

The role teachers' expectations and value assessments of video games play in their adopting and integrating them into their classrooms

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Abstract

Video games have become an essential part of the way people play and learn. While an increasing number of people are using games to learn in informal environments, their acceptance in the classroom as an instructional activity has been mixed. Successes in informal learning have caused supporters to falsely believe that implementing them into the classroom would be a relatively easy transition and have the potential to revolutionise the entire educational system. In spite of all the hype, many are puzzled as to why more teachers have not yet incorporated them into their teaching. The literature is littered with reports that point to a variety of reasons. One of the reasons, we believe, is that very little has been done to convince teachers that the effort to change their curriculum to integrate video games and other forms of technology is worthy of the effort. Not until policy makers realise the importance of professional

development and training as an important use of funds will positive changes in thinking and perceptions come about, which will allow these various forms of technology to reach their potential.

The authors have hypothesised that the major impediments to useful technology integration include the general lack of institutional infrastructure, poor teacher training, and overly-complicated technologies. Overcoming these obstacles requires both a top-down and a bottom-up approach. This paper presents the results of a pilot study with a group of preservice teachers to determine whether our hypotheses regarding potential negativity surrounding video games was valid and whether a wider scale study is warranted. The results of this study are discussed along with suggestions for further research and potential changes in teacher training programmes.

Introduction

Over the past 40 years, video games have become an increasingly popular way to play and learn. Those who play regularly often note that the major attraction is their ability to become quickly engaged and immersed in gameplay (Lenhart & Kayne, 2008). Many have taken notice of video games' apparent effectiveness in teaching social interaction and critical thinking in informal learning environments. Beliefs about the effectiveness of video games in informal learning situations have been hyped to the extent that they are often described as the 'holy grail' that will revolutionise our entire educational system (Gee, 2003; Kirkley & Kirkley, 2004; Prensky, 2001; Sawyer, 2002). In spite of all the hype and promotion, many educators express puzzlement and disappointment that only a modest number of teachers have incorporated video games into their teaching (Egenfeldt-Nielsen, 2004; Pivec & Pivec, 2008).

These results seem to mirror those reported on a general lack of successful integration on the part of teachers and educators of new technologies and media in general. The reasons reported in that research point to a varied and complex issue that involves dispelling preconceived notions, prejudices, and concerns (Kati, 2008; Kim & Baylor, 2008). It is our position that very little has been done to date to overcome these objections. We agree with Magliaro and Ezeife (2007) who posited that teachers can and do greatly influence the successes or failures of classroom interventions. Expenditures on media and technology alone do not guarantee their successful or productive use in the classroom. Policy makers need to realise that professional development and training is the most significant use of funds that will positively affect teaching styles and that will allow technology to reach its potential to change education.

But as Cuban, Kirkpatrick and Peck (2001) noted, the practices of policy makers and administrators to increase the effective use of technologies in the classroom more often than not conflict with implementation. In their qualitative study of two Silicon Valley high schools, the authors found that despite ready access to computer technologies,

only a handful of teachers actually changed their teaching practices (ie, moved from teacher-centered to student-centered pedagogies). Furthermore, the authors identified several barriers to technological innovation in the classroom, including most notably: a lack of preparation time, poor technical support, outdated technologies, and the inability to sustain interest in the particular lessons and a lack of opportunities for collaboration due to the rigid structure and short time periods allocated to instruction. The authors concluded by suggesting that the path for integrating technology would eventually flourish, but that it initially would be riddled with problems caused by impediments placed upon its success by a lack of institutional infrastructure, poor training, and overly-complicated technologies.

We agree with those who suggest that any proposed classroom intervention correlates directly to the expectations and perceived value/benefit on the part of the integrating teachers, who largely control what and how their students learn (Hanusheck, Kain & Rivkin, 1998). Faced with these significant obstacles, it should not be surprising that video games, like other technologies, have been less than successful in transforming the classroom. We further suggest that overcoming these obstacles requires both a top-down and a bottom-up approach. Policy makers carry the burden of correcting the infrastructural issues both for practical reasons as well as for creating optimism on the part of teachers to believe that their administrators actually support their decisions. On the other hand, anyone associated with educational systems for any length of time will agree that a top-down only approach is destined for failure. The successful adoption of any new classroom intervention is based, in larger part, on teachers' investing in the belief that the experience is worth the effort. If a teacher sees little or no value in an intervention, or is unfamiliar with its use, then the chances that it will be properly implemented are minimised. In other words, a teacher's adoption of any instructional strategy is directly correlated with his or her views, ideas, and expectations about what is possible, feasible, and useful.

In their studies into the game playing habits of various college students, Shaffer, Squire and Gee (2005) alluded to the fact that of those that they interviewed, future teachers indicated that they did not play video games as often as those enrolled in other majors. Our review of these comments generated several additional research questions that we believe deserve further investigation. We began to hypothesise that if it were true that teachers, as a group, do not in fact play video games on a regular basis, it should not be surprising that they would have difficulty integrating games into their curriculum. They would not have sufficient basis to integrate the rules of gameplay with their instructional strategies, nor would they be able to make proper assessments as to which games might be the most effective. We understand that one does not have to actually like something or be good at something to appreciate its value. For example, one does not necessarily have to be a fan of rap music or have a knack for performing it to understand that it could be a useful teaching tool. But, on the other hand, we wondered whether the attitudes towards video games on the part of teachers were not merely neutral, but in fact actually negative, which would further undermine any attempts at successfully introducing games into their classrooms.

