Factors Affecting Pre-Service Teachers’ Intentions to Use Web 2.0 Technologies to Supplement Student Learning in K-12 Classrooms

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Abstract

This study investigated pre-service teachers’ views and factors that influence their intentions to integrate Web 2.0 technologies in their future classrooms. A mixed methods research design was used; qualitative interview data were used to triangulate quantitative survey data. Data were analyzed using the Decomposed theory of planned behavior (DTPB) as the theoretical framework (Taylor & Todd, 1995). Results suggest that pre-service teachers’ attitude and their perceived usefulness of Web 2.0 technologies are strong indicators of their intention to use Web 2.0 tools. Additional findings indicate that pre-service teachers intend to use blogs, wikis, and social networking tools in their future classrooms. This study has implications for teacher educators who are preparing pre-service teachers to use Web 2.0 technologies in their classrooms.

Introduction

The role of Web 2.0 technologies (wikis, blogs, social networking, etc.) in education is becoming increasingly prominent, both because of the need for students to develop 21st century skills that will prepare them for living in an information society as well as their potential value of these tools for teaching and learning. Researchers have outlined potential benefits of using Web 2.0 tools in education including effective collaboration, active engagement, interaction, and communication (Dohn, 2009; Hartshorne & Ajjan, 2009; Nelson, Christopher, Mims, 2009; Shihab, 2008). However, the successful integration of these technologies depends on teachers’ abilities to create socially active learning environments that encourage cooperative interaction, collaborative learning, and group work (Nelson, et al., 2009; Coutinho, 2008). Students entering the field of education today, also called digital natives, tend to be savvy with social and communications technologies (Oblinger & Oblinger 2005). Yet, research shows that while pre-service teachers have positive attitudes and express their intentions to use Web 2.0 technologies, they are not prepared to use them in future classrooms (Lei, 2009; Gill & Daigrm, 2008). The National Educational Technology Standards for teachers (NETS-T; International Society for Technology in Education, 2008) identify the importance to pre-service teachers of the fundamental knowledge, skills and attitudes for incorporating contemporary tools and resources to maximize student learning in education (ISTE, 2008).

To prepare pre-service teachers to use Web 2.0 technologies in their classrooms it is important to understand the factors that impact their intentions to use these emerging technologies. Existing literature shows that while few studies have explored the factors influencing the technology integration efforts of pre-service teachers, rarely has research examined the potential factors that determine of pre-service teachers’ intentions to use Web 2.0 technologies in schools.
Purpose of Study

The purpose of this study was twofold. The first was to examine factors influencing pre-service teachers’ intentions to use Web 2.0 technologies in their future classrooms. The second was to explore pre-service teachers’ perceptions of the pedagogical benefits of using Web 2.0 applications to supplement their students’ classroom learning. The research questions for this study included: What factors best predict pre-service teachers’ decisions to use Web 2.0 technologies to supplement classroom instruction? What are pre-service teachers’ views of the pedagogical benefits of using Web 2.0 technologies to supplement their future classroom instruction? How does the follow-up qualitative data help explain the quantitative results?

Theoretical Framework

This study used the decomposed theory of planned behavior (DTPB) (see Fig. 1) as its theoretical framework (Taylor & Todd, 1995). The DTPB extends Ajzen’s (1991) theory of planned behavior (TPB), which focuses on the formulation of an intention to behave in a particular way. TPB suggests that a combination of behavioral intention and perceived behavioral control determines one’s actions. The DTPB explores subjective norms and perceived behavioral control more completely by decomposing attitude, subjective norms, and perceived behavioral control into lower-level belief constructs and states that behavioral intention determines behavior and that attitude, subjective norms, and perceived behavioral control are direct determinants of behavioral intention. The DTPB provides a comprehensive way to understand how an individual’s attitude, subjective norms and perceived behavioral control can influence his or her intention to use Web 2.0 (Ajjan & Hartshone, 2008). Moreover, it helps examine the relationship of factors that impact the adoption and use of new technologies more specifically (Taylor and Todd, 1995).

Fig. 1. Research framework for pre-service teachers’ use of Web 2.0 technologies based on decomposed theory of planned behavior (Taylor & Todd, 1995)
Methods

A mixed methods research design was used to examine students’ intentions to use Web 2.0 technologies in their future classrooms. Specifically, this study used the convergence triangular mixed methods design in which different but complementary data were collected to validate and expand quantitative results with qualitative data (Creswell & Clark, 2007). Quantitative data were collected from an online post survey and qualitative data was obtained from follow-up semi-structured interviews to triangulate against the data obtained from the survey.

