

# A Comparison of the Online Learning Activities and Learning Style Preferences of Young Adult Video Game Players and Nonplayers

Soonhwa Seok<sup>1</sup> & Boaventura DaCosta<sup>2</sup>

<sup>1</sup> Korea University, Seoul, Korea

<sup>2</sup> Solers Research Group, Orlando, FL, United States

Correspondence: Soonhwa Seok, Korea University, 145, Anam-ro, Seongbuk-gu, Seoul, 136-701, Korea. Tel: 82-2-3290-1152. Fax: 82-2-3290-1655. E-mail: sunaseok@yahoo.com; bada7@korea.ac.kr

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## Abstract

A study is presented that compared the online learning activities and learning style preferences of video game players and nonplayers. A total of 1,258 students across seven postsecondary institutions near Seoul, South Korea, rated their experiences with video game play alongside their online learning activities and preferences toward learning styles that share characteristics with many of today's games. Utilizing a causal-comparative approach, descriptive and inferential statistical analyses were used to quantitatively examine the groups. At first glance, the findings revealed that the players were more involved in online learning activities than the nonplayers. Namely, the players (a) took more online courses and/or training per year; (b) shared ideas, documents, information, and/or knowledge online; (c) read and/or contributed to blogs; (d) used the Internet to complete school assignments; and (e) used email, instant message, chat (or other means) to communicate with instructors and peers. However, further examination revealed that the nonplayers held a stronger preference than the players for most of the learning styles examined. That is, the nonplayers preferred online courses and/or training that (a) presented graphics before text; (b) provided opportunities to multitask; (c) offered the ability to selectively access different parts of courseware, rather than linearly stepping through; and (d) were play- rather than work-centric. Although exceptions were found, on the whole, these findings suggest that arguments about today's youth and their different learning preferences, as a result of exposure to and experience with technology, to include video games, may be premature and much more in-depth empirically supported research is needed before definitive conclusions can be safely drawn.

**Keywords:** learning style preferences, online learning, video games

## 1. Introduction

There is a widespread belief that today's youth are profoundly different from those of past generations. Among the many assertions to that effect, one of the more prominent has been that today's youth process information differently as a result of spending their entire lives engrossed in the technological advancements of the late twentieth and early twenty-first centuries. Some have even argued that they demonstrate preferences for learning styles never before seen (Prensky, 2001a, 2001b). In fact, it has been offered that the digital information age has left today's youth so drastically different from those of previous generations that education is not able to keep pace (Oblinger & Oblinger, 2005).

While information and communication technology (ICT) is often cited as a cause and discussed in the context of this shift in learning among young people, video games are also one of the technologies considered to have contributed to the distinct learning style preferences of today's youth (Prensky, 2006). Indeed, some advocates of game-based learning view the role these games play in shaping how youth process information as being so important that they argue that "the young people of today understand instinctively that their games are their very best teachers" (Prensky, 2003, p. 3). Given the argument that today's youth prefer to learn by playing video games over traditional approaches, it stands to reason that differences should exist in the learning style preferences between those who play video games and those who do not. Put more simply, video game players should show a greater preference for nontraditional learning styles than their nonplayer counterparts.

This theory should not come as a surprise. Although considerable research on video games has focused on their

psychosocial implications (e.g., aggressive thoughts or feelings and violent play; see DeLisi, Vaughn, Gentile, Anderson, & Shook, 2012; Elson & Ferguson, 2013), this has not discouraged educators, practitioners, researchers, and others from studying how these games can be used to facilitate and achieve a variety of learning outcomes (Kebritchi & Hirumi, 2008). Thus, there is an impetus, for instance, to investigate game play from the perspective of well-designed learning experiences (Gee, 2007; Squire, 2004), and the application of established instructional strategies and theories in the design of these games to promote learning (Kebritchi & Hirumi, 2008), to include consideration of learning preference (Gee, 2007), as style is often mentioned in the context of individual learning differences, considered to be one of the factors that help influence learner achievement (Özyurt, Özyurt, & Baki, 2013).

Nevertheless, such broad statements about today's youth and their interest in the use of technology as part of the learning process, to include video game play, has not been accepted without scrutiny. Referred to by many as an "overly simplified characterization of an entire generation" (Nasah, DaCosta, Kinsell, & Seok, 2010, p. 532), it has been argued that the use of technology among youth is, in fact, much more limited in scope (Selwyn, 2009), with research to suggest that young people do not expect or want to use technology in education the same way as they do at home or in the community (Lohnes & Kinzer, 2007). Furthermore, the scholastic potential of video games to enhance learning has and continues to be the subject of fierce debate (Guillén-Nieto & Aleson-Carbonell, 2012). For instance, some studies suggest that video games can be a powerful learning medium (Kirriemuir & McFarlane, 2004). At the same time, other studies brand playing these games as a mind-numbing activity that dissuades young people from their studies (Kirriemuir & McFarlane, 2004).

