PERCEPTION OF YOUNG ADULTS ON ONLINE GAMES: IMPLICATIONS FOR HIGHER EDUCATION

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ABSTRACT
The purpose of this study is to identify and categorize the perceptions of young adults before we allocate the resources to design, develop, and implement digital game-based learning in higher education institutions in Taiwan. Q-methodology was conducted for this study because it is a quantitative analysis of subjective data. Thirty young adults from a university were surveyed and asked to rank-order 30 statements about online games. Factor analysis was used to identify the number of factors and the correlation study attempts to identify the individuals who are highly correlated with one another in each specific factor. The data were processed and analyzed following the usual steps of Q-methodology by using the PQMethod software. Three operant factor types (i.e. New media resisters, Pajamasocializers, and Game value resisters) were identified. The findings of this study can help higher education institutions to be aware of the negative and positive attitudes toward online gaming.

Key words: Nominal Group Technique; Massively Multiplayer Online Role Playing Game MMORPG.

INTRODUCTION

Massively Multiplayer Online Role Playing Game (MMORPG) is becoming a form of both entertainment and socialization for the youth. Online games have become part of the educational, social and cultural activities for the Net Generation. Despite the fact that online games are still held in low regard by a majority of public critics, a growing amount of research indicates that games have promising potential as learning tools (Gee, 2003; Squire, 2003; Shaffer, Squire, & Gee, 2005). The needs and demands of Net Generation students are changing rapidly. Today, students not only expect traditional e-learning with accessibility and availability, but also demand multiple forms of interaction and individualization in distance education programs (Chang & Lee, 2010). What the future of e-learning holds is yet to be known, but much attention has be directed toward integrating features of online gaming systems into the e-learning environment in order to meet the new demand of learners.

Numerous studies have shown that digital game-based learning is the next generation's educational media (Foreman, 2003; Oblinger, 2004; Squire, 2005). In traditional e-learning, educators tend to focus on how much *information* is transferred to the learners via streamed-video lectures, lecture notes posted online, discussion on chat boards, and e-mail communication with instructors. For digital game-based learning, the main focus is multiple forms of interaction with instructors, learners, and the learning content itself. Fundamentally, the primary challenges for instructional designers become how *knowledge* is acquired and possibly distributed, shared, and created within the online community. The curriculum design is no longer "one size fits all," but rather that the learning content is customized for each individual in digital game-based learning programs. Thus, there is increasing emphasis on community, simulation, customized curriculums, constructivistic learning, and social-cultural learning experiences in this new paradigm of e-learning. This new paradigm of e-learning has challenged our fundamental perception of education and games and our role in it. Subsequently, it has the potential to reshape the future of higher education in order to adapt to new demands from learners.

However, despite enormous investments in online learning technologies, most of the available data showed that one of the major obstacles to e-learning is culture resistance. As we look at the worth of online games in higher education**,** the question that needs to be asked is this: If we level the playing field in e-learning and use online

games as the next generation of educational media, will the students utilize this method? This is especially so because these virtual worlds involve significant development costs and continuous development processes. Consequently, the purpose of this study is to identify and categorize the perceptions of young adults before we allocate the resources to design, develop, and implement digital game-based learning in higher education institutions in Taiwan. Therefore, the research questions that guide the study are as follows:

1. What are the subjective opinions of university students in Taiwan on online games?
2. What are the factors that represent university students who share similar patterns of thoughts? How many factors are there?

METHODOLOGY

Measuring Subjectivity

Q-methodology was chosen for this study because it is a quantitative analysis of subjective data. In this study, the instrument was developed based from the in-depth interviews. In addition, factor analysis is used to identify the number of factors and the correlation study attempts to identify the individuals who are highly correlated with one another in each specific factor (Brown, 1992; Brown; 1993; Brown, 1994-1995; Brown, 1996; Brown, 1997)

Participants

The Q-sorts include 30 young adults ranging in age from 19 to 25 years old. Twenty (66.7%) of the respondents were males; the other ten (33.3%) were females. Fifteen (50%) of the respondents were gamers; the other 15 (50%) were non-gamers. The respondents spent time online ranging from one to ten hours daily. In this study, the daily average of hours spent online for the student group is 3.70 (SD = 2.22).