Context

The required course, composed of a 1-hour large lecture and a 2-hour lab, helps pre-service teachers learn how to integrate technology tools within their future classrooms. As part of the course, students worked on a five-week project about educational uses of specific Web 2.0 applications (e.g., Facebook, PBWiki, Wordpress, etc.). Students worked in teams of 6-8 students to explore the assigned Web 2.0 technology and create instructional materials on how it could be utilized within a classroom environment. The finished project consisted of a collaboratively written wiki chapter of a Web 2.0 application including examples of its use, training materials on how to use it, as well as educational materials to inform others of its potential. At the end of the project, teams publically presented their Web 2.0 applications and demonstrated how it can be used in the classroom.

Participants

The study took place at a Midwestern university in spring 2010 semester. In total, 286 pre-service teachers completed the online survey. Of the participants, 196 (68 %) were females and 90 (32%) were males. The majority (90%) of the participants were 16-21 years of age, 16 (6%) were between 22 and 27 years, and 11 (4%) were above 28 years of age. The majority of the pre-service teachers (63.6%) rated themselves as being very comfortable with computers, 33.6% rated themselves as fairly comfortable, and 2.8% rated themselves as a little comfortable.

For the qualitative interviews, a purposive sampling method was used to choose participants based on the survey responses. Criteria for selecting the participants were two fold: pre-service teachers representing different majors and representing different grade level interests. Seven participants– three males and four females who represented an equal number within each criterion were selected for final interviews.

Research Instruments

Survey Instrument.

The survey instrument consisted of three sections and was partially adapted from previous studies (Hartshorne & Ajjan, 2009). The first section of the survey included seven multiple choice items to determine the general demographics of the participants including name, e-mail, gender, age, year in school, major, and perceived comfort level with computers. Section two included five statements about participants’ views and intentions to use Web 2.0 tools that explored participant’s levels of proficiency with Web 2.0 applications, actual use, perceptions of pedagogical advantages, and the Web 2.0 technologies that they intended to use in their future classrooms along with one open-ended item asking their thoughts of suing Web 2.0 technologies within a classroom environment. The third section of the survey consisted of modified items of the DTPB scale with a series of 7-point Likert-scale (Strongly agree to strongly disagree) to examine factors that influence pre-service teachers intentions to utilize Web 2.0 technologies in their future classroom. Items focused on actual Usage/behavior (I would have no difficulty explaining why Web 2.0 technologies may or may not be beneficial), Behavioral Intention (I plan to use Web 2.0 technologies in my future classroom), perceived behavioral control (Using the Web 2.0 technologies is entirely within my control), attitude (Web 2.0 will be useful in my teaching), and subjective norms (My students will think it is important to use Web 2.0 technologies in my classroom).

Interview.

The interview questions were developed based on the Web 2.0 attitude and the DTPB constructs to further explore teachers’ survey results and gain additional insights. Sample questions included: What do you think of using Web 2.0 technologies within a classroom environment? Would you use Web 2.0 tools in your future classrooms? Why or why not? What is the most important factor that influences your decision to use Web 2.0 in your future classroom? etc. Each interview session lasted approximately fifteen to twenty minutes.
Data Collection and Analysis

Quantitative data were collected from an online post survey made up of three sections: demographic data, Web 2.0 attitude scale, and the DTPB scale. The survey was administered at the end of the Web 2.0 project to measure factors related to pre-service teachers’ behavioral intentions to use Web 2.0 technologies and perceptions of the benefits of using Web 2.0 technologies in their future classrooms. The survey took approximately 10 to 15 minutes to complete. Demographic and attitude scale data were analyzed with descriptive statistics. The DTPB results were analyzed using path analysis to determine the factors and to estimate the degree of the linkage between variables that determine intention to adopt Web 2.0 technologies.

Qualitative data were collected from one open-ended survey question and follow-up semi-structured interview questions with seven students to triangulate against the data obtained from the survey and to better understand the participants’ responses. Participants were interviewed after the conclusion of the course Web 2.0 project. An informed consent statement approved by the Institutional Review Board (IRB) was used to get participants permission to participate. Qualitative data were content analyzed using Miles and Huberman’s (1994) three step data analysis procedure. First, the data were coded into conceptual chunks and grouped into categories. Then, the categories with similar meanings were combined in order to identify the relationships and the key themes for formulating the assertions. The belief statements were examined and grouped according to the Web 2.0 attitude and the DTPB constructs. The beliefs that appeared key to students’ views about Web 2.0 and decisions to adopt new technology were identified.