In part, because many of them have not been subject to empirical scrutiny. Altogether, these viewpoints create misgivings, casting doubt that today's youth are radically different from those of prior generations when it comes to learning and, consequently, raising questions about the distinct learning style preferences these individuals are believed to exhibit.

### *1.1 Purpose of the Study*

Toward bettering our understanding of this new proposed learning paradigm among today's young people, we present a study that quantitatively examined the learning style preferences of video game players and nonplayers. Specifically, we asked the question: *Do those who play video games place a greater importance on nontraditional learning styles compared to those who do not play?*

To answer this question, we compared the online learning activities and learning style preferences of video game players and nonplayers. Learning styles were selected that shared the characteristics of many of today's widely played video games. Predicated on the suppositions made about young people, we hypothesized that differences existed between those who played video games and those who did not. Namely, we theorized that video game players were more involved in online learning activities than nonplayers. Furthermore, we conceived that gamers held a stronger predilection toward certain learning styles than those who did not play.

The purpose of this investigation was not to enter the debate on the use of video games in the classroom. Instead, our goal was to offer educators, practitioners, researchers, and other stakeholders further empirical evidence on the online learning activities and learning style preferences of today's technology-savvy youth.

Finally, the term *video game* is ambiguous and can be defined in many different ways. In this investigation, the term is used to refer to any "digitally based game." This definition is independent of other factors, including genre (e.g., action-adventure, role-playing) and platform (e.g., console, dedicated hand-held, mobile device, personal computer).

## **2. Method**

### *2.1 Setting*

The study took place in 2011 at seven postsecondary institutions in and around Seoul, South Korea. The country of South Korea was chosen as the location for this research because of the popularity of video games among its youth (see Seok & DaCosta, 2012).

### *2.2 Participants*

Of the 1,400 students solicited, 1,258 agreed to participate. As expected, the majority of the participants were of college age, with 86.6% ( $n = 1,089$ ) within the 19-to-29 age bracket. Among the remaining "nontraditional students," 4% ( $n = 50$ ) reported to be 30 to 39 and 5.6% ( $n = 70$ ) to be 40 years old and older. Although it cannot be ascertained from the data, it could be assumed that this 30-and-older segment of the sample were postgraduate students (the graduate equivalent in the United States), whereas those 19 to 29 were graduates (the undergraduate

equivalent in the United States). Only 3.3% ( $n = 41$ ) reported to be younger – 18 years of age.

The sample was almost evenly distributed by gender, with 50.6% ( $n = 637$ ) being female and 47% ( $n = 591$ ) male. In terms of family annual gross income, as reported by the participants, 36.1% ( $n = 454$ ) of households earned \$60,000 or more, followed by 35% ( $n = 439$ ) earning \$40,000 to \$59,999, and 19.2% ( $n = 241$ ) earning \$20,000 to \$39,999. Further, 57.9% ( $n = 728$ ) of households comprised four family members, followed by 19.1% ( $n = 240$ ) having five or more, and 18.5% ( $n = 233$ ) with three. Finally, with regard to participants' area of study, 22.9% ( $n = 288$ ) studied education, followed by 12.5% ( $n = 157$ ) studying business and 7.9% ( $n = 100$ ) studying healthcare.

### 2.3 Materials

The instrument consisted of a 54-item questionnaire, based on the Digital Propensity Index (DPI; Nasah et al., 2010), designed to measure the degree to which people use ICT in their everyday lives (Henderson & Hirumi, 2005, as cited in Norman, 2008). Updated to reflect technology not available at the time when the index was conceived, the questionnaire used in the present study investigated the use of blogs, email, gaming, instant messaging, online shopping, smartphones (voice and text), and social media, as well as the downloading, sharing, and streaming of media. Online learning activities and preferences were also examined along with demographics.

Not all the items in the questionnaire were used in this study, and consequently, reported here. Instead, a subset of the items measuring video game play, online learning activities, and learning style preferences were used in the statistical analysis. Demographic information was also examined.

#### 2.3.1 Reliability

Norman (2008) reported that the reliability of the DPI was ascertained during two pilot studies, both investigations showing that the instrument was reliable, with a Cronbach's alpha of .858 and .885. In both pilots, negatively correlated items and items with low correlations had been removed from the index. Extending the Norman (2008) reliability data, the questionnaire used in the current investigation was found to be trustworthy, with a Cronbach's alpha of .853 with the constructs measuring video game play, online learning activities, and learning style preferences revealing an alpha .773.

#### 2.3.2 Validity

Regarding validity, Norman (2008) noted that the DPI was based on Prensky's digital native and immigrant premise. That is, as propensity toward ICT increases, age decreases (digital natives); conversely, as propensity toward ICT decreases, age increases (digital immigrants; see Prensky, 2001a, 2001b, for an explanation of the digital native and immigrant concepts; and DaCosta, Kinsell, & Nasah, 2011, for an analysis of this thinking in the context of age).

