of a tautology -- these games are good because they embody sound learning theories (Becker, 2007, p. 25).

However, other studies showed that it was difficult to use COTS games in the learning environment. Kirriemuir and McFarlane (2004) stated that COTS games required teachers to be trained on using them and find learning outcomes that could be derived from playing the game; and the contents of some COTS games did not suit any learning environment. In the case of serious/edutainment games, the learning objectives are spelt out at the design stage and reflected in the activities required to accomplish the goals of playing or winning the game. Ratan and Ritterfeld (2009) analyzed 612 serious games and found that 63% of the game contents serve academic subjects such as algebra, biology, religion and nanotechnology; 14% were related to social change with topics linked to political and social concerns, world poverty and environment issues; 9% of the serious game had occupational contents while 8% dealt with health related topics; 5% of the games train military skills and less than 1% games are related to marketing skills. By educational level, Ratan and Ritterfeld found that the majority of the games were addressed to elementary, middle and high schools (39%) while (16%) targeted college and adult learners and 5% of the games were for preschool learners.

One major negative point surrounding serious games is that they are costly to develop to serve any discipline such as medicine, business, mathematics and others. To create such games, software developers, educators and scientists (subject matter or content experts) have to collaborate to produce games that could serve learning purposes. The effort and cost required to produce these games can be prohibitive. On the other hand, other researchers argue that the COTS games are more attractive and more fun than serious games. And even though their creation was not based on certain learning outcomes Becker (2007) said that "those things educators say are important in the design of effective instruction have already been put to practice in 'good' commercial games" (p. 25). Hence, researchers are encouraging educationist to try to use COTS games. Sandford and Francis (2006) said "existing COTS can be appropriated to create new opportunities to learn" (p. 14). Francis (2006) stated that COTS games such as Civilisation III, Sim City, Age of Empires, Roller Coaster Tycoon and City Trader have been subjected to educationalists and researchers' study to assess their potentials for learning and education benefits. Ratan and Ritterfeld (2009) reported that "any digital game has the potential of providing (incidental) learning opportunities regardless of whether it is considered a serious game or non-serious entertainment game" (p. 10). This researcher also subscribes to this assertion and adds that the teacher can make any digital game whether serious or commercial beneficial by guiding his/her students to the features that are offering learning values and education in the game contents.

Teachers' Attitudes toward Digital Games

Some studies tried to investigate what teachers think of using digital games for learning and teaching. Beggs, O'Neill, Virapen and Alexander (2009) conducted a study in the University of Ulster in Northern Ireland to explore how academic staff viewed digital games in higher education. Their study took the form of a survey emailed to 1140 academic staff of the university. Some 190 academic staff from six faculties including professors, senior lecturers, lecturers, associate lecturers and academic related staff responded to the survey giving the researchers a 12% participation rate. The gender breakdown was 52% male and 48% female. The most numerous respondents (33%) were in the age bracket 31-40; while 66% of the academic staff played

games, 33% did not. Regarding the teachers' opinions on using educational games in conjunction with higher education, 2% thought that using educational games would be a waste of time; however, the majority had positive attitude about the effect of digital games in higher education; 63% of academics considered educational games a good tool for learning; 70% believed that digital games could make learning more fun and enjoyable; 69% said that educational games were capable of improving the students' learning experience; 56% thought that digital game use would motivate students; and 44% said it would help in increasing retention; 65% thought that using digital games in learning was an interesting approach. Furthermore, 53% expressed that utilizing digital game for learning and teaching would suit different learning styles. Even though the general attitudes of academic staff were positive toward education games and learning, 41% never used them with their students and their teaching efforts. Another study in the UK revealed that 35% of teachers use video games in their teaching, while 60% contemplate or plan to introduce them (Williamson & Futurelab, 2009).

Furthermore, Hsu and Chiou (2011) conducted an exploratory study on 125 (56 male and 69 female) pre-service teachers in north Taiwan to discover their awareness of digital game for learning. The participants in the study come from different majors such as science (40%), language (15.2%), mathematics (12%), IT (9.6%), social science (8%) and others (4.8). The results of their study revealed that 64% of the respondents played educational games and the overall results indicated that participants had positive opinions regarding digital games for education. For instance, 89.6% said that digital games had the potential of facilitating teaching; 93.6% said that education games promoted students' motivation. Moreover, 85.6 thought that digital games can help students improve academic achievement. Not only that but they also said that digital games can enhance other desired skills such as critical thinking (85.6%), problem solving (75.2%) , imagination (88%) and information seeking skills (68%).

