Playing Exergames in the Classroom: Pre-service Teachers’ Motivation, Passion, Effort, and Perspectives

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This study investigated pre-service teachers’ experience, motivation, passion, effort, and perspectives in playing exergames in the classroom using the self-determination theory as the main theoretical framework. One hundred forty pre-service teachers participated in the study. A mixed method was used. Data included pre-survey and post-survey results and classroom observation notes. Findings indicated that most pre-service teachers had little prior experience in exergames. However, they enjoyed playing exergames in the classroom and considered it beneficial to incorporate exergames in teaching. They also raised concerns, challenges, and the need for resources to effectively incorporate exergames in teaching. Findings also suggested that promoting pre-service teachers’ higher levels of self-determined motivation and harmonious passion may motivate them to be more active in exergames. Details are discussed in the paper.

Introduction

With the rapid development of digital technologies, using simulations and games for teaching and learning is not only an alternative method, it has also been advocated as necessary for educators and researchers to motivate...
today’s generation of learners (Dickey, 2007; Gee, 2003; Prensky, 2001). The presence of rapid feedback structures, high-end dual coding of audio and visual affordances, and the very fact that children play games at a rapidly increasing rate in their non-school time have all prompted this imperative (Entertainment Software Association, 2007). Further, simulations and games in the classroom offer the promise of increased student interactivity, autonomy to learn at an individualized pace, and the safety to repeatedly practice skills in a digital environment often without the threat of real-world consequences (Prensky, 2001; Winn, 2002).

Exergames are no exception. Exergame or exergaming is a term used for video gaming that is also a form of exercise (Sinclair, Hingston, & Masek, 2007). During the past decade, exergames such as Dance Dance Revolution (DDR) and Wii Sports have been increasingly incorporated in schools, private fitness clubs, recreational centers, and workplaces across the United States to promote physical activities (Daley, 2009; Hayes & Silberman, 2007; Schiesel, 2007). Increasingly popular as they are in classrooms, however, few studies have investigated the students’ motivation or passion in playing exergames (Trout & Christie, 2007).

With this study, we set out to look into a special student population, the pre-service teachers. We believe that it is important to investigate pre-service teachers’ motivation, passion, and effort in exergames, given the fact that the pre-service teachers will be ‘next generation’ educators, and that their motivation towards exergames plays a vital role in predicting their interest, tendency, effort, and engagement in using exergames in their future classrooms (Hadley & Sheingold, 1993; Swan & Mitranii, 1993). The purpose of this study, therefore, was twofold. First, we investigate the pre-service teachers’ motivation, passion, and effort in playing exergames in the classroom through an established theory of human motivation, namely self-determination theory (SDT; Deci & Ryan, 1985; Ryan & Deci, 2000a). Second, since the participating players are pre-service teachers, we investigate if these pre-service teachers see exergames as beneficial in classrooms based on their personal experiences.

**CONNECTIONS BETWEEN TRADITIONAL EXERCISES, EXERGAMES AND LEARNING IN CLASSROOMS**

Studies that evaluated the impact of the use of games in disciplines such as math, science, language, and computer science, have shown positive outcomes in terms of student motivation and learning effectiveness in
relation to curricular activities (Papastergiou, 2009; Rosas, et al., 2003). However, studies looked into the relationship of gaming to physical and emotional health showed mixed results. Some reported that lower levels of physical activity and higher levels of weight were associated with more time dedicated to playing games (Carvelhal, et al., 2007; Vandewater, Shim, & Caplovitz, 2004). Others reported that there were no relationships between gaming and obesity or aggressive behavior (Langer & Brembert, 2005; Wang, Chia, Quek, & Liu, 2006).

At the same time, there has been growing literature that documents the benefits of physical activity for young people’s physical and mental health as well as academic performance (Sallis, 1994; Shephard, 1997). Physical activity has been reported as enhancing academic performance by increasing cerebral blood flow, enhancing arousal level, changing hormone secretion, and improving self-esteem (Dwyer, Sallis, Blizzard, Lazarus, & Dean, 2001; Hart & Shay, 1963; Shephard, 1997; Trudeau & Shephard, 2009). It is in this background that we decided to examine exergames, which supposedly have the potential of combining the benefits of gaming and physical activity and are popular among young people. Exergames enable players to employ active body movements as mode of interaction. As such, playing exergames could become part of the solution against obesity.