Furthermore, Norman (2008) noted that learning styles were included in the DPI as a way to measure the digital native and immigrant differences proposed by Prensky. Namely, as propensity toward ICT increases, interest in the nontraditional learning styles described in this study increases, and as propensity toward ICT decreases, interest in these learning styles decreases. For example, digital natives are thought to place greater importance on learning that is play- rather than work-centric, whereas digital immigrants are thought to place greater importance on learning that is work- rather than play-oriented (see DaCosta, Nasah, Kinsell, & Seok, 2011, for an analysis of these characteristics). As a consequence, although we did not explicitly use the digital native and immigrant vernacular, the explanation of the learning styles offered in the discussion and analysis to follow is presented in the context of Prensky's work.

### 2.4 Procedure

The paper-and-pencil questionnaires were administered at each of the institutions by 10 volunteer undergraduate students assigned to one or more classrooms. The volunteers instructed participants to examine each item independently and give answers that truly applied and not what they would like to be true or what they thought others wanted to hear. Participants were allowed to answer the items in any order and to skip items altogether. All information was self-reported. Participants were allowed to withdraw from the study at any time.

### 2.5 Data Analysis

Both descriptive and inferential statistical analyses were performed. Pearson's chi-square tests of independence were used to explore differences between the players and nonplayers with regard to online learning activities. Mann-Whitney  $U$  tests were conducted to explore differences between the groups with respect to their learning style preferences, because the use of parametric statistics with Likert data is often controversial (e.g., Jamieson,

2004; Norman, 2010). An alpha of .05 was used to determine statistical significance. Finally, statistical analysis was conducted using SPSS 21.

### 2.6 Ethical Clearance and Informed Consent

Appropriate ethical consent was obtained from school officials. Participants 18 years of age and older willfully consented to participate in the study, and were treated in accordance with the American Psychological Association's (2002) *Ethics in Research With Human Participants*.

## 3. Results

For the purpose of statistical analysis, the 1,258 participants were placed into two groups according to their experience with video games: players or nonplayers. *Players* were participants who reported playing video games (this classification applied regardless of frequency of play), whereas *nonplayers* were those who reported that they did not play these types of games at all.

A causal-comparative design was adopted, given the participants were already predisposed to belonging to one of the two groups. Findings revealed that 36.3% ( $n = 457$ ) played video games and 63.3% ( $n = 796$ ) did not (missing,  $n = 5$ ).

### 3.1 Individual Differences

Prior to examining participants' online learning activities and learning style preferences, individual differences between the players and the nonplayers were studied. Specifically, age and gender were compared between the groups, along with frequency and type of video game play. This statistical analysis was conducted to gain a better understanding of the sample and the differences between the groups.

#### 3.1.1 Age and Gender

The two groups were almost evenly distributed by age. As depicted in Figure 1, the players (86%,  $n = 391$ ) and nonplayers (88%,  $n = 697$ ) were predominantly 19 to 29 years of age. Furthermore, the groups were almost evenly distributed by gender, but oppositely skewed. That is, males were mostly found among the players (60.4%,  $n = 276$ ), whereas females were predominantly found among the nonplayers (59%,  $n = 467$ ).

