Three Learning Potentials In Digital Games: Perception Of Malaysian University Teachers

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Abstract:This study aimed to investigate university teachers' perceptions of the potential benefits, or the lack of them, in digital games for learning and teaching in higher education institutions in Malaysia. The survey was conducted by emailing the questionnaire, to which 273 teachers responded online. The study sought to find answers to a fundamental question: How do university teachers in Malaysia view digital games as motivational, collaborative and instructional tools? Moreover, it looked into how do university teachers differ in their views about digital games by such variables as age, gender, academic discipline and other independent variables. The study undertook a descriptive analysis along with t-test and ANOVA to examine possible relationships between teachers' attitudes and their demographic information. The results showed a consistent pattern throughout where the majority of surveyed university teachers exhibited a favorable perception of the usage of digital games in higher education. It is noteworthy that the only variable that influenced such perception was the respondents' previous experience (or lack of it) in using digital game. The t-test and ANOVA results showed no relationships between respondents' demographic characteristics such as gender and age and favorable or unfavorable attitudes towards digital game usage in learning and teaching. Even though the majority of responding teachers had favorable attitude towards using digital games in their teaching , in practice fewer of them had used them for that purpose.
Keywords: Digital games; Game-based learning; higher education; teachers' perception; learning technologies; motivational; collaborative; instructional; ARCS.

INTRODUCTION

Examining the situation of learning and teaching in higher education revealed that there are needs for enhancements particularly in three areas, namely: students' motivation (Gale, 2011 ; Balduf, 2009 ; Baslanti, 2008), the collaborative learning environment (Pivec and Dziabenko,2004 ; Howe & Strauss, 2003) and the conventional instruction methods (Gale, 2011; Baslanti, 2008; Monaco & Martin, 2007). Therefore, some educators, instructional designers and researchers have suggested computer/digital games as a medium for learning and teaching (Mysirlaki & Paraskeva, 2007; Akilli, 2007).

Moreno-Ger, Burgos, & Torrente (2009) asserted that "Games are powerful forces in technology-enhanced learning" (p.681). Johnson, Smith, Willis, Levine & Haywood, (2011) said digital games will have effective influences in higher education learning because they tend to make students build the 21 first centaury skills such as problem solving, critical thinking, decision making, collaboration and others. These skills are becoming important to be instilled on nowadays students (Sardone & Devlin-Scherer, 2010). Moreover, using digital games with university curriculum will help the students to have a deeper understanding of the knowledge taught (Johnson et al. ,2011). Johnson, with some optimism, expected that in two to three years the benefit of using digital games in education would be realized and lead to a wider acceptance and usage in teaching and learning.

Hwang & Wu (2012) support these predictions and reported that the number of studies about digital game-based learning has been increasing in the last 5 years. However, observing Hwang & Wu (2012) results of their review shows that there is a dearth of studies related to the use of digital games-based learning in Malaysia, the Middle East Arab countries, and generally speaking underdeveloped countries. Furthermore, the perception and attitude of higher education teachers in Malaysia and the Middle Eastern Arab countries about the uptake of digital game-based learning in education is limited.

This is particularly important because many studies indicated that digital games will reshape learning and teaching methods in higher education (Chen, Chen & Liu, 2010). Thus, the aim of this study is to elicit university teachers' perceptions and attitudes towards the use of digital games in colleges and universities in Malaysia to serve education from three angles: provoke students' motivation for learning; create collaborative environment and use digital games as new instruction means. And so, overall, the pertinent research question was specifically: How do university teachers view digital games as motivational, collaborative and instructional tools?

GAMES AS A MOTIVATIONAL TOOL

According to Ertzberger (2009) and Gale (2011), digital games can be the right tool to engage and motivate students in classroom. Prensky (2005) claims that digital-game based learning is a new means to motivate students. Becker (2007) saw an intersection between the traits of a digital game player and a motivated learner. According to Garris, Ahlers & Driskell (2002)

> *"Motivated learners are easy to describe. They are enthusiastic, focused, and engaged. They are interested in and enjoy what they are doing; they try hard, and they persist over time."* (p.444).

The description of a motivated learner is applicable to digital games player which made it justifiable to infer that digital games can motivate learners (Becker, 2007).