Procedures

The participants were recruited from a private university in Taiwan. First, concourse (viz., a set of comprehensive statements) was collected to reveal the possible paradigms via the first interview with university students. The research instrument, Q-sample in this study, was developed based on the results of the first interview (i.e. Nominal Group Technique was used for this interview) and through literature review. In this study, the Q-sort design is with 9 piles (-4 through +4, with frequencies 2-3-3-4-6-4-3-3-2). The Q-sort design regulates the exact number of statements that a respondent can put into each pile in the continuum. Each participant sorted 30 statements in the Q-sample according to those with which they most agree (+4) to those with which they most disagree (-4). In other words, participants constructed their viewpoints in Q-sorts on the sorting answer sheet (see Figure 1).

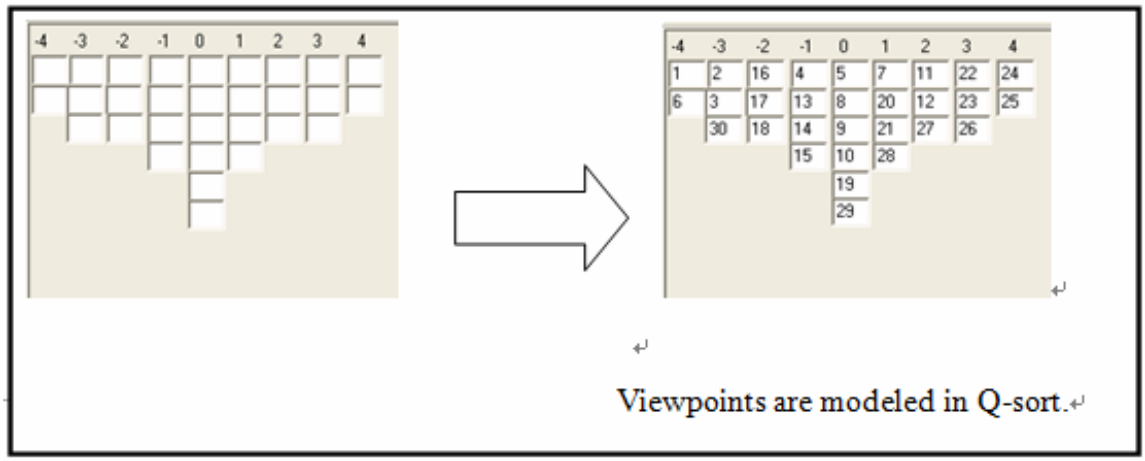

Figure1. Q-sorting

Before sorting, the Q-sample is indeterminate. When a participant sorts the opinion statements, the Q-sample is altered from an indeterminate condition to a determinant one. Each completed Q-sort is a record of an individual's state of the mind. Eventually, 30 students were interviewed and 30 Q-sorts were collected. The 30 Q-sorts were processed and analyzed following the usual steps of Q-methodology by using the PQMethod software. Correlation, centroid factor analysis, and judgmental rotation (hand rotation) were employed to derive significant factors. Overall, three operant factor types were identified.

RESULTS

The analysis of students' Q-sorts which yielded three distinct factor groups: (1) Factor A: New Media Resisters, (2) Factor B: Pajamasocializers, and (3) Factor C: Game Value Resisters. Twenty-three (76.7%) of the 30 students' Q-sorts were divided into the three operant factors. Of the remaining seven Q-sorts, one was not considered to be statistically significant (loadings less than 0.36 on these three factors) and another six were confounded; that is, loading significantly on more than one factor.