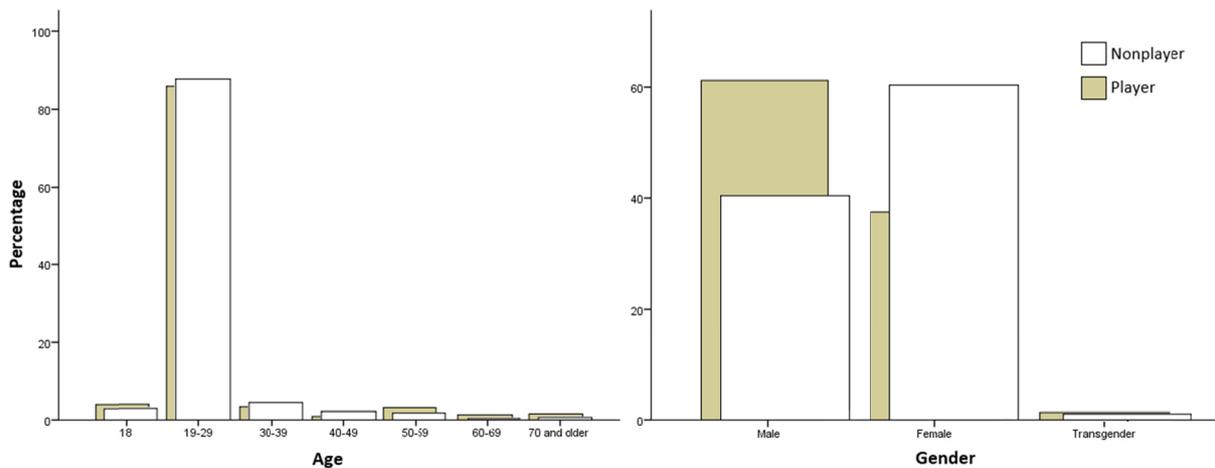


Figure 1. Player and nonplayer age and gender compositions

#### 3.1.2 Frequency of Play

With regard to frequency and type of video game play, as shown in Table 1, half (50%,  $n = 228$ ) of the players played (any kind) of video game on a weekly basis, a quarter (25%,  $n = 115$ ) played at least two to three days a week, followed by those who played daily (21%,  $n = 94$ ). With regard to the frequency with which different types of games were played, similar percentages were found among those who played offline (defined as not requiring an Internet connection and generally playable by one or two players), online (defined as requiring an Internet connection and typically playable by one or more players), and massively multiplayer online games (MMOGs; otherwise thought of as online games, but also viewed as an independent genre), with offline games slightly more popular (82%,  $n = 373$ ). Interest in educational games was almost evenly split among the players, with a slight majority (52%,  $n = 238$ ) solely citing entertainment reasons for their play. Of those who played

educational games, frequency of play was also closely divided among those who played these types of games only a finite number of times and those who played regularly, but in favor of those who had limited their playing to a handful of experiences (25%,  $n = 116$ ).

Table 1. Frequency and type of video game play among players

Items		
Play video games (any kind)	Weekly	228 (49.9%)
	2-3 days per week	115 (25.2%)
	Daily	94 (20.6%)
	More than 3 times per day	20 (4.4%)
Play offline (single or two player) video games	I do not play offline games	84 (18.4%)
	Weekly	200 (43.8%)
	2-3 days per week	82 (17.9%)
	Daily	68 (14.9%)
	More than 3 times per day	19 (4.2%)
	<i>Missing</i>	4 (.9%)
Play online (one or more player) video games	I do not play online games	88 (19.3%)
	Weekly	186 (40.7%)
	2-3 days per week	95 (20.8%)
	Daily	62 (13.6%)
	More than 3 times per day	25 (5.5%)
	<i>Missing</i>	1 (.2%)
Play MMOGs	I do not play MMOGs	110 (24.1%)
	Weekly	181 (39.6%)
	2-3 days per week	83 (18.2%)
	Daily	58 (12.7%)
	More than 3 times per day	24 (5.3%)
	<i>Missing</i>	1 (.2%)
Play educational games (any kind)	I only play games for entertainment	238 (52.1%)
	One or more times	116 (25.4%)
	Weekly	61 (13.3%)
	2-3 days per week	25 (5.5%)
	Daily	16 (3.5%)
	<i>Missing</i>	1 (.2%)

### 3.2 Online Learning Activities

A comparison between players and nonplayers revealed statistically significant relationships among all of the online activities examined, including (a) the number of online courses and/or training per year; (b) the sharing of ideas, documents, information, and/or knowledge online; (c) reading and/or contributing to blogs; (d) using the Internet to complete school assignments, and (e) using email, instant message, chat (or other means) to communicate with instructors and peers. Overall, it was the players who showed a stronger interest in all of the learning activities examined. These findings are supported by the aggregated responses shown in Table 2.

A statistically significant relationship was also found with regard to the number of online courses and/or training participated in per year,  $\chi^2(4, N = 1,243) = 47.16, p < .01$ , Cramer's  $V = .195$ . As shown in Table 2, more of the players (70%,  $n = 319$ ) than the nonplayers (58%,  $n = 459$ ) reported being involved in online courses and/or

training, with the biggest difference found among those taking 6 to 10 courses. This pattern was consistent with the other online activities. Thus, a statistically significant relationship was found with regard to the sharing of ideas, documents, information, and/or knowledge online,  $\chi^2(4, N = 1,244) = 28.11, p < .01$ , Cramer's V .15; the reading and/or contributing to blogs,  $\chi^2(4, N = 1,226) = 15.79, p < .01$ , Cramer's V .113; using the Internet to complete school assignments,  $\chi^2(5, N = 1,249) = 33.09, p < .01$ , Cramer's V .163; and email, instant message, chat (or other technological means) to communicate with instructors and students,  $\chi^2(4, N = 1,249) = 35.07, p < .01$ , Cramer's V .168. That is, more of the players shared ideas, documents, information, and/or knowledge online (83%,  $n = 380$ ; nonplayers, 78%,  $n = 620$ ); read and/or contributed to blogs (79%,  $n = 363$ ; nonplayers, 73%,  $n = 579$ ); used the Internet to complete school assignments (94%,  $n = 428$ ; nonplayers, 89.5%,  $n = 713$ ); and emailed, instant messaged, and chatted to communicate with instructors and students (86%,  $n = 394$ ; nonplayers, 72.5%,  $n = 577$ ). Upon closer examination, the largest differences were found among activities performed on a daily basis in favor of those who played video games.