However, the participants disagreed in regards to digital games' contributions to promoting communication (62.4%) and collaboration (51.2%). Despite that, 85.6% voiced out their desire of using educational games when they start teaching. According to Hsu and Chiou (2011), teachers' attitudes were not influenced by gender differences as revealed by *t*-test analysis.

Similarly, Gibson, Halverson, and Riedel (2007) surveyed 228 pre-service teachers and compared their attitudes based on the differences in age and their habits of playing digital games in their personal lives. They found that 65% agreed that digital games and simulations could be valuable as learning tools. Only 7% rejected the importance of digital games and simulations as a learning tool. The rest of the respondents (28%) were unsure if the games are important for learning. And according to Gibson et al. (2007) participants' age differences had no discernible influence on the pre-service teachers' attitudes. However, their study concluded that there were key differences in perceptions between teachers who played digital games and those who did not.

All the previously mentioned studies showed that the majority of teachers were aware of the positive potentials of digital games as tools to serve education. Some of the questionnaire items used in those studies have been re-used by this survey research whose methodology, implementation and results will be discussed next.

Objectives of the Study

This research seeks to answer the following interrelated questions:

1. Generally speaking, do university teachers in Malaysia have favorable or unfavorable perceptions toward using digital games in their teaching?
2. How do university teachers in Malaysia differ in their views about digital game potential by such variables as age, gender, academic discipline and others sets of independent variables?

METHODOLOGY

Research Design

The research design was structured around a survey questionnaire since that it is a suitable method to find out opinions and attitudes of a certain group of people about a particular area or issues (Fraenkel & Wallen, 2007). Choudrie and Dwivedi (2005) reviewed 48 studies published between 1985 and 2003 that dealt with technology adoption and usage. Their aim was discovering the most used method of research in technologies adoption studies. Their result showed that survey method was the most used compared with other methods such as case studies, interviews, experiments, ethnographic study, secondary data analysis and others. Digital games could be a new technology that needs to be adopted in learning and teaching; therefore it was thought a survey research type is suitable for this study.

This survey used a Likert scale of 5 points (1= strongly disagree; 5= strongly agree) because it is thought to be easier for respondents to answer than using the 7-point scale (O'Neil, 2007). Furthermore the survey questionnaire used "I don't know" as a middle point instead of "neutral" because it gives a clear idea if the responding university teacher does not have an opinion about the asked item which, in this situation, is considered a very import scale (O'Neil, 2007). It enables the researcher to draw different conclusion(s) or recommendation(s) if the majority of respondents do not know the potential of using digital games in higher education.

The items in the questionnaire are adopted and/or re-adapted from previous surveys and also from statements by other researchers such as Beggs et al. (2009); Johnson, Smith, Levine, and Haywood (2010); Chu (2009); Dziorny (2007) (Table 1,Table 2).

The 8 items are distributed into two groups. The first group of items (item 1 to item 4) explores positive attitudes toward the usage of digital games in higher education (Table 1). The second group of items (item 5 to item 8) comprises negative statements toward digital games (Table 2). The reason for having both negative and positive items towards digital games is to confirm that consistency of opinions by respondents is maintained.

Table 1: Positive Attitude Items

Item Number	Survey Items	Resources
1	I think using digital games is useful for students and teacher in higher education.	Dziorny (2007)
2	I believe that using digital games with learning/teaching creates students centered learning environment.	
3	I believe that game based learning in higher education will be an important teaching tool in years to come.	Chu (2009)
4	I think digital games can be applied in many learning contexts.	Johnson et al. (2010)

Table 2: Negative Attitudes Items

Item Number	Survey Items	Resources
5	I am doubtful about the benefits of using digital games based learning in higher education.	Beggs et al., (2009)
6	I consider using digital games for education is a waste of time.	
7	I think learning shouldn't have fun as a necessary requirement.	
8	I feel the usage of digital games is only useful in primary/secondary education not in higher education.	

Besides the attitudinal questionnaire items, the survey questionnaire was designed to elicit behavior information of university lecturers toward digital games. It focused on discovering if lecturers use digital games in their leisure time and with their teaching. Examples of these questions included: 'Do you play any kind of interactive (video) digital games?'; 'How many times do you play a week?'; 'Thinking about computer games that are primarily designed for learning (serious/edutainment games) have you ever used them for educational purposes?'; 'Thinking about the kinds of computer games people play for entertainment, have you ever used any of these games as part of a lesson?'. These questions were adapted from Future Lab (2005).