This paper presents the results of a pilot study we conducted that utilised a group of preservice teachers to determine whether our hypothesis regarding potential negativity surrounding video games was valid and whether a wider scale study is warranted. In this examination, we utilised a preference survey to ask participants to reveal their impressions and expectancies about video games in general, their playing habits, and their personal assessments as to the potential role games might play in their future teaching strategies. We believe that the results we found are useful in determining ramifications for some potential changes in teacher preparation and professional development programmes. They provide more background on the kinds of learning that can take place, as described by Prensky (2001), Gee (2003) and others, they consider how to evaluate supposed educational games that exist in the market, and they suggest successful integration strategies. Just as no one can assume that digital kids already have expertise in participatory learning simply because they are exposed to these experiences in their informal, outside of school activities, those responsible for teacher training cannot assume that just because up-and-coming teachers have been brought up in the digital age, they are automatically familiar with, disposed to using, and have positive ideas about how games can be integrated into their curriculum. As a case in point, we found that there exists a significant disconnect between teachers and their students regarding the value of gameplay, and whether one can efficiently and effectively learn from games.

In this study, we also attempted to determine if there might be an interaction effect based on the type of console being used. We wanted to confirm Pearson and Bailey's (2008) assertions that the Nintendo Wii (Nintendo Company, Ltd. 11-1 Kamitoba-Hokodate-cho, Minami-ku, Kyoto 601-8501, Japan) consoles would not only promote improvements in physical movement, but also assist with social and self-esteem issues. While Pearson and Bailey were discussing the use of the Nintendo Wii with disabled students, we wanted to find out if these benefits translated to assisting reluctant teachers in accepting video games as potential learning tools for the classroom. We compared the gameplay mechanics and preferences of a traditional game console (the Microsoft Xbox 360: Microsoft Corporation One Microsoft Way Redmond, WA 98052-7329 USA) with the Nintendo Wii console, which uses more natural movements as well as simplified graphics.

Expectancy-value theory

We found in the literature a relevant motivational theory that deals with behavioral selection based on the principles of expectancy and perceived value. Founded by Martin Fishbein in the late 1960s and 1970s (Fishbein, 1967, 1968; Fishbein & Ajzen, 1975), expectancy-value theory posits that behavior is a function of the expectancies one has and the value of the goal that one is working towards. Expectancy-value theory also holds that behaviors are in response to one's beliefs and values and are undertaken to achieve some desired end. Behaviors, intentions and/or attitudes are seen as a function of a belief that an object potentially possesses a particular attribute or that a certain behavior will have a particular consequence or outcome. This function also contains an

assessment as to the degree that the attribute or behavior will positively or negatively affect that anticipated outcome (Palmgreen, 1984).

Although expectancy-value theory can explain much with regards to media use and gratification, we realise that behavioral motives are also guided by social circumstances. Views on the part of one's peers as to the usefulness and effectiveness of an intervention weigh heavily on that individual's own views and willingness to risk utilizing it in the classroom. If video games, for example, are not generally accepted as legitimate instructional tools by teachers as a group, the chances of their failing as an intervention will increase. This type of group social behavior is often referred to as 'collective consciousness'. Collective consciousness refers to the shared beliefs and moral attitudes that operate as a unifying force within society that directly influence an individual's ideals, beliefs, and behaviors (Jary & Jary, 1991). While these shared beliefs certainly influence the behaviors of peer groups (e.g., teacher to teacher) there has also been substantive research into the impact of the phenomenon with regard to the influence teachers have on their students.

In his pioneering work in the relationship between teaching and transpersonal psychology, Christopher Bache (2008) recently explored the dynamics of collective consciousness in the classroom. His research resulted in a suggestion that a teacher is capable of exuding unintentional, subtle influences (both positive and negative) on his or her students. If the teacher believes that a specific intervention is beneficial, it stands a better chance of being successful. Bache proposed that such beliefs trigger what he refers to as 'learning fields' that can activate new insights and become a catalyst for change. We suggest that the converse is also true. Negative attributions radiate negative influences and can adversely affect the outcome of utilizing oftentimes contentious educational tools like video games. If these negative attributions do exist, the implications for teacher-training programmes are clear. For games to reach their potential, the collective consciousness of teachers regarding video games needs to be transformed. At the very minimum, teachers and administrators residing within an organisation need to hold similar attitudes towards games. Currently, these attitudes appear to be less than positive, especially in light of the lack of empirical research into the educational value of so-called serious or educational games (Gunter, Kenny & Vick, 2008; Kenny & Gunter, 2008) and the impediments being thrown in their way (Rice, 2006).

