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Teaching Teacher Candidates to Use Technology Games as a Teaching Strategy

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Teaching Teacher Candidates to Use Technology Games as a Teaching Strategy

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Its cornerstones will be innovative use of educational technology and a commitment to an integrated educational experience that develops the whole person.
The **first purpose** of this investigation was to determine whether first-semester Education students could develop games related to the requirements of a specific course which they could then use to learn educational Theory and Applications more successfully than students that did not develop and use such games.

A **second purpose** of this research was to confirm or reject the role of potential pitfalls in the gaming method. Lieberman (2010) has cited two potential pitfalls in the use of games: (1) that instructors are lower in gaming literacy than their students and that (2) students may fall prey to focusing on game theory applications to the detriment of learning content.
Games that Teach Content

The most straightforward way to teach with video games is to have students play a game containing content that aligns with an existing school curriculum. Educators have been using games to teach in this way since 1971 (Lieberman, 2010).

Our digital generation of students are used to thinking on multiple tracks at once and responding to quick and specific feedback (Prensky, 2006).

Computer supported content based games and simulations have been identified as motivational and provide students an opportunity for leadership, reviewing curriculum content, developing cognitive and social skills and promotes student interaction (Klopfer, Osterweil, Groff, & Haas, 2009).
The educational rationale for having students create games depends on the context of the activity. A study in which students developed questions and answers about curricular content for use in simple quiz games cited the potential of gaming as a “vehicle for increasing motivation and engagement” (Owston, R., Wideman, H., Ronda, N.S., & Brown, C., 2009).

Theories of constructivist and constructionist learning hold that learning is most effective when students construct mental models or tangible artifacts. The process of game development incorporates both (Robertson and Good, 2005).
Simple quiz type games are most appropriate for teaching bite-sized chunks of information but can move to more challenging higher-order thinking levels defined by Bloom’s Taxonomy with thought and practice (Rice, 2007).

A variety of tools exist to help non-programmers develop video games, ranging from simple quiz games, into which students need only plug questions and answers, to professional art, animation and level-design tools that allow users to create more complex genres (Prensky, 2008).
Games and Educational Pedagogy

Teaching with games requires a familiarity with video game design and a willingness to rethink pedagogy.

The social networks that develop around games similarly express Vygotsky’s theories of social constructivism and zone of proximal development (Aug et al, 2009).

Other game elements that motivate players and mirror good teaching techniques include setting clear goals, forming healthy competition and providing immediate feedback (Jackson, 2009).
Pre service Teacher Preparation

The generally low level of gaming literacy among teachers is a barrier to the use of games in the classroom since many educators are understandably reluctant to devote class time to experimentation (Charsky and Mims, 2008).
Schrader, Zheng and Young conducted a multi-school undergraduate survey of teachers in pre service and credential programs during 2003-2004 academic year (2006). Although limited in scope the data indicated that pre service teachers were open to new applications of technology and considered gaming to be an important education tool. The survey suggested that there was a need to provide the pre service teachers with training to expand their awareness of the instruction use of video games as well as the underlying theoretical foundations of learning in gaming contexts (Young, Schrader, and Zheng, 2006).
Pre service Pilot Project
Spring 2012 (54 students)
Pre service Project
Fall 2012 (64 students)
Spring 2013 (33 students)
Fall 2013 (31 students)

Early Childhood Program
Special Education Program
Secondary Teacher Certification Program
Pre service students reported in class discussion:

- That they had not observed their teachers using video games in the classroom as a teaching strategy.

- Similar to the Schrader, Zheng and Young survey they themselves had never created a video game but enjoyed playing a variety of video games 3 or more hours per week.
Assignment

Building a Video game based on developmental theorists.

Each game must include questions that reflect the levels of Bloom’s Taxonomy

(students worked in teams and were assigned specific content to cover)

Course Outcomes
1. Demonstrate knowledge of the theories of development for learners.
2. Use technology for planning and managing the teaching and learning environment.
Show video of student game presentations
Show Video of Question and Answer session
Pre service Teachers reported that:

- Initially they were worried about being able to complete the assignment well
- Having a team to work on the assignment help ease their worries
- Before completing this assignment they never would have tried to create a game to use in their classrooms
- Having completed the assignment they are confident that they will use this strategy
- Playing the game helped them determine what they already knew and what they needed to study
This study demonstrates the need for:

Providing pre service teachers with these opportunities to expand their awareness of the instructional merit of video games.

Increasing teachers’ awareness of and experience with these valuable tools to offer a greater opportunity for creatively implementing technologically based educational games into the classroom.
Methodology

- A two-tailed t-test was applied to Control Group and Treatment Group Raw Test Scores on the Theory Pre Test to determine if there was a significant difference between mean Raw Pre Test scores of the Control and Treatment groups.

- A two-tailed t-test was also applied to the Control Group and Treatment Group Raw Test Scores on the Application Pre Test to determine if there was a significant difference between mean Raw Pre Test scores of the groups.
A Theory Increase score and an Application Increase score was calculated for each student in both groups by subtracting each student’s Pre Test score from his Post Test score.

A one-tailed t-test was applied to Control Group and Treatment Group Theory Increase Scores.

A one-tailed t-test was applied to Control Group and Treatment Group Application Increase Scores.
• A one-tailed t-test was applied to Control Group and Treatment Group Theory Increase Scores.

• A one-tailed t-test was applied to Control Group and Treatment Group Application Increase Scores.
Hypotheses

The Hypotheses for each one-tailed t-test were:

• $H_N$ = There is no significant difference between the Increase Scores of the two groups.

• $H_A$ = The Treatment Group Increase Scores were significantly higher than the Control Group Increase Scores.
# Mean Increase Score Comparison

<table>
<thead>
<tr>
<th></th>
<th>Theory Test</th>
<th>Application Test</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Control</td>
<td>Treatment</td>
</tr>
<tr>
<td>N</td>
<td>82</td>
<td>93</td>
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<tr>
<td>Mean Increase</td>
<td>4.34</td>
<td>4.43</td>
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<tr>
<td>SD</td>
<td>2.61</td>
<td>3.22</td>
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<tr>
<td>P(Reject H$_N$)</td>
<td>.16</td>
<td></td>
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</tbody>
</table>
FINDINGS

When the one-tailed t-test was applied to the Theory Increase Scores of the two groups, there was no Significant difference between the Treatment Group (Mean = 4.43) and the Control Group (Mean = 4.32).

When the one-tailed t-test was applied to the Application Increase Scores of the two groups, there was Significant difference between the Treatment Group (Mean = 4.62) and the Control Group (Mean = 3.04).

These results suggest that Gaming may have more effect on higher level thinking (Application vs Theory) and more investigation may be warranted.
We did not find a significant impact of different levels of gaming literacy between the students and their instructor. In our study, both the pre-service teachers and their instructor had sufficient technology literacy to develop content games and use them successfully to increase the testable learning in the students.

We did not find evidence that students with computer game backgrounds fall prey to only focusing on game theory application to the detriment of learning content. The gaming Treatment groups’ Post-test performance was about equally improved in both the Theory (from 2.93 to 6.96) and Application (from 2.52 to 6.28) areas.

Any differences in previous course work in Psychology that might enable some students to perform better on the Theory test would have been picked up on the Theory Pre-test between the two groups, and there was no statistically significant difference between the Pre-Test Theory scores of the gaming and non-gaming groups.
Statements of the pre-service teachers themselves have informed us that opportunities to practice game development and use during their educational experience can expand their awareness and make them more comfortable using technology gaming as a teaching strategy.
Summation and Recommendations


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