The survey also looked into demographic information such as the university teachers' age, gender and years of experience in teaching. Soliciting such information was important to examine if there is any association between the teacher's perceptions/attitudes and their demographic information. For instance, does age or gender of teachers influence their perception and attitude? Or is there a relationship between having favorable attitude toward digital games and being young or old, male or female, and so forth?

Population and Sample

The target population for this research is teachers in higher education in Malaysia. There has not been any questionnaire-based survey study of the university teachers' perception and attitude towards using digital games in Malaysia. And it is not exactly known if digital games are used in teaching and learning at Malaysian universities and to what extent. On the other hand, digital games in higher education have been used and recognized in the US, UK and other countries in Europe (Wong, 2007).

The accessible population was five universities in Malaysia, randomly selected. They are believed to be a good representatives of Malaysian universities that consist of private and public (government-funded) universities. The sample of the study was randomly selected and included professors, associate professors, assistant professors, lecturers, assistant lecturers and tutors. Some of the participants were approached face to face to participate in the study but the majority were approached through their emails found in the staff directory of the selected university website. The survey was sent to 1901 lecturers in different faculties and departments including engineering, computing and informatics, management, multimedia, business and law, economics, mathematics, medicine, pharmacy, biotechnology, information science and technology, education, science, English literature, history and languages. Participation in the study was voluntary; and 273 complete responses were received. According to Fraenkel and Wallen, (2007) a descriptive study should have a minimum of 100 participates as a sample size.

Validity and Reliability

According to Kitchenham and Pfleeger (2002), reusing questionnaire items from previous study can be beneficial because the existing instrument has already been evaluated for validity and reliability. Cronbach's coefficient alpha test was used to check the internal reliability and consistency of the questionnaire (Beedle & Wright, 2007). According to Lim, Khine , Hew, Wong, Shanti and Lim (2003) Cronbach's alpha is considered one of the widely used internal consistency reliability methods. And for an instrument to be judged as internally consistent it has to achieve an alpha above .60 (DeVellis, 1991, cited by Lim et al., 2003). In this study an overall alpha of .885 is achieved which means that the reliability is deemed to be good.

Data Analysis

Survey items where coded into SPSS (version 20) and analyzed through descriptive statistics such as frequencies, means, and standard deviation. Furthermore, possible relationships between questionnaire items namely perceptions and attitudes as influenced by variables such as university teacher's age, gender, teaching discipline, highest degree earned are tested for significance and correlations using *t*-test and ANOVA.

FINDING

Demographic Data

As mentioned earlier, the survey was emailed to teachers in five universities in Malaysia. From those 1901 selected samples, 273 participated in the survey voluntarily, representing a participation rate of 14%. The participants included 50.9% males (N = 139) and 49.1% female (N = 134).

By highest degree attainment, 51.3% (N = 140) of participants hold doctorate degrees followed by 44.3% (N = 121), having master's then bachelor's 2.9% (N = 8) and only 1.5% (N = 4) have specialist degrees.

By age-group, the most numerous of participants falls in the age group 31-35, accounting for 28.2% (N = 77); followed by the age-group 41- 49 (25.3%, N=69); then the age group 36-40 (20.9% N = 57) and finally the age-group 50-above which represents only 9.5 % (N = 2) of the respondents

Moreover, the participants are distributed among academic disciplines as follows: 23.4% (N = 64) in social sciences and humanities; 22.3% (N=61) in computer science and IT; 28.9% (N = 79) in engineering; 2.9% (N=8) in physical and mathematical sciences; 7.9% (N=19) in life sciences and 15.4% (N = 42) come from other different disciplines such as medicine, business, law, chemistry, accountancy, finance, education, and multimedia.

Considering the teaching experience, about 30.8% (N = 84) of the participants have 1- 5 years of teaching experience, while 28.2 % (N = 77) have 6-10 yeas; 18.7% (N=51) have 11 -15 years and 22.3% (N = 61) taught for more than 15 years

As for the teachers' habit of playing digital games, 56.0% (N = 156) of the participants reported that they played digital games, while 44.0% (N = 120) said that they did not play any kind of digital games. Regarding the usage of digital games for teaching, the survey reported that 77% (N = 212) did not use entertainment games as a part of a lesson, while 22.3 % (N = 61) have used it. Also 74.7 % (N=204) did not use serious/edutainment games with a lesson and 25.3% (N = 69) confirmed that they have used these types of games.