The tenets of expectancy-value theory bring to mind McLuhan's tetrad—four principles that formulate an alternate way to view the effect that technology has on society. There exist many attempts in the literature to evaluate technology and its impact on curriculum (Clark, 1983, 1994; Jonassen, Campbell & Davidson, 1994; Kozma, 1983, 1991, 1994). Instead of looking to technology as having a cause and effect consequence, McLuhan's model organises around a view that suggests that any technology worth its while for the long term will participate in an ebb and flow. This ebb and flow will endure as long as it is positively affected by its own novelty as well as those attributes introduced by a newer technology that succeeds it (Hempell, 2006). The corollary is

that when making a judgment about the value of a technology (game), a society (people) will tend to evaluate it in terms of the following questions:

- What new element of value does it introduce?
- What does it make obsolete?
- What does it transform into when it itself is succeeded by an even newer technology?
- What happens if we over depend on it?

In other words, it is a safe bet that nonplaying teachers could be consciously or sub-consciously looking at video games in light of these four evaluative criteria. A negative answer to any one of these questions could invalidate the technology in their eyes. If the collective consciousness of a teacher group is such that games are not viewed as being of value because they are not well understood, that they potentially make the teacher or his or her traditional teaching methods obsolete, that they are perceived as tenuous because they will only be succeeded by some newer fad, or that over-dependence on them has a potentially deleterious effect on those who play too often, video games stand little chance of being generally adopted as a valid educational intervention by these individuals.

The tenets of the ARCS Motivational Model (attention, relevance, confidence, and satisfaction) (Keller & Kopp, 1987) serve as good a foundation as any for identifying possible bases for motivating teachers to more consistently and effectively integrate games into their curriculum. The results of various media reports seem to indicate that video games have gotten the attention of teachers. But, as Keller and Kopp (1987) and others (Fortugno & Zimmerman, 2005) indicate, gaining attention is an insufficient precondition. In order to become fully motivated, teachers need to discover the relevance of games to their specific content areas as well as learn how to create the right kinds of challenges and opportunities for success within the confines and time limits imposed in formal classroom structures. Even once relevance is established, game development and selection has to undergo rigorous validity and accountability. Recent attempts have been made in this regard, but in many cases, more rigorous design and development is needed to better integrate and immerse the teachable moments into the confines of the game's fantasy structure (Gunter *et al*, 2008; Kenny & Gunter, 2008). The silver lining is that any success in doing so will breed future successes, and, in effect, change the collective consciousness of teachers with regards to perceived value and expectancy of video games as effective instructional tools.

Game playing in America

On the other side of this equation are the students who have grown up absorbed in video game culture. Video games constitute a large part of America's economy and culture. More than 38% of all US households own some type of gaming console such as a Nintendo Wii, Sony Playstation 3 (Sony Corporation 1-7-1 Konan Minato-ku, Tokyo 108-0075, Japan), or Microsoft Xbox 360 (Entertainment Software Association, 2008). In 2007, Americans spent over \$18 billion on video games, an increase in sales of 40% over the previous year (The NPD Group, 2008). Statistics also show that approximately 70–80% of Americans aged 16–25 spend between 10 and 16 hours

each week playing (Dolliver, 2007). Although the hours spent playing games decrease as one enters adulthood, video game usage is still growing amongst adults. A recent poll sponsored by the Associated Press and America On Line revealed that more than 50% of adults in the United States between the ages of 20 and 45 now play video games (Slagle, 2006).

The trend towards older people playing games regularly is also growing. In 2005, according to Gamer Magazine, of those who play video games regularly, only a quarter was made up of individuals who were 40 years old and over, which is a range closer to the average age of today's tenured teachers (National Center for Educational Statistics, 2005). But by the beginning of 2008, the average purchaser of video games was 39 years old and close to 25% of them were over the age of 50 (Entertainment Software Association, 2008). These same reports reveal that time spent per week by men and women was approximately equal (7.6 vs. 7.4 hours respectively).

Teachers, on the other hand, seem to be bucking these trends. As noted previously, there exists some evidence, although anecdotal, that a particularly disproportionate percentage of preservice teachers on one college campus (ie, undergraduates in their 20s) may not play regularly (Shaffer *et al*, 2005). These low numbers caused us to wonder if this phenomenon is generalisable, and if so, why? Without conducting a study, one can only guess. Perhaps the answer lies in the fact that games have gotten progressively more complex and difficult to play. Or that games take up too much time for these busy people to devote full concentration to. More importantly, perhaps these individuals do not find any point to learning something that goes against established teaching conventions. Finding the answers to these questions allows those responsible for teacher-training programmes to effect positive changes on the potential learning outcomes that result from integrating video games into a curriculum.

The development of the Wii console

We believe that the complexities associated with learning how to play games using traditional consoles might have been contributing to the lack of playing time on the part of teachers. We wondered if recent advances in console technology might make a difference, especially in light of the fact that console production companies have been advertising that this new technology would make game playing less intimidating for the novice (Miyamoto, 2007). The new console design approach is best embodied by the Nintendo Wii, a gaming platform that debuted to great success in the holiday season of 2006. A long line of research establishes that video games have potential as beneficial activities for nonplayers, especially older adults and those in need of rehabilitation and occupational therapy (Goldstein *et al*, 1997; Hollander & Plummer, 1986; Schueren, 1986). Studies using modern consoles are only beginning to emerge with claims of the newer consoles in conjunction with custom developed games improving memory and attention (Miller, 2005). A question remains as to what effect these newer consoles might have on attracting the nonplaying average teacher.