Results

Factors Influencing Intentions to Use Web 2.0 Applications

The path analysis results show that the pre-service teachers’ perceived usefulness of Web 2.0 technologies is the strongest determinant of their attitudes (see Fig. 2). Attitude in turn has the strongest effect on their intentions to use Web 2.0 technologies in their future classroom. Regression results confirmed each of the three factors, attitude, behavioral intention, and subjective norm, explained a significant variance (71.5%) in behavioral intention (adjusted R2).

![Path analysis of factors that influence pre-service teachers' intentions to use Web 2.0 technologies in the classroom](image)

\[ *p<0.05. \quad **p<0.01. \quad ***p<0.001. \]

Figure 2. Path analysis of factors that influence pre-service teachers’ intentions to use Web 2.0 technologies in the classroom

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Attitude. The results indicated that the pre-service teachers’ attitudes and their perceptions of the usefulness of Web 2.0 tools are the strongest determinants of their intentions to use Web 2.0 technologies. Regression results confirmed each of the three factors, perceived usefulness, perceived ease of use, and perceived compatibility, and explained a significant variance (78.3%) in attitude (adjusted $R^2$). Interview data revealed that pre-service teachers perceived Web 2.0 tools to be useful for student engagement, motivation, collaboration, communication, varied learning experiences, and holding students’ interest. Four out of five participants mentioned that they will use Web 2.0 in the classroom to impact student learning and this in turn can affect their grades. For example, one participant said, “I definitely think that if the students could be excited about using a new technology like this [Web 2.0], it could definitely help in motivation and if they are motivated they can definitely do better in class.”

Subjective Norm. Regression results confirmed each of the three factors—superior, student, and peer,—explained a significant variance (68.3%) in the subjective norm (adjusted $R^2$). Student influence had the strongest influence on the subjective norm, which, in turn, had a strong influence on behavioral intention. From the interviews “students influence” also emerged as the biggest factor in determining whether or not the pre-service teachers intend to integrate Web 2.0 into their teaching. For instance, one participant stated, “If they [students] are having trouble with lecture and I integrate a web 2.0 application and they just catch on and the test grades are awesome, I will use it.”

Perceived Behavioral Control. Regression results confirmed each of the three factors—facilitating resources conditions, facilitating technology conditions and self-efficacy—explained a significant variance (62.2%) in perceived behavioral control (adjusted $R^2$). All three factors were found to influence the perceptions of behavioral control, which also had an influence on behavioral intention of pre-service teachers to use Web 2.0 technologies, with self-efficacy having the strongest influence. The participants’ interviews revealed that while most of the participants felt very comfortable and confident using Web 2.0 technologies, they thought that it might be challenging to meaningfully integrate Web 2.0 within the curriculum. As one of the participants said “I might use a little bit more effort just because we have to come up with new ideas that aren’t already out there but I mean other than that it’s [Web 2.0 technologies] really easy to use.”

Perceptions of use and benefits of Web 2.0 Technologies

In terms of their current uses of web 2.0 technologies, 43% of the students reported that they use wikis, 34.3% use social networks, 33.6% use instant messaging, and 34% occasionally use video chat to supplement their in-class learning. Additionally, many reported that they don’t use blogs (41.6%) and social bookmarking (44.8%) technologies. However, most of the pre-service teachers planned to use wikis (70.6%), blogs (42.7%), video chat (33.2%), and social networking (24.5%) applications in their future classrooms to supplement their students’ learning (see Table 1).