It should be noted that more than half of the 23 students whose Q-sorts were analyzed were identified as the New Media Resisters. Of all the factors, A is the most against online gaming philosophically. In contrast, Factor B contains eight Q-sorts (34.7%) and is the most committed advocate of online gaming. The remaining three Q-sorts in Factor C are identified as the Game Value Resisters. Overall, the operant factor structure for the student group is listed and explained as follows (see Table 1):

Table 1. Factor Structure for Student Group (*)

ID.	Gender	Age	Hours spent online daily	Player	Rotated Factors		
					Factor A	Factor B	Factor C
027	M	2	2	Y	69		
025	M	2	2	Y	66		
017	M	2	1	Y	66		
030	F	2	2	N	61		
015	F	2	3	N	60		
018	F	1	3	N	59		
022	M	2	3	N	59		
023	M	2	1	N	58		
010	M	2	2	N	54		
001	M	2	2	Y	53		
019	F	2	1	N	49		
026	M	2	1	N	47		
006	F	2	2	Y	39		
012	F	2	2	Y		79	
014	M	2	2	Y		68	
011	M	2	1	Y		61	
004	M	2	2	Y		60	
024	M	2	2	N		55	
002	M	2	3	Y		50	
003	M	2	3	N		48	
013	M	2	1	Y		45	
016	M	2	1	N			60
029	F	2	1	N			51

(*) only significant loadings shown ($p<.01$), decimals omitted; 7 undefined Q-sorts are not included. M: Male; F: Female; Y: Yes; N: No; Age 1: under 20 years old; Age 2: 21-25 years old; Hours spent online daily 1: 1-2 hours; Hours spent online daily 2: 3-4 hours; Hours spent online daily 3: above 5 hours.

Factor A: New Media Resisters

Group A, the largest factor group extracted, is comprised of 13 respondents representing 56.5% of the P-sample. Of the Q-sorts in Factor Group A, there are: eight male and five female; five players and eight non-players. Twelve participants range from 21 to 25 years old and one is under 20 years old. In addition, there are four participants who spend one to two hours online daily, six participants who spend three to four hours online daily, and three participants who spend more than five hours online daily. Overall, the following statements are the most highly ranked statements (+4) for factor A (see Table 2):

- Playing online games is a waste of time.
- Gaming reduces the time available for studying, which can negatively impact academic performance.

Members of Group A agreed, but slightly less so (+3) with the following:

- Players might stay up for playing online games. Playing day and night will cause health problems, as well as nearsightedness and other vision problems.
- Playing online games is a waste of money.
- Individuals are vulnerable to Internet addiction while gaming. If players are addicted to the virtual world, this would lead to social withdrawal in real-world.

In contrast, members of Group A disagreed strongly (-4) with the following:

- There are jobs and ranking ladders within players' role-play, which will help players to develop their managing and organizing skills.
- Playing online games can improve reaction time, enhance real-time judgment skills, stimulate brain activities, enhance logical thinking, and improve eye-hand coordination.

And disagreed, but to a lesser degree (-3) with the following statements:

- Playing online games can develop typing skills; playing an English version of an online game can improve English proficiency and can also allow joining gaming competition abroad
- Playing online provides an environment that allows individuals to become familiar with computers and develop computer literacy. It helps players to develop interest in computers.
- Virtual society. I think online games become virtual social communities, which allows players to learn and solve real-world problems in a simulated environment. Players' game characters battle and interact with their opponents' game characters in online games and the players' character interacts with what appear to be other humans in real life.

Compared with the other factor groups, Factor A contains more Q-sorts of females (N=5) and Q-sorts of non-gamers (N=8). Interestingly, five (71.4%) out of seven female participants are in Group A. Of all three factors, members of Group A are the most averse to online gaming, believing that online gaming is related to educational decay, social-isolation, health problems, Internet addiction, and family problems. Factor A participants do not recognize the positive aspects of online gaming, such as social interaction in gaming and players' physical and psychological development. Though members of Group A hold the common stereotypes about online gaming, they do value online gaming as it stimulates the development of the software industry. In addition, they are aware of the popularity of online gaming on higher educational campuses. It is noteworthy that members of Group A are philosophically opposed to online gaming. However, they have a high perceived value of the technical features of online gaming (i.e., graphic design of characters and scenes, sound effects of motion pictures, and role-plays).