Table 2. Player and nonplayer online learning activities

Items	Groups		
	Player	Nonplayer	
Number of online courses and/or training per year	0	133 (29.1%)	332 (41.7%)
	1-5	160 (35%)	281 (35.3%)
	6-10	88 (19.3%)	67 (8.4%)
	11-20	45 (9.8%)	49 (6.2%)
	More than 20	26 (5.7%)	62 (7.8%)
	<i>Missing</i>	5 (1.1%)	5 (.6%)
Sharing ideas, documents, information, and/or knowledge online	Never	74 (16.2%)	170 (21.4%)
	Monthly	131 (28.7%)	273 (34.4%)
	Weekly	99 (21.7%)	190 (23.9%)
	Daily	102 (22.3%)	102 (12.8%)
	More than 3 times per day	48 (10.5%)	55 (6.9%)
	<i>Missing</i>	3 (.7%)	6 (.8%)
Read and/or contribute to blogs	Never	86 (18.8%)	198 (24.9%)
	Monthly	122 (26.7%)	181 (22.7%)
	Weekly	82 (17.9%)	181 (22.7%)
	Daily	107 (23.4%)	138 (17.3%)
	More than 3 times per day	52 (11.4%)	79 (9.9%)
	<i>Missing</i>	8 (1.8%)	19 (2.4%)
Using the Internet to complete school assignments	Never	27 (5.9%)	80 (10.1%)
	Weekly	110 (24.1%)	278 (34.9%)
	2-3 times per day	151 (33%)	235 (29.5%)
	Daily	101 (22.1%)	133 (16.7%)
	More than 3 times per day	66 (14.4%)	67 (8.4%)
	<i>Missing</i>	2 (.4%)	3 (.4%)
Using email, instant message, chat (or other technological means) to communicate with the instructors and students	Never	62 (13.6%)	216 (27.1%)
	Weekly	207 (45.3%)	317 (39.8%)
	2-3 times per day	98 (21.4%)	158 (19.8%)
	Daily	69 (15.1%)	81 (10.2%)
	More than 3 times per day	20 (4.4%)	21 (2.6%)
	<i>Missing</i>	1 (.2%)	3 (.4%)

### 3.3 Learning Style Preferences

The findings also revealed statistically significant differences between the groups with regard to the learning styles examined. As mentioned, these were learning styles that share characteristics with many of today's video games. Specifically, the participants were asked about their preference toward online courses and/or training that (a) encourage communication with others; (b) promote a hands-on approach; (c) present graphics before text; (d) offer immediate feedback; (e) promote multitasking; (f) provide a way to selectively access different parts of courseware, rather than having to be linearly stepped through; and (g) are play- rather than work-centric. Unlike the previous findings with regard to online learning activities, it was the nonplayers who showed a stronger preference for the majority of the learning styles examined. These findings are supported by the aggregated responses shown in Table 3.

The nonplayers were in more agreement ( $M = 670.05$ ) than the players ( $M = 539.76$ ;  $U = 141765$ ;  $p < .01$ ;  $r = -.18$ ) about taking courses and/or training online rather than face-to-face (nonplayers, 39%,  $n = 313$ ; players, 26%,  $n = 120$ ). The nonplayers were also in more agreement ( $M = 678.67$ ) than the players ( $M = 531.66$ ;  $U = 138240.5$ ;  $p < .01$ ;  $r = -.2$ ) with multitasking while learning (nonplayers, 41%,  $n = 323$ ; players, 22%,  $n = 100$ ). The same could be said for courseware that is presented as graphics before text (nonplayers, 10%,  $n = 81$ ; players, 6%,  $n = 29$ ), with the nonplayers in more agreement ( $M = 654.44$ ) than the players ( $M = 562.62$ ;  $U = 151927$ ;  $p < .01$ ;  $r = -.13$ ). With respect to courses and/or training that are play- rather than work-centric (nonplayers, 14%,  $n = 110$ ; players, 12%,  $n = 54$ ), the nonplayers were in more agreement ( $M = 640.29$ ) than the players ( $M = 592.88$ ;  $U = 165880.5$ ;  $p < .05$ ;  $r = -.06$ ). As for preferring to be able to selectively access different parts of courseware (nonplayers, 33%,  $n = 261$ ; players, 24%,  $n = 108$ ), the nonplayers were once again in more agreement ( $M = 658.13$ ) than the players ( $M = 561.79$ ;  $U = 151766$ ;  $p < .01$ ;  $r = -.13$ ). This pattern was finally broken with regard to favoring immediate feedback (players, 9%,  $n = 40$ ; nonplayers, 4%,  $n = 31$ ). Here the players were in more agreement ( $M = 667.12$ ) than the nonplayers ( $M = 597.68$ ;  $U = 159528.5$ ;  $p < .01$ ;  $r = -.1$ ). Finally, no statistically significant differences were found with regard to desiring a hands-on approach to learning ( $U = 176669$ ;  $p = .33$ ) or wanting online courses and/or training that encourage communication with others ( $U = 173822.5$ ;  $p = .85$ ).