Research Results

The research questions of this study tried to investigate to what extent university teachers had positive or negative attitude toward digital games. The question was formed in two parts. The first part involved evaluating the positive views, namely: do university teachers in Malaysia have favorable attitudes towards using digital games in their teaching efforts. To answer this question, item 1, 2, 3 and item 4 were analyzed through means, standard deviation (Table 3), frequencies and percentages (Table 4).

Table 3: Means and Standard Deviations of the Teachers' Positive Attitudes toward Digital Games

Item #		Mean	*SD*
1	I think using digital games is useful for students and teacher in higher education.	3.62	.892
2	I believe that using digital games with learning/teaching creates students centered learning environment.	3.70	.851
3	I believe that game based learning in higher education will be an important teaching tool in years to come.	3.63	.989
4	I think digital games can be applied in many learning contexts.	3.73	.883
	N = 273. Cronbach's alpha = .879		

Table 4: Frequencies and Percentages of Teachers' Positive Attitudes toward Digital Games

I think using digital games are useful for students and teachers in higher education.	**Frequency**	**Percent**
Strongly Disagree	6	2.2
Disagree	32	11.7
Don't Know	49	17.9
Agree	160	58.6
Strongly Agree	26	9.5
I believe that using digital games with learning/teaching creates students centered learning environment.	-	-
Strongly Disagree	4	1.5
Disagree	29	10.6
Don't Know	40	14.7
Agree	171	62.6
Strongly Agree	29	10.6
I believe that game based learning in higher education will be an important teaching tool in years to come.	-	-
Strongly Disagree	8	2.9
Disagree	32	11.7
Don't Know	59	21.6
Agree	129	47.3
Strongly Agree	45	16.5
I think digital games can be applied in many learning contexts.	-	-
Strongly Disagree	5	1.8
Disagree	27	9.9
Don't Know	42	15.4
Agree	162	59.3
Strongly Agree	37	13.6

The means and standard deviation for the positive perception of digital games ranged from 3.62 to 3.73 and from .851 to .989 respectively. The Cronbach's alpha was computed to be .879 for the positive attitude construct, indicating the reliability is deemed to be good. Furthermore, the frequencies and percentage table indicate that most teachers agreed on the positive statements said about digital games. The agreement percentages stand in the range between 58.6% and 62.6%. Teachers who strongly agree with the positive statements about digital games range from 16% to 9%. The percentages of teachers who do not know if the positive statements fit digital games fall within the range from 21% to 14% of participants, while 11% to 9 % of teachers disagree with the positive statements that were given to digital games. A very small minority (between 1% and 2%) strongly disagree with any positive perception of digital games.

The second part of the first question was trying to investigate if university teachers have negative views towards digital games. The question was: Do university teachers in Malaysia have unfavorable attitudes towards using digital games in their teaching efforts. To extract results for this question, the mean, standard deviation (Table 5), frequency and percentage were computed on item 5, 6, 7 and item 8 (Table 6).

Table 5: Means and Standard Deviations on Teachers' Negative Attitude toward Digital Games

Item Number	Survey Items	Mean	SD
5	I am doubtful about the benefits of using digital games based learning in higher education.	2.84	1.099
6	I consider using digital games for education is a waste of time.	2.30	.873
7	I think learning should not have fun as a necessary requirement.	2.18	1.044
8	I feel the usage of digital games is only useful in primary/secondary education not in higher education.	2.54	1.098
	N= 273. Cronbach's alpha = .772		

Table 6: Frequencies and Percentages on Teachers' Negative Attitude toward Digital Games

I am doubtful about the benefits of using digital games based learning in higher education.	**Frequency**	**Percent**
Strongly Disagree	17	6.2
Disagree	118	43.2
Don't Know	49	17.9
Agree	69	25.3
Strongly Agree	20	7.3
I consider using digital games for education is a waste of time.	-	-
Strongly Disagree	35	12.8
Disagree	154	56.4
Don't Know	58	21.2
Agree	19	7.0
Strongly Agree	7	2.6
I think learning should not have fun as a necessary requirement.	-	-
Strongly Disagree	70	25.6
Disagree	134	49.1
Don't Know	27	9.9
Agree	34	12.5
Strongly Agree	8	2.9
I feel the usage of digital games is only useful in primary/secondary education not in higher education.	-	-
Strongly Disagree	32	11.7
Disagree	141	51.6
Don't Know	38	13.9
Agree	44	16.1
Strongly Agree	18	6.6