In spite of claims of being easier to use than the traditional console, the Wii has its detractors. The Wii is certainly simpler than competitors' game consoles like the Xbox

or Playstation, but we suggest that it is still fairly complex for a novice user. For example, to focus on the Wiimote's mechanics and design, aside from the directional ('D') pad to move the character forward, backward, left, and right, there is also the trigger button ('B' button) underneath the remote, required to accomplish certain actions in games (such as releasing the ball in *Wii Sports: Bowling*). Thus, to expect someone of any age to pick up a Wiimote (Wii remote, ie, Wii game controller) and attempt to learn even a simple game will still take a good amount of time. While it is easy to consider moving forward, jumping, ducking and crawling basic functions, when asked to control those actions with a Wiimote, the process can be intimidating for those not familiar with the game mechanics. If they do not practice the button combinations for a specific game often enough, they may not retain the information.

We believe that, in spite of the hype associated with the Wiimote as to its making a difference in novices opting to play, it still needs to be evaluated as to whether it actually would do so. We wanted to find out if one reason for nonplaying on the part of teachers is its perceived learning curve and whether the Wii would make a difference in their decision not to play. As such, this study also included a comparison of participants' views about the Wii console.

Method

Guiding questions

A pretest–posttest quasi-experimental research study was used to test these various hypotheses. This study was conducted with four questions in mind:

- Do preservice teachers play video games as often as their peer age group?
- If not, what are some of the reasons for their disinterest in playing?
- Would the introduction of a Wii console with simpler gameplay mechanics change their views on playing?
- What effect will possible preconceived, negative notions about games have on their potential use of video games as a classroom intervention?

Participants

This study was conducted in two randomly selected technology integration courses for undergraduate preservice teachers ($n = 58$) at a large southeastern university in the United States. The make-up of the class was approximately 65% female and 35% male. All but one or two individuals were in their late teens and early twenties. The instructor of the selected classes offered extra credit for participation and an alternative means to earn extra credit for those who do not wish to participate. No one selected the alternative assignment.

Instrument and procedures

The instrument for gathering information on game playing habits, notions about the value of games, and whether playing a game and console choice had changed their opinion about playing was a pretest and posttest Video Games Preference Inventory (Appendix). These instruments were administered in the form of a pre- and post-

questionnaire that asked 10 specific questions that were graded on a five-point Likert scale, followed by four multiple choice with areas for participants to enter optional, open-ended responses that sought to ascertain additional ideas about video games and to obtain further indication as to why participants did or did not play regularly. The original instrument was developed and then modified based on a review by an independent panel made up of faculty from the College of Education who were familiar with educational technology and instructional designers and faculty from the department of Digital Media who had industry experience and teaching knowledge of game design. A split half analysis of the final, modified version of the questionnaire resulted in a Cronbach's alpha of 0.73 and a Spearman-Brown coefficient of 0.85.

Subjects were randomly selected into two groups: those who would play the Tiger Woods PGA Tour 07 golf game on a Nintendo Wii and those who would play the same game on an Xbox 360. This particular game was selected because of its perceived ease of use and feeling that it was not too gender specific, did not depend on content area knowledge, and was thought to be of general interest to the whole group, thereby minimizing content preference bias. Individuals were taken into a separate room in which they were randomly assigned to either console type. We gave participants minimal instruction as to how to play the game and then let them proceed. As they played, we recorded observations about each player's behaviors and demeanor during play. After playing the video games, participants answered the posttest questionnaire to see if there were any changes in their responses or attitudes towards games and game consoles as a result of their participating.

All but two of the questions on the pretest (Questions 1 and 9) correlated directly to those asked on the posttest. The remaining questions asked for responses in the exact same manner or asked whether participation in the activity had changed their views. Question 1 on the pretest asked how often participants played video games and on the posttest asked whether they felt that the console they utilised was intuitive. Question 9 on the pretest asked about views on violence in games. On the posttest the question was modified to ask whether their playing caused them to be more interested in playing in general. For this reason, Questions 1 and 9 were removed from the pair comparisons calculated by the *t*-test.

Data analysis

Pretest preferences

Questions 1 and 2 on the pretest survey asked whether participants played games regularly and whether they preferred to be doing other things in their spare time. Taken together, these two questions added strength to our ability to infer significance from the responses. A review of responses to these questions indicates that a strong minority (approximately 42%) played video games on a regular basis. This compares to a recent statistic published by the Entertainment Software Association (2008) that nearly 80% of individuals in this age group plays regularly. Question 2 asked whether the participants would rather be doing other things with their time than playing video games.

Nearly 75% of the respondents indicated that they would rather be doing other things, providing further indication that video games were not a part of their leisure-time plans.