Table 3. Player and nonplayer learning style preferences

Items		Groups	
		Player	Nonplayer
Preference for courses and/or training that are online rather than face-to-face	Strongly disagree / Disagree	176 (38.5%)	168 (21.1%)
	Neutral	158 (34.6%)	309 (38.8%)
	Agree / Strongly agree	120 (26%)	313 (39.3%)
	Missing	3 (.7%)	6 (.8%)
Preference for hands-on approaches to learning	Strongly disagree / Disagree	314 (68.7%)	528 (66.3%)
	Neutral	88 (19.3%)	202 (25.4%)
	Agree / Strongly agree	48 (10.5%)	60 (7.6%)
	Missing	7 (1.5%)	6 (.8%)
Preference to multitasking while learning	Strongly disagree / Disagree	207 (45.3%)	230 (28.9%)
	Neutral	149 (32.6%)	240 (30.2%)
	Agree / Strongly agree	100 (21.9%)	323 (40.6%)
	Missing	1 (.2%)	3 (.4%)
Preference for courses and/or training that encourage communication with others	Strongly disagree / Disagree	289 (63.2%)	475 (59.7%)
	Neutral	111 (24.1%)	244 (30.7%)
	Agree / Strongly agree	54 (11.8%)	72 (9.1%)
	Missing	3 (.7%)	5 (.6%)
Preference for courseware that present graphics before text	Strongly disagree / Disagree	321 (70.3%)	452 (56.8%)
	Neutral	102 (22.3%)	256 (32.2%)
	Agree / Strongly agree	29 (6.3%)	81 (10.2%)
	Missing	5 (1.1%)	7 (.9%)

Preference for courses and/or training that are play- rather than work-centric	Strongly disagree / Disagree	252 (55.2%)	383 (48.1%)
	Neutral	148 (32.4%)	298 (37.4%)
	Agree / Strongly agree	54 (11.8%)	110 (13.8%)
	<i>Missing</i>	3 (.7%)	5 (.6%)
Preference to selectively access different parts of courseware, rather than linearly stepping through	Strongly disagree / Disagree	232 (50.8%)	285 (35.8%)
	Neutral	114 (24.9%)	245 (30.8%)
	Agree / Strongly agree	108 (23.7%)	261 (32.8%)
	<i>Missing</i>	3 (.7%)	5 (.6%)
Preference for immediate feedback	Strongly disagree / Disagree	311 (68%)	593 (74.5%)
	Neutral	103 (22.5%)	167 (21%)
	Agree / Strongly agree	40 (8.8%)	31 (3.9%)
	<i>Missing</i>	3 (.7%)	5 (.6%)

*Note.* “Strongly disagree” and “Disagree” have been aggregated; “Agree” and “Strongly agree” have also been aggregated.

#### 4. Discussion

In an effort to better our understanding of young people and what is believed to be a new learning paradigm as a result of exposure to and experience with technology, we quantitatively compared the online learning activities and learning style preferences of video game players and nonplayers. The comparison revealed individual differences among those who played video games and those who did not, but more important, differences in the context of online learning activities and learning style preferences.

##### 4.1 Individual Differences

Individual differences were first examined to help understand the players and nonplayers and help put the findings of this investigation in context. While interesting findings emerged with regard to the types of video games played, offering further support for commentary about today’s technology-savvy youth, generally speaking, the players were typical of what has been described in the video game literature. That is, an examination of age, gender, and game play revealed that the players were predominantly 19 to 29 years of age, male, and played video games on a regular basis.

It could be argued that the 19-to-29 age bracket is older than the adolescent demographic typically viewed as the stereotypical gamer. This may be attributable to the sample itself, in that the participants were postsecondary students, and thus, befitting this age demographic. Some would argue that if the participants had been younger than 18 years of age, findings most likely would have portrayed these younger individuals as the dominant players. However, there is research to show that the image of the teenage gamer is misplaced, and video game players very much share an adult profile (Griffiths, Davies, & Chappell, 2003). Thus, the 19-to-29 sample may, in fact, be a much more realistic portrayal of today’s video game player than that of the clichéd teen gamer. Nonetheless, future investigations should consider larger age ranges in their samples.

Furthermore, it might be proposed that the gender profile among today’s video game players is misdirected, at least among certain genres of game play. For example, there is research to suggest that casual games, generally (but not always) played on mobile devices, are a growing activity among females (Information Solutions Group, 2013), with some findings showing that females play these types of games as much as males (Information Solutions Group, 2011, 2013). It has been generally agreed, however, that males are the dominant gender when it comes to video game play (Ivory, 2006; Leonard, 2006), playing these games on a more frequent basis and for longer periods of time (Chou & Meng-Jung, 2007). These findings are increasingly believed to have been exacerbated by the video game industry, which has debatably targeted male players (Fron, Fullerton, Morie, & Pearce, 2007).