Also, it is worth mentioning that there are five gamers (45.4% of the gamer population) who are also the resisters of online gaming in Factor A. The researcher had further interview with these respondents to ensure the research results are consistent with the data collected after interpreting the factors. This finding may be due to the fact that these university students know they do not like online gaming but are asked by their peers and university classmates to explore the virtual gaming world together. In other words, they play games because they want to improve friendships with their existing peers. They play games because it is a common topic among students' peer groups. Their opinion profiles reveal that they show strong negative feelings about online gaming, but they see that online games have brought friends together for shared play and interaction.

Factor B: Pajamasocializers

Group B, representing 34.7% of the P-sample, is comprised of eight respondents. Of the Q-sorts in Factor Group B, there are: seven male and one female; six players and two non-players. Interestingly, six (75%) out of eight participants in Group B are gamers. Members of group B are all 21 to 25 years old. In addition, there are two participants who spend one to two hours online daily, four participants who spend three to four hours online daily, and two participants who spend more than five hours online daily. Overall, the following statements are the most highly ranked statements (+4) for factor B (see Table 2):

- The visualizations, 3D graphic design, and sound effects of motion pictures in online gaming are nice; the design of characters is cute; the design of the scenes is vivid and sophisticated.
- Many university students play online games. Online gaming is a common topic among students' peer

groups.

Members of Group B agreed, but slightly less so (+3) with the following:

- Playing online games is a waste of time.
- Gaming is highly interactive. Individuals can play their own roles, organize a team for adventures, and accomplish tasks in order to gain experiences and advance in levels.
- Playing online games can improve reaction time, enhance real-time judgment skills, stimulate brain activities, enhance logical thinking, and improve eye-hand coordination.

In contrast, members of Group B disagreed strongly (-4) with the following:

- Some online games contain too much sex or violence. Thus, they are not suitable for everyone to play.
- I think online game play will lead individuals to isolate themselves from other family members. It will raise concerns on family relations.

And less so (-3) with the following:

- Playing online games can make money (selling an account number and virtual objects).
- Playing online games will stunt brain activities and people will become very stupid.
- I feel online games only target those specific groups of people in Internet cafes and only target youth. The market is not fully penetrated yet.

Compared to the other factor groups, Group B has higher percentages of gamers (N=6) and males (N=7). Of all three factors, members of Group B are the most optimistic about the social, technical, psychographic, and behavior benefits of online gaming, including the multimedia design, interactivity and social learning, higher order thinking and eye-hand coordination, instant feedback, self-affirmation, multiple identities, and anonymous companionship. Factor B participants do not recognize the common stereotypes and negative aspects of online gaming such as parent-child communication problems, social isolation, violence and violent acts within the games, internet addiction, educational decay, and stunted brain development.

Group B participants are aware of the popularity of online gaming on higher educational campuses. In addition, they don't consider gamers to be limited to young people and believe that the current gaming market already includes various demographic subgroups. In other words, there are different age-groups of gamers existing in the virtual world.

Factor C: Game Value Resisters

Group C is comprised of two respondents. Of the Q-sorts in Factor Group C, there are: one male and one female; two non-gamers. Both members in Group C are 21 to 25 years old. Both participants spend one to two hours online daily. They identified strongly (+4) with the following statements (see Table 2):

- Playing online games is a waste of time.
- Playing online games is a waste of money.

Members of Group C agreed, but less so (+3) with the following:

- Until now, there has been no online game rating or age regulatory system for players. The government is too slow and too far behind to develop online gaming-related policies.
- Online games, with a lot of hidden online crime, have increased problems in society.