Controller issues and game complexity did not, apparently, figure into their decisions not to play. For Questions 3 and 7 on the pretest (are games/game controllers too complex?), only 22–25% indicated that they agreed. Nearly 35% indicated they had no opinion. Responses to one of the open-ended questions at the end of the pretest survey appeared to contradict these results. Nearly 70% of the participants indicated that one of the least desirable aspects of video games was that they were too complicated, that video games were too difficult to learn, or that playing them took too long. On the other hand, nearly 80% indicated that they disagreed with the statement that video games were intimidating. This further indicates that the decision not to play was a matter of conscious choice. Negative preconceptions about their value obviously colored their impressions about how difficult games were to learn. Perhaps what we were witnessing was further validity of Sweller's (1999) early ideas on cognitive load.

One of the multiple-choice questions (coded as Question 11) asked participants how familiar they were with games. Only 17% indicated that they were 'very familiar' with games, with the remaining 83% choose either 'somewhat familiar' or 'not familiar'. Of this group, over 30% indicate they were not familiar with video games at all. Pairing these responses to Question 10 ('I think video games can teach things in that classroom') in which approximately 60% disagreed or strongly disagreed, indicates that the lack of familiarity with video games preclude many of them from making informed decisions as to including and integrating video games in their lesson plans.

One of the more interesting questions (the open-ended question [coded as #14]) asked whether participants anticipated their feelings about games would change. More than 75% indicated that they anticipated no change in their feelings about games to occur. Reasons for this attitude ranged from 'I already know about games, and I like them' (approximately 30% of this group) to 'I'd rather be doing other things' (70% of this group).

Posttest results

There was little indication that those who did not play video games prior to the activity would begin playing more often, as asked (Question 9) after their participation in this activity. Approximately 56% of participants indicated that they disagreed with the statement that they were more interested than before. One of the multiple-choice questions (coded as Question 14) asked whether their feelings about video games had changed as a result of their participation. Almost 62% of those asked indicated that their opinions had changed, with 95% of them indicating that it was for the positive. Of those who indicated that their opinions did not change, approximately one-half indicated that it was because they had already liked games before, the other half stating that

they still did not care for games or still would rather be doing other things. A factor analysis for the type of console indicated that the Wii accounted for approximately 55% of the variance amongst responses.

For Question 10, only 20% indicated that their preconceptions about the value of video games had changed. While the game they played did not have explicit educational goals, when coupled with the responses to the other direct and open-ended questions, we believe we were reasonably correct in assuming that video games would still be of little use to this portion of the group either as an educational or leisure time tool. (Table 1).

Comparison of pretest and posttest responses

In order to investigate changes in attributions about games, a paired sample *t*-test was calculated to compare responses to several of the questions on the pretest and posttest. Responses to Questions 3, 5, 7, 8, and 10 all appeared to change significantly from the pretest to the posttest. As noted previously, Questions 1 and 9 were not included because they dealt with different issues between the pretest and posttest. Questions 3, 7, and 8 dealt with perceived complexity of playing video games and utilizing game controllers. Question 5 dealt with self-perceptions as to the comfort level participants had with playing and willingness to play. Question 10 dealt with feelings as to whether each individual felt that video games could teach things in the classroom. These results seem to indicate that at least some of their preconceived notions about games and their potential in the classroom may have been based on their general lack of familiarity with games.

Merging responses to Question 10 (value of video games in the classroom) with those to Question 11 (familiarity with games) indicate that the majority of those who were somewhat familiar (61%) or not familiar (55%) disagreed or strongly disagreed that games can teach things in the classroom. A minority (less than 40%) accounted for the variance in responses after participating in the activity.

Table 1: Changes in attitudes towards games $p > 0.05$

Paired samples		Mean	Std. Deviation	Std. Error Mean	T	df	Sig. (2-tailed)
Pair 2	bq2—aq2	0.143	1.197	0.160	0.893	55	0.376
Pair 3	bq3—aq3	0.268	0.798	0.107	2.513	55	0.015
Pair 4	bq4—aq4	-0.214	1.022	0.137	-1.569	55	0.122
Pair 5	bq5—aq5	-0.393	1.303	0.174	-2.257	55	0.028
Pair 6	bq6—aq6	-0.143	0.903	0.121	-1.184	55	0.242
Pair 7	bq7—aq7	0.411	0.949	0.127	3.238	55	0.002
Pair 8	bq8—aq9	-0.929	1.616	0.216	-4.299	55	0.000
Pair 10	bq10—aq10	0.750	1.654	0.221	3.393	55	0.001

Legend: 'bq' indicates these were pretest questions ('before'). The number correlates with the question number.

Table 2: ANCOVA to calculate interaction of posttest question nine with console type

		Sum of squares	df	Mean square	F	Sig.
Aq-9	Between groups	6.254	1	6.254	5.220	0.026
	Within groups	65.887	55	1.198		
	Total	72.140	56			

In order to determine the interaction effects of the type of console on perceptions about game complexities and willingness to play, we calculated an ANCOVA in which we compared responses on the relevant posttest questions (Questions 3, 5, 7, 8, and 9) as controlled for console type (Table 2). We found only one response to have an interaction effect at the 0.05-level: response to Question 9. That question dealt with whether or not those who utilised the Wii console might be more interested in playing video games. This seemed to indicate that some of the claims about the attraction and ease of use by Wii console makers held some validity. In the follow-up questions, participants told us and responded on the postgame surveys that, while the Wii might be fun to play, they still failed to see the relevance of games in general. We understand that the game used in this study was of a general nature and it was not designed to be an academic experience. These results do, however, seem to indicate there exists an opportunity on the part of makers of Wii consoles that needs to be looked into further.