Some popular exergames on the market include DDR, Xavix, Sony Playstation’s Eye-Toy, CatEye Fitness equipment, Wii Sports, and the most recently marketed xBox Kinect. DDR is a dance simulation game during which players stomp, spin, slide, and dance on a touch-sensitive dance pad in proper time with music. Similarly, Xavix games, including tennis, baseball, and bowling get video game players to interact in a virtual sport event from a “first-person” perspective. The Eye-Toy allows individuals to have their images projected onto the screen and the Eye-Toy game “Groove” allows players to create dance movements to over 28 songs. CatEye allows individuals to ride a bicycle ergometer connected to a Sony Playstation so that moving on the ergometer coincides with movement within the game. The most recently marketed xBox Kinect uses no controller. It uses a motion sensor that tracks one’s entire body, creates a digital skeleton of the player, remembers the player, and recognizes the player’s voice so that the player can control his or her moves.

In this study, we focused on Wii Sports. Wii Sports include a collection of five sports simulations, designed to demonstrate the motion-sensing capabilities of the Wii Remote to players. The five sports are tennis, baseball, bowling, golf, and boxing. Players use the Wii Remote or Wiimote to mimic actions performed in real life sports, such as swinging a tennis rack-
et. The rules for each game are simplified to make them more accessible to new players. The games also feature training and fitness modes that monitor players’ progress in the sports. Unlike most other video games, Wii Sports are aimed at both gamers and non-gamers (NiSuTe, 2006). The approach is to introduce simple games stimulating thinking as well as playing sports (NiSuTe, 2006).

Not only have Wii Sports been popular as entertainment activities in people’s free time, they have also been introduced to educational settings to facilitate students’ engagement in physical activities (Schiesel, 2007). Graves, Stratton, Ridgers, and Cable (2007) measured the energy expenditure of children playing Wii Sports as compared to other video games that did not employ active body movement. They found that Wii sports required significantly more energy than the other video games, but less than real sports they simulate. Besides the improved physical health, studies have also shown that playing exergames can improve mental well-being. Fox (1999), after reviewing past studies on physically active games, reported that there is growing evidence that exercise increases mental well-being through improved mood and self-perception. In addition, classroom teachers have started to use Wii Sports to help their students learn in areas beyond physical activities. According to Weir (2008), an elementary teacher helped his students to improve math skills by using the Wii bowling sport: he asked his students to calculate the number of pins needed to get a spare and to count the number of pins knocked down. Some schools included Wii Fit as a tool in their physical education classes (Stevens, 2009). It was reported that this new approach to teaching physical education had positive outcomes, in which the students not only responded very well to the new teaching method, but also learned about their bodies and lost weight (Stevens, 2009).

**THEORETICAL FRAMEWORK: SELF-DETERMINATION THEORY**

Self-determination theory (SDT; Deci & Ryan, 1985; Ryan & Deci, 2000a, 200b, 2007) is a promising theoretical framework for explaining students’ motivation and motivational outcomes. “To be motivated means to be moved to do something. A person who feels no impetus or inspiration to act is thus characterized as unmotivated, whereas someone who is energized or activated toward an end is considered motivated ” (Ryan & Deci, 2000b, p. 1). According to SDT, self-determination continuum, from higher to lower self-determination, includes intrinsic motivation, extrinsic motivation, and
Intrinsic motivation refers to doing an activity for the pleasure it provides or for its own sake. Extrinsic motivation is apparent when individuals perform an activity because they value its associated outcomes such as public praise, more than the activity itself. Amotivation refers to behavior that is neither intrinsically nor extrinsically motivated (Ryan & Deci, 2000a).

With SDT, Deci and Ryan (1985) outlined the organismic integration theory (OIT) to explain a process of internalization through which individuals satisfy their needs. OIT proposes four types of behavioral regulations in the internalization process, each one reflecting a different reason for acting out the behavior. The four types of behavioral regulation are in a continuum, from internal to external, including integrated regulation, identified regulation, introjected regulation, and external regulation. Integrated regulation behavior is closely linked to intrinsic motivation. It is behavior that is solely for its own sake or enjoyment. Identified behavior is self-determined according to one’s choice or values. It is characterized by feelings of want. Introjected regulation is behavior that is internally controlled or self-imposed, such as acting out feelings of guilt avoidance, and is characterized by the feeling of ought rather than want. Finally, externally regulated behavior is controlled by external means such as rewards or external authority.