On the other hand, members of Group C disagreed strongly (-4) with statements:

- The higher the level, the higher the achievement. For pursuing victory, individuals will keep playing continuously.
- Online games occupy Internet broadband usage and waste public resources. Online games have not much value – we should not give them too high a regard or over-promote online games.
- I think online games ensure privacy and anonymity. They provide a form of escape and help players forget about the real world troubles and pressures, as well as being an activity for killing time.

And less so (-3) with the following:

- Some online games contain too much sex or violence. Thus, they are not suitable for everyone to play.
- I think online game play will lead individuals to isolate themselves from other family members. It will raise concerns on family relations.
- I will be in a good mood if my avatar is dressed appealingly - those virtual objects make me feel gorgeous!

Group C participants deem online gaming a waste of time and money. However, they still recognize a few benefits and positive effects of online gaming, such as enhanced typing skills and language proficiency. Apparently, they still see some value in gaming. In addition, they do not appear to be concerned over the contents of online gaming (i.e., violent behavior) nor the parent-child communication problems. In fact, this group is quite concerned about gamers' social isolation issues, the crime in the virtual world, and the slow development of government policy related to online gaming.

Consensus Statements

Taking the analysis as a whole, this study reveals various perceptions about online games and three factor types are identified in this study: (1) New Media Resisters, (2) Pajamasocializers, and (3) Game Value Resisters. Overall, the students' statement scores by factors/opinion types, generated by the PQmethod statistical software, are shown in Table 2. However, consensus statements between Factors A, B, and C are twofold. The most agreed upon statement among all three factors was "Playing online games is a waste of time." They reveal that those students in Group A, B, and C do not recognize the practical value of playing online games.

In addition, the most disagreed upon statement among all three factors was "I think online games only target those specific groups of people in Internet cafes and only target youth. The market is not fully penetrated yet." Those respondents believe the online gaming industry has already targeted market segments besides the subgroup of youth and the submarket of gamers in Internet cafes.

Table 2. Student Group's Statement Scores by Factors/Opinion Types

Statements	Factors(*)		
	A	B	C
1. The visualizations, 3D graphic design, and sound effects of motion pictures in online gaming are nice; the design of characters is cute; the design of the scenes is vivid and sophisticated.	2	4	0
2. Playing online games is a waste of time.	4	3	4
3. Many university students play online games. Online gaming is a common topic among students' peer groups.	2	4	0
4. Playing online games can make money (selling an account number and virtual objects).	-2	-3	1
5. Playing online games can develop typing skills; playing an English version of an online game can improve English proficiency and can also allow joining gaming competition abroad.	-3	-1	2
6. Gaming reduces the time available for studying, which can negatively impact academic performance.	4	-2	2
7. Online gaming is one way of making new friends. People who come from different places or players who have the same interests can chat, disclose their feelings, and care for each other online. Also, fellow players sometimes meet each other and have fun together in the real world.	-1	2	1
8. Players might stay up for playing online games. Playing day and night will cause health problems, as well as nearsightedness and other vision problems.	3	0	1
9. Some players often voluntarily help fellow players in online games, such as guiding the way, lending tools and equipment, teaching how to reach the next level. Some players voluntarily share their experiences battling monster and level-up know-how for other players as reference guides on gaming-related web sites.	-1	1	-1
10. Until now, there has been no online game rating or age regulatory system for players. The government is too slow and too far behind to develop online gaming-related policies.	0	1	3
11. Playing online provides an environment that allows individuals to become familiar with computers and develop computer literacy. It helps players to develop interest in computers.	-3	-1	0
12. There are jobs and ranking ladders within players' role-play, which will help players to develop their managing and organizing skills.	-4	0	0
13. Playing online games will stunt brain activities and people will become very stupid.	0	-3	1