We also explored a possible interaction effect of console type on the pretest and posttest responses. These results seem to indicate that the type of console might help overcome reluctance to begin playing, but that it would not have a real significant effect on long-term playing habits.

Reasons for non-play

The reasons that these individuals did not play video games regularly are less clear. An overwhelming majority (almost 90%) indicated that video games did not intimidate them necessarily, but a minority (45%) thought that video games were too complicated. It is interesting that in the open-ended question as to what they thought was the least desirable feature of playing video games, almost two-thirds indicated that they were too difficult or that they took too much time to complete. Only a small group (39%) indicated other aspects as being least desirable, such as the level of violence or the complexity of the game controller.

Conclusions

The responses to the questions when comparing the pretest to the posttest indicate an increase in positive attitudes towards playing games after participants actually played. From the paired sample *t*-tests, we found that those whose attitude towards game playing was negative in the beginning had significantly changed in a positive direction after they participated in the activity, indicating the strength of their preconceived negative notions about playing. These changes occurred after only one directed game-play situation. It made us wonder what might happen if games are further integrated

into teacher-training activities. These types of changes were expected. It is not unusual for one to change their preconceived notions about an activity once they become even a little more familiar with it. Whether that translates into a corresponding increase in the chances that these future teachers would be more willing to integrate games into their curriculum and lesson plans remains to be seen. Certainly, looking into this phenomenon warrants more investigation in future studies.

These changes serve as a reminder that in order to change their opinions about playing video games, teacher-training programmes need to integrate more activities that introduce future teachers to games on a more inclusive basis. This means that undergraduate programmes will need to include additional courses in the theoretical underpinnings of game play, courses on how to evaluate and integrate game technologies, and more on the types of learning that they can expect as a result of their students playing games in their classrooms. Many states in the United States require that all teachers in training take at least one technology course.

Given that technology is destined to become a larger part of the curriculum, perhaps this is not enough. Certainly, a limitation of this particular study was that it evaluated only one game and one that was not educationally oriented. We do not infer that our conclusions can be widely generalisable. We do know from our experience and personal conversations we have had with game developers and educators such as Kurt Squire and James Gee, amongst others, that the resistance on the part of schools and many teachers can be daunting. Many proponents of integrating video games into the curriculum are beginning to look to alternative ways to do so, bypassing the system in the process.

The Nintendo Wii has the potential to close the perceived complexity and confidence gap between players and nonplayers, though not completely. While the game console alone will not convert reluctant teachers into avid gamers, console technologies such as the Wii are making great strides in this direction. We recognise that the Wii is not like most of the video games that have been garnering so much attention over the years. The latter are cognitively based in which thinking about the situation is more critical than hand-eye coordination. In contrast, the Wii does not require nearly as much thinking as it does movement. It is primarily a psychomotor game and is not like the video games that have energised educational research. Our intent was to determine just how large a role the learning curve might play in converting reluctant teachers.

What we found in teachers was that the Wii in some regards had an opposite effect. When observing the actions and comments made by the individuals during their participation in the activity, we found that the Wiimote game controller takes a little getting used to. Because it is operated with one hand pointed at the screen as opposed to two hands holding it comfortably in one's lap, gamers with arm or wrist problems may have difficulty holding or moving it during game play. We noted anecdotally that participants utilizing the Microsoft Xbox 360 were sitting comfortably in a chair while playing the game. Those utilizing the Nintendo Wii, on the other hand, were required to swing at

the ball during their golf game and seemed to be having a little more difficulty adapting to the hand-eye coordination required to successfully put the ball in the hole. Perhaps the console is not the issue, but the difficulties actually reside in learning the rules of gameplay, which are based on trial and error and essentially unstructured—something that may be anathema to teachers in general. These factors will be the subject of a future study.

The most common reasons reported in the current study for participants not using video games seemed to confirm Fortugno & Zimmerman's (2005) suggestions that they did not yet fully understand or appreciate the potential of games due to their unfamiliarity with them. The study also corroborated previous research that most games do not include sound pedagogical principles in their design (Gunter *et al*, 2008). We believe it is safe to say that familiarising teachers with the general rules of gameplay is only half the battle. Changing their collective consciousness and preconceived negativity also requires validity testing of the games' instructional constructs. Video games still have to deliver the instruction and academic content as promised. In spite of all the media coverage surrounding students' apparent passion for gaming and how much they seem to be learning in informal situations, it is unrealistic to think that games will fundamentally change the way instruction is delivered in school settings without a useful balance of expectations between game-playing students and their nonplaying teachers (Rice, 2006). Some research suggests that many teachers only rarely utilise digital media for teaching despite their general positive attitudes towards those media. Identifying the reasons behind this phenomenon also deserves more attention.