In addition, Vallerand and his colleagues (2003) proposed two types of passion relevant to motivation: harmonious passion and obsessive passion. Passion is defined as “a strong inclination toward an activity that one finds important, invests time in, and likes” (Vallerand, et al, 2003, p. 757). Harmonious passion refers to a motivation to engage in an activity by personal choice which is in harmony with other life domains. This type of passion is linked to positive outcomes during and after the activity engagement. In contrast, obsessive passion refers to an internal pressure that forces people to engage in an activity they choose and view as important. This form of passion is in conflict with activities in other life domains and is linked to negative outcomes during and after the activity engagement. Based on the dualistic model of passion, autonomous internalization of an activity may lead to harmonious passion and controlled internalization can lead to obsessive passion. Previous studies show that harmonious passion is generally related to positive emotions, concentration, and flow, while obsessive passion is related to negative emotions, rigid persistence, conflict between activities and other life aspects, and self-destructive behaviors (Mageau, et al, 2005; Seguin-Levesque, et al, 2003; Vallerand, et al, 2003).

Games and exergames are perceived as motivating for the players. However, little research has investigated the kinds of motivation related to
playing exergames. Yet, such an investigation is especially important when
the exergames are brought into the classrooms to promote students’ physical
activities or academic achievements. This is because different kinds of mo-
tivation or passion, for instance, intrinsic or extrinsic, may achieve different
efforts in students playing the games, and consequently may result in differ-
ent benefits.

THE STUDY

Research Purpose and Questions

The purpose of this study was to investigate how well SDT would ap-
ply to and account for pre-service teachers’ motivation, passion, and effort
in exergames, and what the pre-service teachers would see as beneficial or
harmful in incorporating exergames in the classroom based on their per-
sonal classroom experiences. The following questions formed as the main
research questions of this study:

• What are the pre-service teachers’ prior experiences with
  exergames such as Wii Sports?

• What are the pre-service teachers’ levels of motivation, passion,
  and effort towards exergames in the classrooms?

• Are there relationships between pre-service teachers’ motivation,
  passion, and effort towards classroom exergames as defined by
  SDT? If so, what are the relationships?

• How do pre-service teachers personally feel about playing
  exergames in the classroom setting?

• Based on their own classroom exergaming experiences, what are
  pre-service teachers’ attitudes towards integrating exergames in
  classrooms?

Research Population

One hundred and forty pre-service teachers in their junior and senior
years from the College of Education of a research university in the U.S. par-
ticipated in this study. All the participants were enrolled in a teaching meth-
od course entitled “movement tasks in games, rhythms, and sport activities.” The data were collected through the duration of the course in the summer of 2010.

Most participants ranged between 18 and 23 years old ($M_{age} = 21$). Of the 140 participants, 52.2% were male and 47.8% were female. The participants included 60.9% Caucasian, 13.0% African American, 8.7% Asian American, 8.7% Hispanics, and 8.7% bi-racial groups, representing a diverse group of students in the teacher education program. The participants had a wide range in their future teaching interests including arts, math, science, and kinesiology. They volunteered to participate in the study, signed the consent forms, and completed all phases of the data collection.

**Research Instruments, Procedure, and Analyses**

A mixed method was incorporated in the study to answer the research questions. The data for the study came mainly from three sources: a pre-survey questionnaire, field observation notes by two researchers over two periods of 30-minute exergaming activities in the classroom, and a post-survey questionnaire.

The participants were first asked to complete an open-ended pre-survey questionnaire at the beginning of the course. The pre-survey sought demographic info and the pre-service teachers’ prior experiences of playing video games. They were asked about their levels of expertise and enjoyment playing various video games, including Wii Sports. They were asked to provide examples and explain reasons for their responses.

The participants then spent a total of one hour (divided in two separate 30-minute class sessions) playing Wii Sports games such as tennis and golf, while the two researchers observed the sessions and took notes. During each period of 30 minutes, approximately 25 or so participants shared one Nintendo station and took turns to be in control of the Wiimotes. Each station was equipped with four Wiimotes, which meant that four participants could be in control of the station and use the Wiimotes simultaneously each time, while the rest of the group would either watch or follow the moves behind those who were in control of the station. In fact, all the participants were encouraged to follow the movement at the same time while watching the screen even when they did not have the control of the Wiimotes. Every participant was able to be in control of the Wiimote at least two times during the 30 minutes’ period.

