Teacher Perceptions and Use of Web-based Tools for Student Collaboration in K-12 Education

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Abstract

The purpose of this study was to understand K-12 teacher perceptions on web-based tools for collaborative learning and how the perceptions affect the selection and utilization of the tools in teaching. An online survey was created to collect data and snowball sampling technique was used to recruit participants through Facebook. The results show that there is not strong correlation between participant perceptions and their utilization of the tools in teaching.

Key words: K-12 teacher, web-based tools, perceptions, utilization

Introduction

Studies showed that attitude and mindset influence teachers utilizing Web 2.0 applications in instruction (Capo & Orellana, 2011, Luehmann & Frink, 2009). Teacher preconceptions can cause them to overlook the potential of web tools to engage students in more in-depth learning (Luehmann & Frink, 2009). The previous studies have mixed results on whether and how content areas and teaching level influence teachers’ intention and utilization of web-based tools in general (Sadaf et al., 2012, Yuen, Yaoyuneyong, & Yuen, 2011, Parnell & Bartlett, 2012). The intent of this research was to investigate K-12 teachers’ perceptions and use of web-based tools with a narrower focus on collaborative learning.

This study aimed to answer the following questions:
1. What are K-12 teacher perceptions on web based tools for collaborative learning?
2. How do teacher perceptions affect the selection and utilization of web based tools for collaborative learning in K-12 education?

Literature Review

Web-based tools

Web 2.0, as a concept, as well as a set of tools DiNucci (1999), has been widely used and misused after a Web 2.0 conference held by MediaLive International and O’Reilly Media, Inc. in 2004 (O’Reilly, 2005). Due to the difficulty in defining the concept “Web 2.0”, some of the authors clarify the term by identifying its features/competency and a variety of applications that could be considered the set of tools that comprise Web 2.0. Some of the core features identified are interactive platform ((O’Reilly, 2005); improving information retrieval, relevance, and awareness (Barsky and Cho, 2007); harnessing collective intelligence (O’Reilly and Batelle, 2009); user sharing, contributions, and participation (Bonk, 2011). The tools that have been considered as Web 2.0 tools are Wikis, Blogs, Google, and podcasting (O’Reilly, 2005; Barsky and Cho, 2007; Norton and Hathaway, 2008). This study avoided using the concept “Web 2.0” and gives preference to the more cumbersome, but less ambiguous, term “web-based tools for collaborative learning.” While this term is overly broad, the focus will be on five categories of tools: blogs, social networks, wikis, podcasting, and video sharing, with specific applications identified in each category. These tools were chosen due to their accessibility, free-to-use options, potentials for cooperative learning and prior existence in literature. Throughout this study, researchers specify web-based tools by name and/or the categories in use.

Blogs. Blogs (short for Weblogs) are online journals with one primary author to facilitate asynchronous communication on a particular topic. Blogs are part of many course management systems (Blackboard, Desire to Learn etc) and have been “viewed as the most useful Web 2.0 application in terms of improving student learning” (Ajjan and Hartshorne, 2008). In recent years, advances in mobile technology reduce the need for specialized...
Podcasts can be accessed and utilized anytime, anyplace, and have marked advantages in distance learning (Cook, student created projects (Deal, 2007) or as alternative assessments (Pannell and Hutchison, 2010). Students may utilize podcasts to fill in their notes with anything missed during classes, consequently with a common theme” (Deal, 2007, p. 2). It can be used to archive lectures, supplement course materials, and student created projects (Deal, 2007) or as alternative assessments (Pannell and Hutchison, 2010). Podcasts can be accessed and utilized anytime, anyplace, and have marked advantages in distance learning (Cook, 2008). Students may utilize podcasts to fill in their notes with anything missed during classes, consequently resulting in additional review and more thorough notes (McDonald, 2008). McDonald also pointed out the usefulness of using podcast lectures to conduct self-assessment on the quality of the lecture and/or to adjust anything in the future. According to Borja (2005), students are motivated by the creativity and the broader audience that can be reached with podcasting. Pannell and Hutchison (2010) stated the benefits of podcasting on student motivation as students in a last class of the day were observed being actively engaged while listening to podcasts discussing a math assignment. Fryer (2008) stated “The fact that podcasts can be educational and instrumentally valuable in teaching students a variety of important twenty-first literacy skills, while also being fun, is more than icing on the cake” (p. 1).

Wiki is generally defined as a web page or site to which users and viewers alike can contribute and/or modify using either simple text markup language or a rich text editor (Peterson, 2009). Wikis are characterized by their collaborative nature, ease of use, convenience, open source access, uniqueness, and versatility (Shih et al., 2008). Teachers can use wikis to gain efficiency in distribution of information (Reich et al., 2012). The most common use of wikis in a classroom setting is collaborative learning. This is made possible by features that allow users to create and share knowledge resulting in a rich, cooperatively created end-product (Biasutti and EL-Deghaidy, 2012). Moreover, the collaborative nature of wikis allows learners to develop a community and a social environment, wherein they create and edit content with and for each other. Pifarré and Staarman (2011) referred to this as the ‘thinking together’ model. When used with assignments that foster collaborative and group interaction, wikis can be rewarding learning tools that construct knowledge (Hazari, North, & Moreland, 2009). Wikis are also used to enhance collaborative writing and reflection for which students work together to achieve a common goal or objective as designated in their assignment (Wichadee, 2010).