With regard to type of video game play, the players were engaged in both offline and online games, only slightly in favor of single- or two-player games not requiring an Internet connection. This may explain the disinterest in MMOGs, an online game genre commonly played among Asian youth (Seok & DaCosta, 2012). With the overwhelming popularity of online games, these findings are unexpected but may simply be a result of the postsecondary students in this sample not having the time, giving their academic workload, to participate in this kind of play. Thus, this investigation, with a much younger sample, might have yielded different findings. That is,

there is the possibility that those of high school age, although also supposedly carrying demanding academic workloads, might spend more time playing these types of games, an assumption stemming from research focused on problematic video game play (commonly referred to as video game addiction) in Asian countries (e.g., Seok & DaCosta, 2012, 2014). Access to bandwidth is not a contributing factor, since South Korea can claim to have one of the highest penetration rates in the world (Anderson, 2009).

What is perhaps of most interest with regard to the individual differences is the players' involvement in educational games. Granted, slightly less than half of those who played these games did so regularly, mostly on a weekly basis, compared to half who had only played a finite number of times. And, in spite of the research that shows video games are increasingly being used for educational purposes, the preponderance of the evidence has depicted video games as primarily an entertainment medium (Ritterfeld & Weber, 2006). Thus, the finding that such a large percentage of the players engaged in this type of gaming, with an almost quarter of all the players reporting regular play, could be viewed as a departure from the literature. At the same time, however, these findings, could also be seen as evidence in support of the argument that today's youth prefer to learn by playing video games over traditional approaches.

#### *4.2 Online Learning Activities*

It should not come as a surprise that statistical significance was found when examining differences between players and nonplayers, with the players reportedly engaged in more online learning activities than the nonplayers. Among the activities, the players reported that they took more online courses and/or training than the nonplayers; specifically, 6 to 20 courses and/or training sessions in a given year. The exceptions were the same percentage of players and nonplayers who were involved in 1 to 5 courses and/or training sessions, and more of the nonplayers who claimed that they were involved in more than 20. While the latter may be difficult to explain given the typical course workload of postsecondary students (i.e., 20 or more of these online sessions could be viewed as excessive and perhaps not even possible within a typical academic year), the former may be a result of the fact that many universities and colleges, depending on their size and programs, only offer certain courses online (e.g., introductory classes), thus, explaining the equal percentage of students taking one to five courses and/or training sessions, independent of video game play.

The findings also revealed that the players were more likely than the nonplayers to focus on online activities related to learning and academic pursuit. For instance, more of the players reported that they used ICT, to include email, instant message, and chat, to converse with instructors and peers. Also, more of the players took advantage of the Internet to complete school assignments. Generally speaking, they were also more open to the sharing of ideas, documents, information, and/or knowledge online, which included reading and/or contributing to blogs. Unfortunately, data on the topic of these blogs and what information was shared online were not collected; thus, their academic relevance cannot be ascertained. Even so, these findings show that the players expressed a greater openness toward using online technologies in activities easily related to learning.

Altogether, these findings offer additional evidence in support of our hypothesis that differences can be found between video game players and nonplayers. Specifically, video game players are more involved in online learning activities than nonplayers. This is as far as the findings were aligned with our hypotheses.

#### *4.3 Learning Style Preferences*

As anticipated, the results further revealed differences between the players and nonplayers in terms of learning style preferences, but not in the way we had anticipated. Although exceptions were noted, it was the nonplayers who expressed interest in most of the learning styles examined. Namely, the nonplayers preferred courses and/or training that presented graphics before text with opportunities to multitask; that offered the ability to selectively access different parts of courseware, rather than linearly stepping through; and that were play- rather than work-centric. In addition, the nonplayers expressed stronger preference for courses and/or training that were online rather than face-to-face.

Overall, these are unexpected discoveries, given the styles were specifically chosen because they share characteristics with many of today's video game titles. For example, the preference for courses and/or training presented as graphics before text is based on the proposition that exposure to high-quality graphics, comprising little or no accompanying text, has heightened the visual sensitivity of today's students (Prensky, 2001a, 2001b). Hence our hypothesis that the players would have expressed the most interest in this preference assumed the almost too realistic graphics found in today's video games.

It has also been proposed that today's students have grown up accustomed to multitasking while learning, almost mimicking the parallel processing behaviors of computers. Commonly cited examples include watching

television while doing homework or listening to music while learning about subjects on a computer. Although the benefits of multitasking while learning are debatable, it has been suggested that we are now dealing with a generation of students who are much more adept at (and interested in) parallel processing (Prensky, 2001a, 2001b). If this is the case, it was reasonable to have expected to find the players showing a greater preference, particularly given that many of today's video games require players to handle multiple tasks at once.