Towards the end of the semester, the participants were asked to respond to a post-survey questionnaire. The post-survey questionnaire included three
7-point Likert scale surveys on motivation, passion and effort, and five open-ended questions seeking further insights of their experience and perspectives.

In the post-survey questionnaire, the three 7-point Likert scale surveys were previously validated questionnaires measuring self-determined motivation, (Guay, Vallerand, & Blanchard, 2000), passion (Vallerand et al., 2003), and perceived effort (McAuley, Duncan, & Tammen, 1989). The first survey used was the Situational Motivation Scale (SIMS, Guay, Vallerand, & Blanchard, 2000). It was used to assess the participants’ intrinsic motivation, extrinsic motivation (which included external regulation, introjected regulation, identified regulation, and integrated regulation), and amotivation towards their exergaming exercises. The SIMS survey used a 7-point Likert scale, from strongly disagree to strongly agree, on 16 items stating the reasons why the participants were currently engaged in the activity. Examples of the items included statements such as “because I think that this activity is interesting,” “I do this activity but I am not sure if it is worth it,” and “because I feel that I have to do it.” The construct of the SIMS scale was supported and validated by five studies and was also supported by correlations with other constructs as postulated by theories (Guay, Vallerand, & Blanchard, 2000). The second survey was the Passion Scale (Vallerand et al., 2003), which examined the participants’ harmonious passion and obsessive passion with a 7-point Likert scale and asked the participants to check from strongly disagree to strongly agree on each of the 18 items that best described the participants’ thoughts and feeling about the present activity. Examples of the items included statements such as “I enjoyed this activity very much,” “I put a lot of effort into this activity,” and “This activity did not hold my attention.” The third survey used was on perceived effort (McAuley, Duncan, & Tammen, 1989). It used a 7-point Likert scale from strongly disagree to strongly agree, and included 14 items such as: “This activity is in harmony with the other activities in my life.” “This activity is a passion that I still manage to control.” “This activity allows me to live memorable experiences.” With this instrument, McAuley, Duncan, and Tammen (1989) used confirmatory factor analyses to test and compare alternative models that are nested within the Intrinsic Motivation Inventory items originated by Ryan (1982). Correlational analyses and multiple regression analyses were used to analyze data from these three surveys.

In addition to filling out the three surveys, the participants were asked to respond to five open-ended questions relating to their classroom experiences on exergames. They were asked why or why they did not enjoy playing exergames in the classroom, whether and why they considered it benefici-
cial or harmful to incorporate exergames in the classroom. They were also asked, based on their experience, if they believed that their future students would enjoy, benefit, and learn from playing exergames, what they would see as challenges of incorporating exergames in their future teaching, and what resources would be necessary for effectively integrating exergames in the classroom.

Open-coding was used for the analysis of open-ended questions because it is a rigorous method to create understanding and to draw conclusions inductively from data through labeling and constant comparison (Glaser & Strauss, 1967). This method enabled the concepts found in the data to be categorized and themes to emerge. It helped create an understanding based on the participants’ perceptions. Two researchers independently analyzed the participants’ responses and labeled the emerging themes from the participants’ written responses and their field notes before agreeing upon the themes to report in this paper.

RESULTS

Prior Experience in Exergames

Of the 140 pre-service teacher participants, 36% said that they had never played any exergames; 30% indicated they were beginning players; and another 30% grouped themselves as middle-level players. Only 4% of the pre-service teachers indicated that they were advanced players. This result indicated that most of the pre-service teachers had little previous experience with exergames.

Relationships Between Motivation, Passion, and Effort in Exergames

Correlational analyses revealed that obsessive passion was positively associated with identified regulation, harmonious passion and perceived effort. Further, harmonious passion was positively related to intrinsic motivation, identified regulation, and perceived effort, but negatively related to external regulation and amotivation. The following table (Table 1) presents the descriptive statistics and correlations among the variables.
Table 1
Descriptive statistics and correlations among variables (N = 140)