Huang & Chong (2009) conducted a study to explore the potential of games to motivate students in mathematics. The study revealed that students in a class with a digital game integrated into the classroom activities showed a significant improvement in motivation, achievement and attitude toward the subject in comparison with the class which had only a traditional learning environment. Moreover, it created a constructive learning environment that engaged students in activities that required discussions and conversations with one another.
Papastergiou (2009) suggested that digital games can be harnessed to create effective and motivational learning environment. The study confirmed an increase in the students' learning motivations. Furthermore, Digital game seemed to have given students greater enthusiasm to learn and greater amount of knowledge regardless of the student's gender. This is further discovered when Kirriemuir & McFarlane (2004) found that motivation is one of the key reasons of choosing to adopt digital games based learning; and that this motivation factor can also bring fun and academic achievements to learning.
With all these confirmations of the motivation contributions of digital games, yet, Lemke, Coughlin, & Reifsneider (2009) noted that the motivation aspect of digital games is just one among many other advantages.

DIGITAL GAMES AS COLLABORATION TOOL

Sandford and Francis (2006) contend that digital games can be an effective source of collaborative learning environment. In addition, according to Kirriemuir and McFarlane (2004) and Gale (2011), a growing body of research in the area of digital games pointed out that games were tools that facilitate activities that were part of collaborative learning such as social, communication and peer activities.
It is becoming important to create a collaborative learning environment for the students. Howe & Strauss (2003) justified why and stated that the current generation is team-oriented; and there are many reports that described the tendency of teens to be socializing in groups of more than two; which explains their enthusiasm and attraction to different kinds of social network mediums such as Facebook, YouTube, Twitter or MySpace. Therefore, Howe & Strauss (2003) recommend to teachers in higher education to start planning to meet students' expectation of finding collaborative learning environment such as group activities, collective assignments and projects.
Johnson et al., (2010) said that it was not difficult to integrate games that featured with collaborative playing such as massively multiplayer online (MMO) games to establish a collaborative learning space. Gale (2011) reported a study accomplished by Mansour and El-Said (2009) that created and integrated a multi-players role-playing educational game at University of Louisville. The study concluded that social interaction between students and their classmates improved and that

> *"Playing the game facilitated collaboration and communication among students which in turn enhanced their learning performance"* (Mansour and El-Said ,2009, p.236. Cited by Gale, 2011).

Johnson et al., (2010) reported that digital games were not only useful for building a collaborative learning but they were also applicable to various learning contexts.

DIGITAL GAMES AS INSTRUCTIONAL TOOL

Digital games can be a very useful instructional tool (Sardone & Devlin-Scherer, 2010; Papastergiou, 2009). Gale (2011) predicted that using digital games in classroom or any part of the learning process, as an instructional tool, will become common in the future. In fact, Prensky (2005) contended that they were powerful instructional tools that must be used in learning and teaching. Blunt (2009) conducted a study on three different higher education courses as an attempt to discover the relation between digital game-based learning, learning processes and their results. The study found that students in all courses (male, female and different ethnic groups) who used digital games with traditional learning scored in the test significantly higher than students

(male, female and different ethnic groups) who did not use the game with traditional learning. However, different age-groups showed different results. Students with age 40 years and under who played games scored higher then students who aged 40 and above. Subject to further research confirmation, this could indicate that students who are not included in the "digital native" generation will not benefit from digital game-based learning and tend to prefer traditional means of learning.

McMichael (2007) found that games somehow enticed the students, with the teacher, to discuss, analyze and compare different topics and situations in history.

"Playing the games encouraged fruitful discussions about what drove change in a society, political upheaval, epidemic disease, religious expansion and turmoil, economic development, warfare" (p.214).

He further stated that utilizing games aligned to curriculum allowed the students to develop skills and enabled them to analyze questions related to certain topics.

These studies that showed positive results from utilizing digital games with universities courses provoked the researchers of this study to investigate where do university teachers in Malaysia stand in regard to using digital games with their teaching methods. The following section will show how the research was conducted and teachers' perceptions were obtained, presented, and analyzed.

RESEARCH DESIGN

This study took a survey (cross sectional) research type since it is a suitable method to find out opinions and attitudes of a certain group of people about a particular area or issues (Fraenkel and Wallen, 2007). In fact, it is a very common method of behavioral investigation used in social research generally acceptable in principle with little or no contestable argument. The questionnaire used Likert with 5-point scale (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). The items in the questionnaire were adapted from previous surveys and other researchers' statements such as Future Lab (2005); Beggs, O'Neill, Virapen, & Alexander, (2009); Ritzhaupt, Gunter, & Jones (2010) ; Johnson, Smith, Levine & Haywood (2010); Dziorny (2007) ; Chu (2009); de Freitas (2006); Felicia (2009) ; Johnson, Adams & Cummins, (2012).