Table 1
Pre-service teachers’ perceptions of the pedagogical benefits of Web 2.0 applications

<table>
<thead>
<tr>
<th></th>
<th>Blogs (%)</th>
<th>Wikis (%)</th>
<th>Social Networking (%)</th>
<th>Social Bookmarking (%)</th>
<th>Instant Messaging/Chat (%)</th>
<th>Video Chat (%)</th>
<th>Video Sharing (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve student-teacher interaction</td>
<td>29.4</td>
<td>13.6</td>
<td>28.7</td>
<td>1.7</td>
<td>10.8</td>
<td>11.5</td>
<td>2.8</td>
</tr>
<tr>
<td>Improve student learning</td>
<td>9.8</td>
<td>63.3</td>
<td>6.3</td>
<td>3.5</td>
<td>1.0</td>
<td>6.6</td>
<td>7.7</td>
</tr>
<tr>
<td>Improve student satisfaction with the course</td>
<td>20.3</td>
<td>24.1</td>
<td>26.2</td>
<td>6.6</td>
<td>2.4</td>
<td>4.5</td>
<td>12.9</td>
</tr>
<tr>
<td>Improve interaction with other students</td>
<td>11.2</td>
<td>5.6</td>
<td>47.2</td>
<td>4.5</td>
<td>16.8</td>
<td>11.2</td>
<td>1.4</td>
</tr>
<tr>
<td>Improve student grades</td>
<td>13.6</td>
<td>49.0</td>
<td>10.8</td>
<td>11.2</td>
<td>3.5</td>
<td>3.5</td>
<td>3.8</td>
</tr>
<tr>
<td>Improve student writing ability</td>
<td>53.8</td>
<td>23.1</td>
<td>5.6</td>
<td>4.2</td>
<td>4.5</td>
<td>.3</td>
<td>3.1</td>
</tr>
<tr>
<td>Easy to use/share content knowledge</td>
<td>15.4</td>
<td>38.1</td>
<td>18.5</td>
<td>9.1</td>
<td>5.9</td>
<td>4.9</td>
<td>6.6</td>
</tr>
<tr>
<td>Improve critical thinking with collaborative learning</td>
<td>19.9</td>
<td>37.8</td>
<td>13.3</td>
<td>7.0</td>
<td>5.2</td>
<td>9.1</td>
<td>5.6</td>
</tr>
</tbody>
</table>
In terms of pre-service teachers’ perceptions of the benefits of using Web 2.0 technologies to supplement classroom instruction, the results showed that the pre-service teachers felt that the use of different Web 2.0 technologies could provide students with several benefits. They viewed wikis as the most useful Web 2.0 application in terms of improving student learning (63%); improving student grades (49%), ease of use/sharing content knowledge (38%), and improving critical thinking with collaborative learning (38%). In terms of improving student writing ability (54%) and improving student-teacher interaction (29%), blogs were viewed as most beneficial. Social networking technologies were perceived to improve interaction with other students (47.2%), improve student-teacher interaction (28.7%), and improve student satisfaction with the course (26%).

Interview and open-ended survey data also revealed pre-service teachers’ thoughts that Web 2.0 technologies can offer many advantages to students learning through more interaction, communication, improved writing, and extended class time. For example, one of the pre-service teachers stated, “Web 2.0 technologies enhance learning by providing various learning opportunities for students. Students can use them to connect with peers and teachers outside the classroom and to bring other elements into the classroom (i.e., virtual field trips).” Another commented, “I think that blogs are a great way to communicate in the classroom and get students more involved and interacting with each other.” Similarly, another one said, “Wikis and blogs can be a great tool for compilation and organization of student writings as well as a place to receive feedback and improve upon work.”

Discussion

This study explored pre-service teachers’ views and factors that influenced their intentions to integrate Web 2.0 technologies in their future classrooms. The results revealed that pre-service teachers had both positive attitudes and high intentions to integrate Web 2.0 technologies in their future classrooms as teachers.

Factors Predicting Pre-Service Teachers Intentions to Use Web 2.0 Technologies

The path analysis results show that the pre-service teachers’ perceived usefulness of Web 2.0 technologies is the strongest determinant of their attitudes. Attitude in turn has the strongest effect on their intentions to use Web 2.0 technologies in their future classroom. Interview data supported this finding and revealed that pre-service teachers viewed Web 2.0 technologies to be useful to enhance their teaching as well as supplement their students’ in-class learning. This perception of the usefulness of Web 2.0 might be due to the pre-service teachers’ exposure to Web 2.0 technologies during the Web 2.0 project that helped them learn how to integrate Web 2.0 technologies within their future classrooms. This is consistent with Coutinho’s (2008) study that found that providing technology-rich experiences to pre-service teachers with Web 2.0 technologies has a positive influence on pre-service teachers’ intentions to use them in the classroom.