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Intrinsic Motivation</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Identified Regulation</td>
<td>.80**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. External Regulation</td>
<td>-.32**</td>
<td>-.30**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Amotivation</td>
<td>-.58**</td>
<td>-.45**</td>
<td>.44**</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Harmonious Passion</td>
<td>.50**</td>
<td>.53**</td>
<td>-.39**</td>
<td>-.34**</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Obsessive Passion</td>
<td>.10</td>
<td>.29**</td>
<td>-.09</td>
<td>.13</td>
<td>.48**</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>7. Effort</td>
<td>.61**</td>
<td>.53**</td>
<td>-.24**</td>
<td>-.51**</td>
<td>.52**</td>
<td>.18*</td>
<td>-</td>
</tr>
</tbody>
</table>

M: 5.54, 1.26
SD: 4.59, 1.33
5.88, 1.32
1.78, 1.12
4.78, 1.16

Note. \( M = \text{mean}; SD = \text{standard deviation}; \) Bivariate correlations among the study variables are significant at the \( p < .01 \) level. * \( p < .05, ** p < .01 \).

The multiple regression analyses indicated that identified regulation and external regulation were significant predictors of harmonious passion, accounting for 33.8 % of the variance. Further, identified regulation and amotivation were significant predictors of obsessive passion, contributing to 16.9% of the variance. Finally, hierarchical regression analysis, entering harmonious passion and obsessive passion first, and self-determined motivation constructs in the second block, revealed that harmonious passion, intrinsic motivation, and amotivation were significant predictors of perceived effort, accounting for 47.1 % of the variance. Table 2 and Table 3 display the results from multiple regression analyses.

Table 2
Results of Stepwise Regression Analyses (N =140)

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>Step</th>
<th>Independent variables</th>
<th>( R^2 )</th>
<th>( \beta )</th>
<th>( T ) Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harmonious Passion</td>
<td>1</td>
<td>Identified Regulation</td>
<td>.338</td>
<td>.45</td>
<td>6.24**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>External Regulation</td>
<td></td>
<td>-.25</td>
<td>- 3.46**</td>
</tr>
<tr>
<td>Obsessive Passion</td>
<td>1</td>
<td>Identified Regulation</td>
<td>.169</td>
<td>.44</td>
<td>5.01**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Amotivation</td>
<td></td>
<td>.33</td>
<td>3.73**</td>
</tr>
</tbody>
</table>

Notes. \( \beta \) values are standardized regression coefficients from the regression analysis; ** \( p < .01 \).
### Table 3
Results of Hierarchical Regression Analyses (N = 140)

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>Step</th>
<th>Independent variables</th>
<th>R²</th>
<th>β</th>
<th>T Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Effort</td>
<td>1</td>
<td>Harmonious Passion</td>
<td>.274</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>Harmonious Passion</td>
<td>.471</td>
<td>.56</td>
<td>6.76**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Intrinsic Motivation</td>
<td></td>
<td>.26</td>
<td>2.95**</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Amotivation</td>
<td></td>
<td>-.28</td>
<td>-3.26**</td>
</tr>
</tbody>
</table>

Notes. β values are standardized regression coefficients from the regression analysis; **p < .01.

### Enjoyment and Positive Attitudes Towards Using Exergames in the Classroom

Responses to the open-ended questions showed that the participants were overwhelmingly positive in their descriptions about their experience playing the exergames in the classroom. Most of the participants enjoyed playing Wii Sports and felt comfortable playing them in the classroom. They indicated that they liked it and that they wished that they had more time to play.

Most pre-service teachers were positive about integrating exergames into classrooms, and they saw a positive relationship between playing exergames and academic achievements. Seventy-nine (79%) of the participants indicated that it was beneficial to incorporate exergames in teaching and it would help improve students’ academic achievements. The positive comments can be grouped into four main themes. First, it was fun playing exergames, and as a result, student attendance and performance would improve. Here’s what Allen had to say, “if the students enjoy doing it then they will come to class more and actually want to be involved in the lesson.” Second, exergames would help students obtain knowledge and skills, and improve self-esteem. Cathy suggested, “With Wii Sports, students can learn the rules of different sports and also gain some knowledge related to skill-related fitness. Wii fit can foster concepts related to health-related fitness.” Third, exergames would promote students’ motivation and productivity in learning. Most participants believed that any forms of physical activity, regardless of what they were, would help improve academic achievements. Ellen commented: “Every physical movement activity promotes positive health development. It helps people feel motivated, with less stress, and ready to achieve
better in everything they do.” Last but not the least, incorporating exergames in the classroom would help teachers stay updated with new technology and better connect to their tech-savvy students. Beth commented: “Most of the kids already use Wii at home and Wii is so popular now and it will be even more popular in the near future. Teachers need to be aware of the latest trends that attract children to exercise.”