Finally, we recognise that the current study has merely scratched the surface as to the extent of the work that has to be done. In the current study, we interviewed those who were intending to go into the teaching profession. As a group, they indicated that they did not play as often as their counterparts, confirming what Shaffer *et al* (2005) had previously found. This appeared to have a bearing on their notions about the value of games. The mere fact of playing and becoming more familiar with a game, even though it was not educational, still appeared to have a positive effect on their judgments and expectations about games. This study only covered one group of preservice teachers. We can only speculate as to the extent of differences that may exist between older teachers and their students, and as to the potential ramifications these attitudes will have on adoption. Enough evidence exists, in our opinion, to warrant more research on this subject.

References

- Bache, C. (2008). *The living classroom: teaching and collective consciousness*. Albany, NY: State University of New York Press.
- Clark, R. E. (1983). Reconsidering research on learning from media. *Review of Educational Research*, 54, 4, 445–459.
- Clark, R. E. (1994). Media will never influence learning. *Educational Technology Research and Development*, 42, 2, 21–29.

- Cuban, L., Kirkpatrick, H. & Peck, C. (2001). High access and low use of technologies in high school classrooms: explaining an apparent paradox. *American Educational Research Journal*, 38, 4, 813–834.
- Dolliver, M. (2007). So that's where kids' time goes. *Adweek*, 48, 52.
- Egenfeldt-Nielsen, S. (2004). Practical barriers in using educational computer games. *On the Horizon*, 12, 1, 18–21.
- Entertainment Software Association (2008). *2008 Game Player Data*. Retrieved October 26, 2008, from <http://www.theesa.com/facts/gameplayer.asp>
- Fishbein, M. (1967). Attitude and the prediction of behaviour. In M. Fishbein (Ed.), *Readings in attitude theory and measurement* (pp. 477–492). New York: Wiley.
- Fishbein, M. (1968). An investigation of relationships between beliefs about an object and the attitude towards that object. *Human Relationships*, 16, 233–240.
- Fishbein, M. & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: an introduction to theory and research*. Reading, MA: Addison-Wesley.
- Fortugno, N. & Zimmerman, E. (2005). Learning to play to learn: lessons in educational game design. *Gamasutra*, April 5, 20. Retrieved April 10, 2009, from <http://www.ericzimmerman.com/texts/learningtoplay.htm>
- Ge, J. P. (2003). *What video games have to teach us about learning and literacy*. New York: Palgrave Macmillan.
- Goldstein, J., Cajko, L., Oosterbroek, M., Michielsen, M., Houten, O. V. & Salverda, E. (1997). Video games and the elderly. *Social Behavior and Personality*, 25, 4, 345–352.
- Gunter, G. A., Kenny, R. F. & Vick, E. H. (2008). Taking serious games seriously: immersing academic content through endogenous fantasy. *Educational Technology Research and Development Journal*, 56, 6, 511–537.
- Hanusheck, E. A., Kain, R. F. & Rivkin, S. G. (1998). *Teachers, schools, and academic achievement. NBER Working Paper Series, Working Paper 6691*. Cambridge, MA: National Bureau of Economic Research. Retrieved October 25, 2008, from <http://www.nber.org/papers/w6691>
- Hempell, A. (2006). The resonating interval: exploring the process of the Tetrad. Retrieved October 22, 2008, from <http://www.anthonyhempell.com/papers/tetrad/concept.html>
- Hollander, E. K. & Plummer, H. R. (1986). An innovation therapy and enrichment program for senior adults using the personal computer. In F. A. McGuire (Ed.), *Computer technology and the aged: implications and applications for activity programs* (pp. 59–68). New York: Haworth Press.
- Jary, D. & Jary, J. (1991). *Collins dictionary of sociology* (p. 774). Glasgow: Harper Collins.
- Johnson, S. (2005). Your brain on video games: could they actually be good for you? Retrieved February 15, 2008 from Discover Web site: <http://discovermagazine.com/2005/jul/brain-on-video-games/?page=1>
- Jonassen, D. H., Campbell, J. P. & Davidson, M. E. (1994). Learning with media: restructuring the debate. *Educational Technology Research and Development*, 42, 2, 31–39.
- Kati, E. K. (2008). Preservice teachers' conceptions about computers: an ongoing search for transformative appropriations of modern technologies. *Teachers and Teaching*, 14, 2, 157–179.
- Keller, J. M. & Kopp, T. W. (1987). Application of the ARCS model to motivational design. In C. M. Reigeluth (Ed.), *Instructional theories in action: lessons illustrating selected theories* (pp. 289–320). New York: Lawrence Erlbaum.
- Kenny, R. F. & Gunter, G. A. (2008). Endogenous fantasy-based serious games: intrinsic motivation and learning. *International Journal of Social Sciences*, 2, 1, 8–13.
- Kim, C. & Baylor, A. L. (2008). A Virtual Change Agent: Motivating Pre-service Teachers to Integrate Technology in Their Future Classrooms. *Educational Technology & Society*, 11, 2, 309–321.
- Kirkley, S. E. & Kirkley, J. R. (2004). Creating next generation blended learning environments using mixed reality, video games, and simulation. *TechTrends*, 49, 3, 42–89.
- Kozma, R. B. (1983). Reconsidering research on learning from media. *Review of Educational Research*, 53, 4, 445–459.