The analysis reveals that means and standard deviation for the perception of the negative attitude of digital games ranged from 2.18 to 2.84 and from .873 to 1.099 respectively. The Cronbach alpha was computed to be .772 for the negative attitudes construct, indicating the reliability is deemed to be good. Furthermore, the frequencies and percentage table indicates that most teachers disagree on the negative statements said about digital games. The percentages of disagreeing teachers fall between 56.4% and 43.2%. Teachers who strongly disagree with the negative statements said about digital games vary between 25% and 6%. On the other hand, teachers who agree with the negative statements range between 7% and 25%. Teachers who do not know if digital games are negative to learning vary between 9% and 21%.

After investigating teachers' positive and negative attitudes toward digital games it was vital to inspect if their attitudes have been influenced by external factors such as demographic information, personal use of

games or previous experience of using digital games with learning and teaching. T-test and ANOVA were used for this purpose. And it was found that academics attitudes were not influenced by the difference in age, gender, length of teaching experience, earned degree, teaching disciplines and the different types of digital games platforms. However, it was found that teachers' attitudes were significantly different and influenced by three factors namely: their playing life habits of digital games or the lack of it; the frequency of game playing; and their previous experience in integrating serious/entertainment games in classroom. The following demonstrate the t-test and ANOVA analysis in more details.

Teachers' Attitudes towards Digital Games and Difference in Gender

T-test for independent means was used to examine whether gender differed significantly in teachers' attitude because it is suitable to be used to test relationship between a variable/construct and two subgroup of a sample such as male and female. As it is known, 0.05 level of statistical significance is normally used in reporting the results (Fraenkel & Wallen, 2007). Based on that from Table 7 it can be observed that there is not a significant difference in the positive attitude between male (M = 3.7068, *SD* = .71597) and female (M= 3.6287, *SD*= .83325), t (271) = .832, p = .406. Also there is no significant difference in the negative attitude of teachers toward digital games between male (M = 2.3975, *SD* = .77367) and female (M = 2.5373, *SD* = .81429), *t* (271) = 1.455, *p* = .147.

Table 7: *t*-Test for Teachers' Attitudes and their Gender

	Male (N=139)		Female (N=134)			
Constructs	Mean	SD	Mean	SD	t	p-value
Positive constructs	3.7068	.71597	3.6287	.83325	.832	.406
Negative constructs	2.3975	.77367	2.5373	.81429	1.455	.147

Teachers' Attitudes towards Digital Games and the Difference in Age Groups

The ANOVA analysis reveals that there is no significant difference between all constructs that helped verify teachers' views on digital games and their age because the value of *F* is less than the critical value and the value of *p* is greater than .05. The following will demonstrate more detailed justification.

Table 8 shows that there is no statistically significant difference between the age group and constructs determining positive attitude towards digital games, at *F*(4, 268) = 0.591, *p* = .670). Because the critical value of f is 2.42 at the .05 level of significance and its computed value is 0.591, which is less than the critical value, also the *p*-value is greater than .05.

In addition, Table 8 demonstrates that there is no statistically significant difference between the age group and constructs determining whether university teachers have negative attitude towards digital games, at *F*(4, 268) = 1.634, *p* = .166). Because the critical value of *F* is 2.42 and its computed value is 1.634, which is less than the critical value and the *p*-value is greater than .05.

Table 8: ANOVA Result for Teachers' Attitudes towards the Digital Games and Age Group

		Sum of Squares	df	Mean Square	F	*p*-value
Positive constructs	Between Groups	1.429	4	.357	.591	.670
	Within Groups	162.070	268	.605		
	Total	163.499	272			
Negative constructs	Between Groups	4.098	4	1.025	1.634	.166
	Within Groups	168.026	268	.627		
	Total	172.124	272			

Teacher's Attitudes towards Digital Games and the Different Majors

There is no significance difference between the discipline and all constructs that are determining teachers' attitude because the computed value of *F* is less than the critical value of which is 2.65 in all cases of the constructs. Similarly with the case of the *p*-value which is greater than .05. The following will detail more information about the results of this analysis. (Table 9) shows that there is no statistically significant difference between the teachers' disciplines and constructs determining whether teachers' have positive attitude towards digital games, at *F* (3, 269) = 0.234, *p* = .872).This is because the computed value of F is 0.234, is less than the critical value which is 2.65. And the *p*-value is greater than .05.