The items in Table 1 explored if digital games can provide motivational factors according to the perceptions of our sample of university teachers. These items were used on the basis of the motivational design ARCS model (Huang, Diefes-Dux, Imbrie, Daku, & Kallimani, 2004; Huang, Huang, Diefes-Dux, & Imbrie, 2006 ; Kebritchi, Hirumi, and Bai, 2010). The reason for choosing ARCS model reflects the researchers' agreement with Huang et al., (2006) statement that

"The ARCS motivational design model is widely applied when designing, developing and evaluating motivational strategies because of its applicability and practicability with instructional design processes" (p.245).

ARCS stand for attention, retention, confidence and satisfaction. Keller (1987) said that motivation can be provoked through these four factors. Therefore, each item in this group was mapped to ARCS components (Huang et al., 2004) below.

Table 3: DGBL as a Motivational Tool Items

Survey Items	ARCS factors	Resource
I believe that using digital games in teaching students help to maintain their attention and focus during the learning/playing session.	Attention	de Freitas (2006)
I feel that using digital games for learning and teaching gives students different educational experience from those given by traditional classroom instruction.	Relevance	de Freitas (2006); Johnson, Adams, and Cummins, (2012) and Johnson et al., (2010)
Using digital games based learning can increase self-esteem and confidence of students and make them independent learners.	Confidence	de Freitas (2006)
Digital games can bring fun and enjoyment to learning.	Satisfaction	Beggs et al., (2009)
I think using digital games for learning	ARCS	de Freitas (2006)

| gives students an added motivation to study. | |

And likewise items in table 2 are used to generate the university teachers' positive or negative views about digital games as a collaborative factor supporting learning among students.

Table 4: DGBL as a Collaborative Tool

Survey Items	Resource
I feel that digital games based learning reinforces teamwork and collaboration.	Johnson, Adams, and Cummins, (2012) and Johnson et al., (2010)
I think using digital games in education can develop students' social negotiation skills.	
I believe some digital games allow learners to work together to solve problems collectively that could not be solved individually.	

Finally, statements in table 3 were used to generate the respondents' opinion about digital games potential as an instructional tool.

Table 5: DGBL as an Instructional Tool Items

Survey Items	Resource
I think with the use of digital games based learning students can learn from mistakes.	Felicia (2009)
Through digital games I can provide students with problems to solve that are related to the subject/topic to learn.	Johnson, Adams, and Cummins, (2012) and Johnson et al., (2010)
I consider digital games useful because they provide feedback to students during learning/playing session.	
In my opinion using digital games can put the learner in a simulated world environment where he/she can apply the concept that she/he has learnt.	de Freitas (2006)
I believe that using digital games with teaching and learning increases retention (students' ability to remember information and skills they have learnt) of a topic / subject.	
I consider digital games as good revision tool.	Beggs et al., (2009)

Besides using the attitudinal questionnaire items, several open-ended questions were designed to elicit behavior information of university surveyed teachers toward digital games. They also sought to discover if the teachers played digital games in their leisure time or used them with their teaching. These questions were also adapted from Future Lab (2005).
They were:

    (1) Do you play any kind of interactive (video) digital games?
    (2) How many times do you play a week?
    (3) "Thinking about computer games that are primarily designed for [learning (serious/edutainment games)] have you ever used them for educational purposes?" (P. 2)
    (4) Thinking about the kinds of computer games people play for entertainment, have you ever used any of these games as part of a lesson?

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 and attitudes and their demographic information. For instance, does age or genders of

responding teachers influence their perception and attitude? Or, if there is any relationship between having favorable attitude toward digital games and being young or old, male or female and so on.

POPULATION AND SAMPLE

The accessible population was five universities in Malaysia randomly selected. They are believed to be a good representative of Malaysian universities that consists 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. Very few of the participants were approached face–to-face but the majority was approached through their emails addresses that were found in the staff directories of the selected universities websites.

The questionnaires were emailed to 1901 university teachers in different faculties and departments such as 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 anonymous which resulted in 273 (n=273) responses. According to Fraenkel and Wallen, (2007) a descriptive study should have a minimum of 100 participants as a sample size. This criterion is fulfilled by this descriptive study.