- Kozma, R. B. (1991). Learning with media. *Review of Educational Research*, 61, 2, 179–211.
- Kozma, R. B. (1994). Will media influence learning? Reframing the debate. *Educational Technology Research and Development*, 42, 2, 7–19.
- Lenhart, A. & Kayne, J. (2008). Teens, video games, and civics. *Pew Internet & American Life Project*, (September 16), 1–63. Retrieved, November 6, 2008, from <http://www.pewinternet.org/Reports/2008/Teens-Video-Games-and-Civics.aspx>
- Magliaro, J. & Ezeife, A. N. (2007). Preservice teachers' preparedness to integrate computer technology into the curriculum. *Canadian Journal of Learning and Technology*, 33, 3. Retrieved, April 10, 2009 from <http://www.cjlt.ca/index.php/cjlt/article/view/163/153>
- Miller, G. (2005). Computer games help seniors stay sharp. Accessed November 11, 2008, from <http://scienenow.sciencemag.org/cgi/content/full/2005/1115/3>
- Miyamoto, S. (2007). Iwata asks: no barriers—a controller for everyone. Retrieved March 5, 2008, from <http://www.nintendo.com/wii/what/iwataasks/volume-1/part-2>
- National Center for Educational Statistics (2005). Special analysis 2005. Retrieved January 22, 2008, from <http://nces.ed.gov/programs/coe/2005/analysis/sa01.asp>
- Palmgreen, P. (1984). Uses and gratifications: a theoretical perspective. In R. N. Bostrom (Ed.), *Communication yearbook* Vol. 8 (pp. 61–72). Beverly Hills, CA: Sage Publications.
- Pearson, E. & Bailey, C. (2008). The potential of new generation games consoles to support disabled students in education. *Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2008* (pp. 6199–6205). Chesapeake, VA: AACE. Retrieved, November 11, 2008, from <http://www.editlib.org/p/29241>
- Pivec, P. & Pivec, M. (2008). Games in schools. Literature review. Brussels. Interactive Software Federation of Europe, European Schoolnet. Retrieved April 10, 2009, from [http://insight.eun.org/shared/data/pdf/final_literature_review_\(gis\).pdf](http://insight.eun.org/shared/data/pdf/final_literature_review_(gis).pdf)
- Prensky, M. (2001). *Digital game-based learning*. New York: McGraw-Hill.
- Rice, J. W. (2006). New media resistance: barriers to implementation of computer video games in the classroom. Paper presented at the American educational Research Association Annual Meeting, San Francisco, CA.
- Sawyer, B. (2002). Games in schools. Literature review. Brussels. Interactive Software Federation of Europe, European Schoolnet. Retrieved April 10, 2009, from [http://insight.eun.org/shared/data/pdf/final_literature_review_\(gis\).pdf](http://insight.eun.org/shared/data/pdf/final_literature_review_(gis).pdf)
- Schueren, B. (1986). Video games: an exploration of their potential as recreational activity programs in nursing homes. In F. A. McGuire (Ed.), *Computer technology and the aged: implications and applications for activity programs* (pp. 49–85). New York: Haworth Press.
- Shaffer, D. W., Squire, K. R. & Gee, J. P. (2005). Video games and the future of learning. *Phi Delta Kappan*, 87, 2, 105–111.
- Slagle, M. (2006). Poll: 4 in 10 Americans play video games [Electronic Version]. *Washington Post*, May 8. Retrieved May 9, 2008, from <http://www.washingtonpost.com/wp-dyn/content/article/2006/05/07/AR2006050700172.html>
- Sweller, J. (1999). *Instructional design in technical areas*. Camberwell, Vic (Australia): Acer Press.
- The NPD Group (2008). *2007 U.S. video game and PC game sales exceed \$18.8 billion marking third consecutive year of record-breaking sales*. Retrieved October 21, 2008, from http://www.npd.com/press/releases/press_080131b.html

Appendix I

Participant Name: _____

For each of the statements below, please indicate the extent of your agreement or disagreement by checking the appropriate box under the column that describes your feelings.

	<i>Strongly disagree</i>	<i>Disagree</i>	<i>No opinion</i>	<i>Agree</i>	<i>Strongly agree</i>
1. I play video games on a regular basis.					
2. I would rather do other things than play video games.					
3. Video games are too complex to learn.					
4. Video games are too time-consuming to utilise in the classroom.					
5. I feel comfortable playing video games.					
6. I prefer to play video games that have a strong story.					
7. Video game controllers are too difficult to use.					
8. The act of playing video games is intimidating to me.					
9. I think video games are too violent to use in a classroom.					
10. I think video games can teach things in the classroom.					

Short Answers (use back of paper if you need to)

How familiar with video games are you? (Circle one)

Very Familiar Somewhat Familiar Not Familiar

What do you think is the most appealing aspect of video games (game play, controller, story, involvement, etc.)?

What do you think is the least appealing aspect of video games (game play, controller, learning how to play, violence, etc.)?

As a result of doing this activity, do you think your feelings towards video games will change? (Circle one)

Yes No

Explain your choice:

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