Table 9: ANOVA Result for Teachers' Attitudes towards the Digital Games and Different Majors (Specializations)

		Sum of Squares	df	Mean Square	F	*p*-value
Positive constructs	Between Groups	.426	3	.142	.234	.872
	Within Groups	163.073	269	.606		
	Total	163.499	272			
Negative constructs	Between Groups	.069	3	.023	.036	.991
	Within Groups	172.055	269	.640		
	Total	172.124	272			

Moreover, Table 9 shows that there is no statistically significant difference between the discipline and constructs that test if teachers have negative attitude towards digital games, at *F* (3, 269) = 0.036, *p* = .991). The critical value of *F* is 2.65. Since its computed value is 0.036, which is less than the critical value. And the *p*-value is greater than .05.

Teachers' Attitudes towards Digital Games and the Length of Teaching Experience

It was found that there is no statistically significant difference between the duration of teaching experience and the all attitudes constructs because the value of F is less than the critical value 2.65 and the *p* value greater than .05. The following Table 10 will present the detailed result for each construct.

Table 10: ANOVA Result for Teachers' Attitudes towards the Digital Games and the Length of Teaching Experience

		Sum of Squares	df	Mean Square	F	*p*-value
Positive constructs	Between Groups	2.921	3	.974	1.631	.183
	Within Groups	160.578	269	.597		
	Total	163.499	272			
Negative constructs	Between Groups	1.660	3	.553	.873	.456
	Within Groups	170.465	269	.634		
	Total	172.124	272			

Table 10 shows that there is no statistically significant difference between the duration of teaching experience and the constructs that examine if teachers have positive attitude towards digital games, at *F* (3, 269) = 1.631, *p* = .183) .The critical value of *F* is 2.65 and its computed value is 1.631, which is less than the critical value. Also the *p* value is greater than .05.

(Table 10) shows that there is no statistically significant difference between the duration of teaching and constructs determining negative attitude towards digital games, at F (3, 269) = 0.873, p = .456). The critical value of F is 2.65 and its computed value is 0.873, which is less than the critical value. Also the *p* value is greater than .05.

Teacher's Attitudes towards Digital Games and Discipline of Teaching

It was found that there is no statistically significant difference between the duration of teaching experience and the all attitudes constructs because the value of *F* is less than the critical value 2.26 and the *p* value greater than .05. (Table 11) shows that there is no statistically significant difference between the discipline of teaching and constructs determining positive attitude towards digital games, at *F* (5, 267) = 0.460, *p* = .806). The critical value of f is 2.26. Since its computed value is 0.460, which is less than the critical value. The *p* value is greater than .05.

Table 11: ANOVA Results for Teacher's Attitudes towards the Digital Games and Discipline of Teaching

		Sum of Squares	df	Mean Square	F	*p*-value
Positive constructs	Between Groups	1.397	5	.279	.460	.806
	Within Groups	162.102	267	.607		
	Total	163.499	272			
Negative constructs	Between Groups	3.551	5	.710	1.125	.347
	Within Groups	168.573	267	.631		
	Total	172.124	272			

Furthermore, Table 11 shows that there is no statistically significant difference between the discipline of teaching and constructs determining negative attitude towards digital games, at *F* (5, 267) = 1.125, *p* = .347). The critical value of *F* is 2.26. Its computed value is 1.125, which is less than the critical value. The *p* value is greater than .05.

Teacher's Attitudes towards Digital Games and their Habit of Playing

There is a significant difference in positive teachers' attitude toward digital games between those who play games in their daily life (M = 3.7827, *SD* = .81852) and those who do not play (M= 3.5229, *SD* = .692) conditions; *t* (271) = 2.781, *p* = .006. The result indicates that being a gamer or not as a teacher has an effect on their positive attitude on digital games based learning in higher education. However, there is no significant difference in teachers' negative attitude between teachers who play digital games (M= 2.3824, *SD* = .84002) and teachers who do not play digital games (M = 2.5729, *SD* = .72428); *t*(271) = 1.975 , *p* = 0.049. Since the *p* value is less than .05, this means that teachers' negative views of digital games were not influenced by the fact that they play digital games in their daily life.