VALIDITY AND RELIABILITY

According to Kitchenham & 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. 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). This study achieved an overall alpha of 0.885; and so the reliability is deemed acceptable.

RESULTS AND DISCUSSION

DEMOGRAPHIC DATA

The participants who responded to the survey included 50.9% males (N=139) and 49.1% female (N=134). The majority of them are between the ages of 31-35 (28.2%), which indicates that the participants tend to represent the so-called "games generation" according to Prensky's (2001) statement's that those who are over 39 could not be from the games generation.

Table 4 : Age-group of the Participated Teachers

31-35 years old	36-40 years old	41-49 years old	50 and above years old
28.2%	20.9%	25.3%	9.5%

By highest degree attainment, doctorate holders (51.3%) are in a slight majority over master's holders (44.3%) as the following table indicates:

Table 5: Highest Degree Attainment by Surveyed Teachers

Doctorate degree	Master's degree	Bachelor's degree	Specialist degree
51.3%	44.3%	2.9%	1.5%

Furthermore, the surveyed teachers have wide-ranging years of services as indicated in table 6.

Table 6: Years of Teaching Experience

1 - 5 years	6-10 yeas	11 -15 years	More than 15 years

30.8%	28.2 %	18.7%	22.3%

About (41%) of the surveyed teachers have more than 11years of teaching experience, while about (30.8%) have 5 years of teaching experience or less. Generally speaking, the surveyed teachers have enough teaching experience to give an informed opinion about the research questions, specifically the benefits of using digital games in the learning and teaching contexts. And when this is considered with the teachers' habit of playing games or not playing them, the final conclusion regarding their opinions can be considered informed.

Table 7: Percentage of Teachers Playing Digital Games

Played digital games	Didn't play
56.0%	44.0%

More than half of the teachers do play digital games, but slightly less than half don't seem to care for the same. Those playing digital games show different frequencies of playing according to the following data.

Table 8: Teachers' Frequency of Playing

Once a week	2-3 times a week	Play 4- 6 times per week
58.2%	5.9%	12.1 %

It is evident that half of the players enjoy their hobby only once a week, while some 18% show more enthusiasm by playing between two 2 to 6 times a week.

However, more than 70% of surveyed university teachers have not used commercial or serious digital games as part of their teaching methods

Table 9: Teachers Using Digital Games in Classroom

Game Category	No	Yes
Entertainment Games	77%	22.3 %
Serious/Edutainment Games	74.7 %	25.3%

The above data raises a question: do the surveyed universities teachers in Malaysia have doubts in the benefits of using digital games in education system as motivational, collaborative and instructional tool? The following discussion will attempt to answer this question and explain the relevant reasons.

TEACHERS' ATTITUDES TOWARDS USING DIGITAL GAMES

Table 10 below shows that the surveyed university teachers in Malaysia support Beedle & Wright (2007) opinion; and they believe that digital games can boost up students motivation because they provide fun elements, richer learning experience and sustain students' attention to the lesson. In short using digital games used as part of learning and teaching has the potential to fulfill the requirements in the ARCS motivational model.

Table 10: Means and Standard Deviations of Teachers' Attitudes towards Digital Games

Construct	Survey Items	Mean	SD	p%
Motivation	I believe that using digital games in teaching helps students to maintain their attention and focus during the learning/playing session.	3.72	.897	72.2
	I think using digital games for learning gives students an added motivation to study.	3.81	.858	75.1
	Using digital games based learning can increase self-esteem and confidence of students and make them independent learners.	3.44	.930	55.4
	I feel that using digital games for learning and teaching gives students different educational experience from those given by traditional classroom instruction.	3.99	.779	86.8
	Digital games can bring fun and enjoyment to learning.	4.04	.724	89.0
Collaboration	I feel that digital games based learning reinforces teamwork and collaboration.	3.55	.903	62.3
	I think using digital games in education can develop students' social negotiation skills.	3.41	1.000	57.2
	I believe some digital games allow learners to work together to solve problems collectively that could not be solved individually.	3.75	.830	72.5
Instruction	I think with the use of digital games based learning students can learn from mistakes.	3.66	.847	69.6
	Through digital games I can provide students with problems to solve that are related to the subject/topic to learn.	3.74	.851	71.4
	I consider digital games useful because they provide feedback to students during learning/playing session.	3.72	.816	72.2
	In my opinion using digital games can put the learner in a simulated world environment where he/she can apply the concept that she/he has learnt.	3.80	.821	78.4
	I believe that using digital games with teaching and learning increases retention (students' ability to remember information and skills they have learnt) of a topic / subject.	3.74	.847	71
	I consider digital games as good revision tool.	3.67	.927	70.7

Moreover, the study reveals that the majority of university teachers in Malaysia also agree with Johnson, Adams, and Cummins, (2012) and Johnson et al., (2010) and think of digital games as a powerful tool to build a collaborative leaning environment.