The idea of selectively accessing different parts of courseware, rather than linearly stepping through, is similar to the way information is accessed on the Internet, via a networked web of interrelated hyperlinks (DaCosta et al., 2011). Prensky (1998) described this in the context of the alarming speed with which today's students are believed to process information, concluding that young people would rather access information selectively than being presented with a predetermined sequence of information, further noting that this preference "has increased their awareness and ability to make connections, has freed them from the constraint of a single path of thought, and is generally an extremely positive development" (Prensky, 1998, p. 12). These are characteristics found in many video games, in particular, MMOGs, which allow players the freedom to explore virtual worlds. Thus, our assumption that players would have shown a greater interest in selectively accessing different parts of courseware rather than linearly stepping through.

Perhaps the most surprising of our findings involved the belief that today's students enjoy learning through playing and that learning does not have to be a laborious activity (Prensky, 2001a, 2001b). Given the play aspect of video games, we had anticipated that of all of the learning styles examined, this was the one that would have been viewed most favorable by the players.

Finally, among the exceptions, wanting immediate feedback turned out to be the only preference popular among the players. This may be explained by the ability of video games to respond instantly to stimuli, thus, leaving these individuals with such a disposition compared to their nonplayer counterparts. However, with regard to the preference for online courses and/or training that encourage communication with others and offer a hands-on approach to learning, no statistically significant differences were found between the players and nonplayers. This may possibly be explained by the fact that these two preferences are not specific to online learning, and thus, could be argued to be a common interest among both the players and nonplayers.

#### *4.4 Limitations and Future Research*

Care should be taken when interpreting the results of this study given the effect sizes (see Cohen, 1988), requiring further and closer examination of the topic. Further, certain aspects of the study, while not necessarily limitations, pose a concern. Social desirability bias, for example, must be considered. It is possible that the participants responded based on what they felt others wanted to hear, fueling validity challenges associated with self-reported data. There are also methodological concerns when using questionnaires as the sole means for investigating learning style preferences. Thus, scholars may wish to incorporate other approaches such as qualitative methods in future studies. Furthermore, the learning styles examined here were specifically chosen because they share characteristics with today's video games. However, they may not be representative, warranting a more watchful selection in future research. Another caution involves the heterogeneous nature of the players and nonplayers classification, in that there is a substantial difference, for example, between someone who plays briefly, once per week, and a daily player. Therefore, we cannot be certain that the two groups do not differ beyond only video game play, and must consider the possibility that the findings may be due to factors other than their gaming behavior. Along the same lines, although the players were asked about the frequency of their play with regard to offline, online, MMOGs, and educational games, this investigation focused on video games in general and, therefore, did not take into consideration factors such as genre (e.g., action-adventure, role-playing) and platform (e.g., console, dedicated hand-held, mobile device, personal computer). It may be advantageous to examine the role that these and related factors may play with regard to interest in online learning activities and learning style preferences. In addition, this inquiry examined differences between video game players and nonplayers. As part of future investigations, researchers may wish to examine the predictability of learning style preferences in the context of these two groups. Finally, many gaming studies are conducted in Southeast Asian countries. This is done for a number of reasons, most notably the technological advancements emerging from these cultures and the overwhelming popularity of video games among Asian youth. Caution should be exercised when interpreting the findings based on samples from these countries, as they are remarkably different from other parts of the world in terms of their gaming culture. Thus, scholars should also focus on Western and Eastern gaming populations in future investigations.

#### **5. Conclusion**

In summary, this article presented the findings of a study predicated on the belief that today's youth are unlike

the young people of generations past. Namely, they process information differently, which has been attributed to having grown up immersed in the technological advancements of the digital information age. This has resulted in numerous claims, to include the proposition that the young people of today exhibit learning style preferences never before seen. Video games have been called out as one of the technologies that have contributed to the distinct learning style preferences of today's youth leading to the assumption that differences must exist between those who play video games and those who do not.

To gain a better understanding of this issue, the question proposed in this study was as follows: *Do those who play video games place a greater importance on nontraditional learning styles compared to those who do not play?*

Findings revealed that differences do exist between players and nonplayers in the context of online learning activities and learning style preferences, but not in the way we had expected. That is, the results revealed that while the players expressed a strong and general interest in the online learning activities surveyed, these same video game players did not place greater importance on the learning styles examined than their nonplayer counterparts. These are unexpected findings, given the styles were specifically chosen because they share characteristics with many of today's video games.

Educators, practitioners, researchers, and other stakeholders should not view these findings as evidence against the use of video games in education but instead as empirical data that raise questions about the suppositions made about today's youth and their unconventional learning, at least in the context of video game play. Thus, we put forth that our understanding is far from clear, and much more investigation is warranted before conclusions can be safely drawn.

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