Table 12: T-Test Results for Teacher's Attitudes towards the Digital Games and their Habit of Playing

Do you play any kind of interactive (video) digital games?	**No (N=120)**		**Yes (N=153)**			
	Mean	SD	Mean	SD	t	*p*- value
Positive constructs	3.5229	.69285	3.7827	.81852	2.781	.006
Negative constructs	2.5729	.72428	2.3824	.84002	1.975	.049

Teachers' Attitudes towards Digital Games and the Frequency of Playing

Table 13 shows that there is a statistically significant difference between the frequency of use of digital games and constructs determining positive attitude towards digital games, at F (3, 269) = 4.820, p = .003). The critical value of f is 2.65. Since its computed value is 4.820, which is more than the critical value and the P value is less than 0.05.

The above (Table 13) shows that there is no statistically significant difference between the frequency of use of digital games and constructs determining negative attitude towards digital games, at F (3, 269) = 2.36, p = .071). The critical value of F is 2.65. Since its computed value is 2.36, which is less than the critical value and the P value is greater than 0.05.

Table 13: ANOVA Results for Teachers' Attitudes towards the Digital Games and the Frequency of Playing

		Sum of Squares	df	Mean Square	F	*p*-value
Positive constructs	Between Groups	8.341	3	2.780	4.820	.003
	Within Groups	155.158	269	.577		
	Total	163.499	272			
Negative constructs	Between Groups	4.426	3	1.475	2.366	.071
	Within Groups	167.698	269	.623		
	Total	172.124	272			

Teachers' Attitudes towards Digital Games and Type of Digital Games Platforms.

(Table 14) shows that there is no statistically significant difference between the types of digital games used and constructs determining positive attitude towards digital games, at F (5, 194) = 0.921, p = .468). The critical value of f is 2.26. This is because the computed value is 0.921, which is less than the critical value and the P value is greater than 0.05.

Table 14: ANOVA Result for Teachers' Attitudes towards the Digital Games and Types of Digital Game Platforms.

		Sum of Squares	df	Mean Square	F	*p*-value.
Positive constructs	Between Groups	2.834	5	.567	.921	.468
	Within Groups	119.346	194	.615		
	Total	122.180	199			
Negative constructs	Between Groups	1.139	5	.228	.357	.877
	Within Groups	123.733	194	.638		
	Total	124.872	199			

Table 14 shows that there is no statistically significant difference between the types of digital games used and constructs determining negative attitude towards digital games, at *F* (5, 194) = 0.357, *p* = .877). The critical value of F is 2.26. This is because the computed value is 0.357, which is less than the critical value and the *p* value is greater than .05.

Teachers' Attitudes towards Digital Games and Previous Experience of Integrating Entertainment Games in Classroom

From Table 15 it can be observed that there is a significant difference in positive teachers' attitude toward digital games *t*(271)=2.989, *p* = 0.003, between teachers who had used entertainment digital game in learning (M= 3.9262 , SD= .79758) and teachers who had not used them (M= 3.5943 , *SD* = .75449). However, the *t*- test statistic shows no significant difference in the negative attitudes of the teachers *t*(271) = .992, *p* = .322, between those who experienced using entertainment games as part of lesson (M = 2.3770, *SD* = .90556) and those who did not (M = 2.4917, *SD* = .76132).

Table 15: *t*-test Results for Teachers' Attitudes towards Digital Games and Previous Experience of Integrating Entertainment Games in Classroom

Thinking about the kinds of computer games people play for entertainment, have you ever used any of these games as part of a lesson?	**Yes (N= 61)**		**No (N= 212)**			
	Mean	SD	Mean	SD	T	*p*-value
Positive constructs	3.9262	.79758	3.5943	.75449	2.989	.003
Negative constructs	2.3770	.90556	2.4917	.76132	0.992	.322

Teachers' Attitudes towards the Digital Games and Previous Experience Integrating Educational Digital Games in Classroom

According to (Table 16) it can be observed that there is a significant difference between teachers' views about the positive effect of digital games in learning ($t(271)=2.331$, p 0.02) between those who have used serious/educational digital games (M= 3.8551, *SD* = .81282) and those who did not (M= 3.6054, *SD* =.75384).

Table 16: *t*-test Result for Teachers' Attitudes towards the Digital Games and Previous Experience Integrating Educational Digital Games in Classroom

Thinking about computer games that are primarily designed for learning (serious/edutainment games), have you ever used them for educational purposes?	**Yes (N = 69)**		**No (N = 204)**			
	Mean	SD	Mean	SD	T	*p*-value
Positive constructs	3.8551	.81282	3.6054	.75384	2.331	.02
Negative constructs	2.3587	.79229	2.5025	.79523	1.299	.195

However, the *t*-test reveals that the teachers' negative attitudes toward digital games did not reach statistical significance $t(271) = 1.299$, $p = 0.195$ for the difference between teachers who used serious/educational digital games for educational purpose (M = 2.3587, *SD* = .79229) and those who did not (M = 2.5025, *SD* = .79523).