The last part of the study evaluated if digital games are viewed suitable to be used as an instructional tool to support learning; and according to (Table 10) more than (50%) agree with Felicia (2009) ; Johnson, Adams, and Cummins, (2012) ; Johnson et al., (2010); de Freitas (2006) and Beggs et al., (2009) agree that digital games have what are needed to be used as instructional tools because they provide feedback to students and experiential learning as well as strengthen the students' retention and develop their problem solving skills.

Finding that teachers strongly support digital games based learning, triggered the importance of finding whether their views were influenced by any demographic variables. But, it was found through t-test and ANOVA that the gender or age had no influence on the teachers' point of view as (Table 11) shows.

Table 11: T-Test for Teachers' Attitudes by their Gender

	Male (N=139)		Female (N=134)			
Constructs	Mean	SD	Mean	SD	T	P-value
Collaborative tool	3.5755	.77377	3.5597	.83231	0.163	.871
Motivation tool	3.8115	.66497	3.7881	.71955	0.280	.780
Instructional tool	3.7290	.69686	3.7139	.74441	0.173	.863

However, the study discovered that the experience (or lack of it) of employing games in learning had played a part in forming teachers' perceptions (Table 12, Table 13).

Table 12: 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
Collaborative tool	3.8470	.77118	3.4874	.79383	3.137	.002*
Motivation tool	3.9869	.74464	3.7462	.66713	2.418	.016*
Instructional tool	3.8852	.81680	3.6745	.68359	2.028	.044*

Note: P < 0.05.

Table 13: 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
Collaborative tool	3.7778	.81783	3.4967	.78540	2.543	0.012*
Motivation tool	3.9797	.75704	3.7392	.65828	2.523	0.012*
Instructional tool	3.8913	.79871	3.6642	.68299	2.284	0.023*

Note: P < 0.05.

The above statistical analysis shows an association between the influence of having an experience of using digital games in classroom and having favorable attitude toward using them in teaching for motivating the students, creating collaborative learning environment and being used as an instructional tool.

LIMITATIONS

The major limitation that may have constrained the study is time and resources. With more time and resources, the sample size could have been extended to cover a larger number of respondents at universities and colleges throughout Malaysia, instead of relying on responses from 5 universities. And with anonymity to be maintained, follow-up with non-responding participants could not be carried out. Short of time and cost did not allow the researcher to seek additional methods of data collection such as interviews which could have made added strength to the data collected through the survey questionnaire. Furthermore, technical problems related to emailing process had to be tackled.

CONCLUSION

Utilizing new IT and communication technologies in higher education is very important to enhance learning for the benefit of today's students, or the "digital natives" (Prensky, 2001, 2005), who are not only adept to such technologies but spend considerable time on them getting entertainment and knowledge. Digital games for learning are one of these technologies that researchers around the world are increasingly becoming interested to see them in prevalent use by the education systems of all levels, from kindergarten to university.

But intent of such adoption must begin with understanding the teachers' thinking about digital games; and so the basic question would be: What is the perception and attitude of teachers towards digital games? In another word, would they be for or against the idea of introducing digital games in their classrooms and how do university teachers in Malaysia differ in their views about digital games potentials by such variables as age, gender, academic discipline and others sets of independent variables?. In Malaysia, this fundamental issue has not been researched adequately and so this study was carried out to explore it through a questionnaire survey.

This study found that the surveyed university teachers in Malaysia have positive attitude towards using digital games as a motivational, an instructional and a collaboration tools with teaching and learning in higher education. This positive attitude suggests that teachers are supposedly willing to start integrating and utilizing digital game in their teaching efforts.

The findings and the results of this study can be a starting point to any future research related to the usages of digital games in higher education in Malaysia. For instance, this study shows that the teachers have positive attitudes towards digital games, yet very few have used digital games in their teaching. Why? There are barriers and that is the critical issue hindering the integration of digital games into classroom teaching and learning at higher educational institutions in Malaysia.

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