In addition, all three groups—administrators, peers, and students—are the key determinants of subjective norms of pre-service teachers. Subjective norm in turn, did not influence behavioral intention. However, students exerted a stronger influence on subjective norms as compared to the other two groups. These results imply that pre-service teachers’ behavior is likely to be affected by their future students’ expectations regarding the use of technology. The interview data also suggested that pre-service teachers believed that integrating Web 2.0 technologies will make learning more meaningful and relevant for their students because they are already using these technologies outside of the classroom. This finding is supported by Shihab (2008), who suggested that today’s students expect learning to take place using modern digital communication tools, therefore Web 2.0 technologies should be integrated into the classroom due to the technology expectations of digital natives as well as its great potential for teaching and learning.

Self-efficacy and facilitative technology conditions were found to influence the perceived behavior control of pre-service teachers toward the intention to use Web 2.0 technologies. On the other hand, facilitative resource conditions did not influence the perception of behavioral control. However, self-efficacy is found to be the greatest determinant of pre-service teachers’ perceived behavior control. This is corroborated by the findings of previous studies, which showed computer self-efficacy to positively influence teachers’ view and intentions to use and integrate computers (Anderson & Maninger, 2007; Giallamas & Nikolopoulos, 2010). Although, pre-service teachers expressed high self-efficacy in using Web2.0 applications, their self-efficacy related to integrating Web 2.0 applications in lessons within classrooms was low. This might be due to their lack of actual classroom experience. Coutinho (2004) suggested that teacher education programs can provide pre-service teachers more opportunities to reflect on the pedagogical uses and implications of Web 2.0 technology integration.

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Perceptions of Use and Benefits of Web 2.0 Technologies

The results of the study indicate that a majority of the participants intend to use Web 2.0 technologies in their future classrooms. They believe that integration of these technologies into the teaching and learning environment has the potential to improve student learning. This finding is comparable to other research findings that consider Web 2.0 technologies useful having great potential for teaching and learning in the classroom (Coutinho, 2008; Hartshorne & Ajjan, 2009; Shihab, 2008). While pre-service teachers mentioned many benefits, they also noted that successful integration depends on how selected Web 2.0 technologies relate to the content being taught, learning goals, and age level of the students. This implies that in addition to the benefits of using Web 2.0 technologies, pre-service teachers are aware of the context of meaningful integration into classrooms.

Conclusions and Implications

This study explored factors that affect pre-service teachers’ intentions to use Web 2.0 in future classrooms and found that pre-service teachers had both positive attitudes and high intentions to adopt Web 2.0 technologies in their future classrooms as teachers.

The results of this study provide evidence that pre-service teachers’ attitudes and perceptions of usefulness of Web 2.0 tools are the strongest indicators of their intentions to use Web 2.0 tools. Behavioral intention, in turn, is a strong indicator of actual behavior. Thus, the focus of teacher technology programs preparing pre-service teachers’ to effectively integrate Web 2.0 in the classroom might be on improving their attitudes toward emerging technologies as well as enhancing their perceptions of usefulness of Web 2.0 use by providing appropriate training and knowledge of how they can impact student learning. Moreover, pre-service teachers should be given opportunities to practice using these technologies in actual classrooms during their student teaching experiences. According to Albion (2008), pre-service teachers should learn about Web 2.0 by immersing them in authentic practice.

The results also indicate that most of the pre-service teachers intend to use blogs, wikis, and social networking tools in their future classrooms. They believe that integration of these technologies into the teaching and learning environment has the potential to improve student learning. While pre-service teachers believe that Web 2.0 technologies have great potential in K-12 education, they also noted that it all depends on the teacher’s ability to meaningfully integrate these technologies with the content being taught, and age level of their students. Hence, it is important for teacher educators to help pre-service teachers understand meaningful connections between technology, content, and pedagogy. According to Lei (2001), meaningful technology integration can happen by helping pre-service teachers develop technological pedagogical content knowledge (TPCK). Thus, teacher education programs should include strategies that pre-service teachers can use to affect their student learning, according to their grade level interests and specific subject areas.

This study contributes to the field by revealing pre-service teachers’ attitudes and perceived usefulness as a significant predictor of their intentions to use Web 2.0 in their teaching. Future research can now determine the specific interventions that will help to increase pre-service teachers’ attitudes and perceived usefulness of Web 2.0 technologies. Teacher education programs should focus on these factors to enhance teacher education programs and prepare pre-service teachers to able to use these tools effectively. Moreover, longitudinal studies may be designed to determine if these beliefs about using Web 2.0 technologies translate into actual use in the classroom during student teaching experiences.
References