14. Gaming is highly interactive. Individuals can play their own roles, organize a team for adventures, and accomplish tasks in order to gain experiences and advance in levels.	0	3	-1
15. Some online games contain too much sex or violence. Thus, they are not suitable for everyone to play.	0	-4	-3
16. I think online game play will lead individuals to isolate themselves from other family members. It will raise concerns on family relations.	1	-4	-3
17. The higher the level, the higher the achievement. For pursuing victory, individuals will keep playing continuously.	-1	1	-4
18. I think online games only target those specific groups of people in Internet cafes and only target youth. The market is not fully penetrated yet.	-2	-3	-1
19. Online games can stimulate the development of the software industry.	1	1	-1
20. Virtual society. I think online games become virtual social communities, which allows players to learn and solve real-world problems in a simulated environment. Players' game characters battle and interact with their opponent's game characters in online games and the player's character interacts with what appear to be other humans in real life.	-3	2	-2
21. Playing online games can improve reaction time, enhance real-time judgment skills, stimulate brain activities, enhance logical thinking, and improve eye-hand coordination.	-4	3	-1
22. I will be in a good mood if my avatar is dressed appealingly - those virtual objects make me feel gorgeous!	-2	0	-3
23. Online games occupy Internet broadband usage and waste public resources. Online games have not much value – we should not give them too high a regard or over-promote online games.	0	-2	-4
24. Playing online games is a waste of money.	3	-1	4
25. Online games, with a lot of hidden online crime, have increased problems in society.	2	0	3
26. Individuals are vulnerable to Internet addiction while gaming. If players are addicted to the virtual world, this would lead to social withdrawal in real-world.	3	-1	0
27. I think online games ensure privacy and anonymity. They provide a form of escape and help players forget about the real world troubles and pressures, as well as being an activity for killing time.	-1	0	-4
28. I think online games will lead users to a degree of social withdrawal and have anti-social behaviors toward society. It has a negative impact on players' human relations in general.	1	-2	2
29. Security issues are a very high concern, because accounts, passwords, and virtual objects are easily stolen.	0	0	2
30. Online games provides different role-plays and players can assume a "reinvention of self" and experience different identities which are distinct from their real life. Players can self-manipulate and control what they cannot achieve in offline settings. I think online games satisfy personal imagination and fantasy.	1	2	-2

* Item rankings: -4 = most unimportant in this sample; 0 = ambivalent; +4 = most important in this sample

DISCUSSION AND CONCLUSION

The Group A participants (56.5% of the students) are philosophically opposed to online gaming. Group A participants reacted affirmatively to most of the negative statements about online gaming. Furthermore, those Group B respondents, representing 34.7% of the student group, are the supporters of online gaming who had high philosophical value ratings and high technical value ratings in this study. In addition, members of Factor C have more neutral attitudes toward online gaming. They think that video games have some negative effects, but also have some benefits. Interestingly, this research does find evidence of some negative perceptions of gaming, but closer examination with those gamers (i.e. gamers in both the New Media Resisters' group and the Pajamasocializers' group) reveals that online gaming is a valuable social learning tool.

This study began with the premise that today's university students recognize the positive effects of online games, however, the following conclusions from my study reveal a very different picture: (1) most of the students are philosophically against online gaming; (2) online games are a social activity and an interactive medium; (3) the concerns of female students need careful consideration. Accordingly, the findings indicate that respondents' attitudes about online gaming are not affected by age or by hours spent online daily, but by gender and prior game-playing experiences.

1. Most of the students are philosophically against online gaming.

   The results of this research have illustrated that the majority of university students (approximately 56.5% of the participants) are philosophically against online gaming. Based on the findings, we can no longer assume

that all of the university students demand a game-based learning environment. In other words, online gaming will attract some learners while repelling others, as previous literature explained (Squire, 2004), especially, individuals who perceive both a low philosophical value and a low technical value toward gaming.

2. Online games are a social activity and an interactive medium.
The gamers in Pajamasocializers are the most optimistic about the social benefits of online gaming. In addition, those gamers in the New Media Resisters' group explained that online gaming is a social gathering place for youth. It helps players to improve friendships with their existing peers. Therefore, as evidenced by those gamers in both the New Media Resisters and the Pajamasocializers, online gaming is a social learning tool and it provides multiple forms of interaction.