DISCUSSION

University teachers' general attitudes were captured through 8 items weighted in a 5-point Likert scale (1= Strongly disagree, 2= disagree , 3=don't know, 4=agree and 5= strongly agree). Four of these items were positive statements for digital games and their benefits, while the other four were negative statements against digital games. As shown earlier, the mean for the positive statements (items 1, 2, 3 and 4) ranged between 3.62 and 3.73 and standard deviation from 0.851 to 0.989. This indicates that the tendency of teachers' attitude is favorably supportive of the benefits and importance of digital games. This result is consistent with Gibson, Halverson, and Riedel (2007) and Beggs et al. (2009), even though their studies were conducted elsewhere in the world, not with respondents from Malaysia. The highest percentage rate (62.6%) of teachers agrees with Dziorny (2007) that digital games can create a student-centered learning environment. Also, a high percentage of university teachers (59.3%) believed that digital games can be applied in many learning contexts, supporting Johnson et al. (2010) who said that many studies and experience showed effective result of digital games in different disciplines. It is noticeable that the agree

scale achieved the highest percentage of responses, yet 'I don't know' scale got the second highest percentage rate of responses, which means even though that the majority of teachers agreed that digital games have positive influence and viewed them favorably, high numbers of teachers are not sure about the digital game benefits in learning. For example 47.3% of the teachers believed that digital games will be an important teaching tool in years to come, which is the lowest rate in the agree scale for all the positive statements but there are 21.6% of teachers who do not know if this statement is valid or not and it is the highest rate for 'I don't know' scale in the positive items construct.

To confirm that teachers had positive attitude toward using digital games in learning, they were subjected to negative statements against digital games. The analysis of the survey showed that the mean for the negative construct ranged between 2.18 and 2.84 and standard deviation from .873 to 1.099. This result shows that teachers disagree with the negative statements about digital games, which means in a way a supportive and positive perspective for using digital games in learning/teaching. Moreover, the highest percentages rates belong to the disagree items. Some 56.4% of teachers disagreed with the item saying: "using digital games for educations is a waste of time". The second highest rate (51.6%) was for the item stating: "usage of digital games is only useful in primary/secondary education not in higher education", which strengthens the conclusion that the majority of teachers believe in the potential of digital games in learning and higher education. Furthermore, the second highest rate of scale in the negative construct is 'I don't know', which provides additional evidence that the majority of the participants are divided between the majority who believe in the positive potentials of digital games on education and those who have not formed any opinion by indicating "don't know" .

The survey revealed that the majority of the teachers are game players themselves (56.0%). That could mean they are be able to envisage or realize the benefits of digital games and how they can be used for learning, which explains in part why the majority of teachers have positive attitudes toward the usage of digital games for learning and teaching. But 44.0% is still considered a high number of teachers who do not play; and that may explain why they are unable to judge if digital games are beneficial. They may be among the 32.6% who say that they are doubtful about the benefits of using digital game based learning in higher education. That a high number of teachers are unsure about the benefits of digital games can be attributed to the fact that more than 70% of the teachers have never used digital games in the teaching/learning process. This elaboration is supported by the result of the *t*-test and ANOVA analysis which indicates that teachers' positive attitude toward digital games is influenced by whether the teachers have the habit of playing digital games, by the frequency of playing digital games and having used digital games in their teaching. Moreover, this relationship between teachers' attitudes and their gaming experience was also found by Gibson, Halverson, and Riedel (2007) who found that teachers who were involved in playing digital games had significant different attitudes from teachers who did not play.

It is also important to note that university teachers' attitudes was not influenced by the difference in their gender which is a similar conclusion found by Hsu and Chiou (2011). Furthermore, teaching experience, disciplines, age, highest earned degree or difference in digital games platforms did not have influence on the teachers' attitudes in this study based on ANOVA and *t*-test results.

CONCLUSION

The primary conclusion of this study is that the majority of university teachers in Malaysia have positive attitude toward the benefits and uses of digital games in classroom teaching. That positive attitude is not impacted by variables such as gender, age, discipline or other factors except by one variable: previous experience with digital games. Those who play any digital game are more likely to have favorable attitude. Generally, the implication suggests that teachers are willing to start integrating and utilizing digital games in their teaching efforts.

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