**Discomfort and Concerns over Playing Exergames in the Classrooms**

Several people indicated some discomfort, of which, most were related to the fact that others were watching. “I am shy.” “Everyone was watching me.” “I was afraid classmates would laugh at me if I didn’t know how to play.” Some participants indicated that they were not good at it and that they would need more practice. Others pointed out the difference between playing the real sports and Wii Sports: “I play tennis, but I am not good at playing tennis in Wii.” “I don’t know all the tricks of how to work the controller.” One participant mentioned that the Wii game felt “silly for our age.” Related to the discomfort, participants indicated that they would be more motivated and would enjoy playing the exergames more if they could have more practice, have more time to play, and play the entire game, rather than taking turns and sharing the station to play with the other classmates for only 30 minutes. Several participants also indicated that they would be more motivated if they could play with friends and in small groups (instead of having an audience/classmates watching). Perhaps similar to playing real physical games, competition was brought up by some participants as motivating, but by others as a de-motivating factor for playing the exergames. Twenty or so participants also expressed different levels of concern over the use of exergames in the classroom. Jenny stated: “Wii Sports are all about cheating the game. I don’t think the students would play full out, but instead mimic the movements needed to complete the game.” Maureen had this dilemma: “I think that kids spend so much time at home in front of a game that they should be outside playing. I do think that if they are engaged in something they enjoy they will enjoy the class more.”

While watching the participants play with the Wii Sports, the researchers had similar impressions regarding the intensity of the activities. It appeared that although participants were laughing while playing, quite often they seemed to have only moved their hands or arms rather than the whole body. In addition, because 25 or so participants had to share one station and had to wait for their turns to play the Wii Sports, there were quite some
watching and waiting rather than playing. These limitations prevented the participants from fully enjoying playing the games.

The constraints of the setup, including the limited time, station, and games that the participants were able to play, obviously affected the participants’ perspectives. Yet, the limitations also helped the participants think of their future constraints, challenges, and necessary resources to effectively integrate Wii Sports in classroom settings. The participants expressed various challenges of incorporating exergames in their future classrooms. These challenges include finding space and time to integrate exergames in classrooms, obtaining funding for sufficient equipment and varieties of games, and managing a large class with students of different interests and skill levels. As stated by Steve, “it will be difficult to get all the equipment needed to play this activity because most schools don’t have all of those things. Also it will be hard to keep the kids who are standing to the side waiting their turn interested and out of trouble.” Several participants also stated that it could be challenging to obtain supports from parents, administrators, and the other teachers. Stephanie commented, “I think that the challenge I would face would be trying to convince parents that this is not just a video game activity but kids can learn with this activity.” One participant pointed out the possible difficulty of incorporating a particular Wii Sport in different subject matters: “I don’t think golf would apply to my future teaching in any subject I would be teaching. I think other exergames might be useful, but I don’t feel golf would be that much of an enjoyment to my class, or help me teach a particular subject.”

**DISCUSSIONS**

One purpose of this study was to investigate the predictive utility of self-determined motivation and passion on pre-service teachers’ effort in exergaming such as Wii Sports. The study showed that the identified regulation was the positive predictor of harmonious passion and obsessive passion. Identified regulation refers to behaviors that are highly valued and performed out of choice and values. This type of extrinsic motivation reflects behavior that is internalized and self-initiated even though the behavior itself is not always fun (e.g., “I take part in exergaming because I want to learn skills” and “I take part in exergaming because I can learn skills which I could use in others areas of my life”). The findings indicate that to promote pre-service teachers’ passion toward exergaming, it is important to highlight the values or importance of exergaming for teaching and learning purposes. In addition, harmonious passion and intrinsic motivation were sig-
nificant predictors of perceived effort. The pre-service teachers had inherent feeling of pleasure and accomplishment toward engaging in exergames. This finding makes conceptual sense, because the pre-service teachers who enjoy exergaming will be more likely to participate in exergames, compared with those who feel pressured to participate in exergames. This result and the findings from similar studies suggest that teacher educators should promote the pre-service teachers’ high levels of harmonious passion and intrinsic motivation in exergaming, which should foster their effort and engagement.