3. The concerns of female students need careful consideration.
Overall, the findings of this study provide new information that female students may not choose to engage in digital game-based learning methods. Most of female students do not recognize the positive aspects in online gaming. And they also hold the common stereotypes about gaming. This study suggests the gender differences in the gaming worlds. In other words, the concerns of female students need careful consideration. In fact, this research suggests that females may be socially against video games or are likely to have psychological barriers when gaming in public. Therefore, an attention should be paid to gaming narratives, graphic design, game characters, and story structure. Especially because the gaming industry, game worlds, and education policy makers are usually male-dominated, such information can be useful to game developers and higher education administrators as they recruit more females to make strategic decisions about games design and digital game-based learning projects in the curriculum.

FINAL THOUGHTS: INNOVATION FOR LEARNING

In this internet economy era, school administrators face a number of challenges, one of which is how universities ought to relate to media. In this study, the researcher has gathered data to diagnose internal realities in universities. This research indicates that the majority of students showed negative feelings about online gaming. Should schools turn their backs to emerging media? This research does not propose that this is the end of the story for digital game-based learning. Clearly, if schools are going to face demands for change, they should also be sensitive to the external realities, especially in this networked, global world.

Generally speaking, it is unlikely that the trend and the development of digital game-based education will abate in the foreseeable future as the literature review suggested previously. Few young learners today live in a home without a computer and few of today's elementary school students in countries such as Taiwan and South Korea have known a world without video games. Research universities are continuously facing competition from profit-oriented institutions. More and more companies, such as Microsoft, are looking at the value of online games for educational use. Higher education institutions must be prepared for what lies ahead. Based on this understanding, one of the biggest challenges facing higher education today is how to achieve student satisfaction and retention in a cost effective manner against tough competition. Certainly, online games cannot be a complete substitute for textbooks on campus at this stage, but they could be an alternative for learners with different learning styles. As a matter of fact, information technology is not always a cure for all the challenges we are facing on university campuses; however, it signals a new era for higher education in this twenty-first century.

IMPLICATIONS FOR HIGHER EDUCATION

After the e-learning boom went bust, university online education was left facing a host of unrealized threats and opportunities, from digital game-based learning to mobile learning. Where will the e-learning program go from here, and who will drive it forward? Consequently, it is vital for higher education institutions to be aware of the negative and positive attitudes toward online gaming indicated in the research findings. Based on the results of the study, recommendations for further research for universities which intend to encourage the implementation of digital game-based learning are listed as follows:

1. Minimizing uncertainty and risk
   - Universities should consider how to encourage the acceptance of digital game-based learning among female students. More female game designers should participate in digital game-based learning projects. More female students should be invited to join the games during the beta-testing stages in order to get their feedback.

2. Ensuring the Quality of Digital Game-Based Programs
   - Attention should be paid to gaming narratives, story structure, characters, and graphic design.

Therefore, it will be well accepted by a diverse and multicultural population of students and faculty in higher education institutions in order to stress racial, gender, and culture diversity in the virtual world.

- Online gaming oftentimes does not match the assessment criteria in most of national testing. Universities should consider how students, teachers, and school boards would criticize or accept the notion of playing games in formal educational settings since such process-oriented and socio-cultural approaches (i.e., Deweyian pragmatism) have a troubled history of implementation in the standard national curriculum.

- Higher education institutions should have a proper balance between the formal and the informal modes of education, a proper balance should be created between theory and practice in the virtual world, and a proper balance should be designed between learning content and context in digital game-based learning programs. Curriculum designers and game designers should work closely in order to assure the quality of the programs.

- In order to provide scaffolding experiences to learners, universities should employ some experienced individuals or subject matter experts (i.e., practitioners or retirees in that subject area) to act as game masters (GM) in the virtual world; so that personal support and adequate responses can be provided simultaneously in the virtual world.

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