Another purpose of the study was to investigate the pre-service teachers’ experience in playing exergames in the classroom, and based on their personal experience, what they would suggest as beneficial or harmful in integrating exergames in classrooms. Despite the lack of prior experience and some discomfort, the pre-service teacher participants were very positive about their experience and about using exergames in classrooms. They described the exergaming activities as fun and exciting. They pointed out many benefits of integrating Wii Sports into classrooms, including but not limited to the possibility of improving students’ attendance and academic performance, the opportunity of helping students obtain knowledge and skills, and the likelihood of helping teachers stay updated with new technologies and thus better connected to their students. Based on their classroom exergaming experiences, the pre-service teachers also indicated some discomfort, concerns and challenges. One discomfort was playing the games in front of the public (the other classmates) instead of being by oneself or with a group of close friends. This created a sense of anxiety especially when one was a novice of the game. The limited time and station to play the games presented as one of the biggest challenges.

These descriptive comments are closely tied to the results on motivation, passion, and effort. They provided insights into the pre-service teachers’ attitudes towards playing exergames and their intention to integrate exergames in their future teaching practices. Teachers often consider potential positive outcomes against perceived barriers, and weigh the potential effectiveness of integrating technologies in the classroom against perceptions that technology may be difficult to use, unpleasant to learn, inconvenient, costly, or time-consuming (Glanz, Lewis, & Rimer, 1997). This study confirmed teachers’ consideration of these important elements when integrating technologies into classrooms. The study also confirmed the importance of the social contextual conditions that support one’s feelings of competence, autonomy, and relatedness in self-determined motivation (Ryan & Deci, 2000b). These three basic psychological needs are the basis for one to maintain intrinsic motivation and to become more self-determined with respect
to extrinsic motivation (Ryan & Deci, 2000b). As pointed out by the pre-service teachers, some big challenges to effectively incorporate exergames into the classroom are: becoming familiar with the game and being able to incorporate the game into the curriculum, receiving supports from administrators and parents, and having sufficient time and equipment to play the games. Therefore, to facilitate self-determined motivation, the school and classroom environments (i.e., the social contextual conditions) need to help teachers feel satisfied of the three basic human needs – the needs to feel connected, effective, and self-sufficient when they are exposed to new ideas and exercise new skills.

This study serves as an important launching pad for a series of studies we are undertaking. The study sets a foundation for investigating further inquires including to what extent pre-service teachers’ positive attitudes help them engage in exergame themselves, and what professional development will help them effectively incorporate exergames and other technologies into their future teaching and better connect to their future students while being mindful of the limitations of technologies. The results of this study provide us with a baseline for more in-depth studies.

**CONCLUSION**

In summary, the findings suggested that most of the pre-service teachers were not familiar with exergames such as Wii Sports nor were they active game players. With limited experience in games, however, most of them tended to be positive about the use of exergames in classrooms and see a positive relationship between incorporating exergames in student learning and academic achievements. The reasons given for such positive attitudes included the importance of keeping up with new technologies, of connecting teaching activities to the familiar daily activities of younger learners, of creating fun opportunities in learning, and the importance of physical activities in facilitating students’ learning. Not surprisingly, those who were uncomfortable playing exergames themselves shared similar discomfort and doubts about incorporating the exergames in classrooms. Such concerns included the possibility of exergames replacing traditional exercises, discouraging children further from outdoor activities, and not offering sufficient workout as traditional games do.

The findings also suggested that promoting pre-service teachers’ higher levels of self-determined motivation and harmonious passion may motivate them to be more active in exergaming. These results supported the notion that the higher the pre-service teachers’ motivation and harmonious passion,
the more likely they will feel they are in a motivated state. These results of the present study help deepen our understanding of motivation in exergames among pre-service teachers.

Although the study focused on Wii Sports, we believe the findings provide insights for incorporating the other exergames such as DDR and even the newest xBox Kinect into the classroom because similar benefits and challenges could apply to the other exergames. The computer gaming industry has evolved significantly in the first decade of the 21st century, affecting everyone’s daily life. The exergames continue to expand from gaming to education, health, and social life. Compared to many other computer or video games, exergames have greater potential to promote positive lifestyles and educational opportunities while providing a fun and entertaining learning environment.

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Playing Exergames in the Classroom


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