Social networking is web-based services that allow individuals to (1) construct a public or semi-public profile within a bounded system, (2) articulate a list of other users with whom they share a connection, and (3) view and traverse their list of connections and those made by others within the system (Boyd & Ellison, 2007). A survey conducted in 2009 by Schmucki, Hood, and Meell showed that Facebook and MySpace were two of the most popular social networking sites joined by and familiar to K-12 educators. Twitter found to be one of the top content-sharing tools for personal, professional, and classroom use (Schmucki, Hood, and Meell, 2009).

Podcasts. “Podcasting is a means of publishing audio and video content on the web as a series of episodes with a common theme” (Deal, 2007, p. 2). It can be used to archive lectures, supplement course materials, and student created projects (Deal, 2007) or as alternative assessments (Pannell and Hutchison, 2010). Podcasts can be accessed and utilized anytime, anyplace, and have marked advantages in distance learning (Cook, 2008). Students may utilize podcasts to fill in their notes with anything missed during classes, consequently resulting in additional review and more thorough notes (McDonald, 2008). McDonald also pointed out the usefulness of using podcast lectures to conduct self-assessment on the quality of the lecture and/or to adjust anything in the future. According to Borja (2005), students are motivated by the creativity and the broader audience that can be reached with podcasting. Pannell and Hutchison (2010) stated the benefits of podcasting on student motivation as students in a last class of the day were observed being actively engaged while listening to podcasts discussing a math assignment. Fryer (2008) stated “The fact that podcasts can be educational and instrumentally valuable in teaching students a variety of important twenty-first literacy skills, while also being fun, is more than icing on the cake” (p. 1).

Video-sharing. Video-sharing and video-sharing sites allow users to view, upload, share, tag, and comment on posted videos. Chunneng, Tianjun, and Hsinchun (2010) indicated that videos on video-sharing sites can be user-generated, are short in length, and provide diverse content. “In the current decade, the technologies of interest are still collaborative ones, but also those that foster student generation and visualization of knowledge,” (Bonk, 2008, p. 6). YouTube, as the world’s most popular video sharing site, was chosen as the representative of this category in this study. Video sharing sites have many practical applications for K-12 use. YouTube provides a platform for students to be content creators, not just content viewers.” (Adam & Mowers, 2007, p. 22). Bonk (2008) suggested the use of videos from video sharing sites as starters and enders of lessons and to motivate and engage students in their learning. He cited the ease of access and flexibility as further reasons to integrate videos from video-sharing sites. “The class comes to life and ideas begin to resonate with students,” (Bonk, 2008, p. 6). Bonk (2008) also stated that “online videos such as YouTube videos can augment or illuminate the weekly assigned readings,” (p. 5). Bonk (2008) indicated that videos “rouse students’ minds to life by showing them new insights, perspectives, and situations to learn from,” (p. 6). In addition to Bonk, Adam and Mowers (2007) stated that “YouTube can be a valuable resource and is just one more example of the potential of Web 2.0 tools, which, in the hands of enlightened educators, can inspire students and support their digital learning style,” (p. 22).
Methodology

Participants. The target population for this study was K-12 teachers that utilize Facebook. Participants were invited through Facebook wall postings from their friends, which informed them of the purposes, methods and provided a link to the survey. The study was conducted in the spring of 2013. Sixty eight teachers completed the survey. 12 were male (17.6%) and 56 were female (82.4%). Ages ranged from under 25 to the 55 – 64 range. There were no responses from age 65 and over. Years of experience ranged from under 5 years to 26 years or more. Table 1 below showed the characteristics of the participants.

<table>
<thead>
<tr>
<th>Age</th>
<th>%</th>
<th>Years of experience</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 25</td>
<td>5</td>
<td>5 years or fewer</td>
<td>16</td>
</tr>
<tr>
<td>25 - 35</td>
<td>20</td>
<td>6-10 years</td>
<td>18</td>
</tr>
<tr>
<td>35 - 44</td>
<td>20</td>
<td>11-15 years</td>
<td>13</td>
</tr>
<tr>
<td>45 - 54</td>
<td>9</td>
<td>16-20 years</td>
<td>6</td>
</tr>
<tr>
<td>55 - 64</td>
<td>14</td>
<td>21-25 years</td>
<td>6</td>
</tr>
<tr>
<td>total</td>
<td>68</td>
<td>26 years or more</td>
<td>9</td>
</tr>
</tbody>
</table>

Table 1. Age and years of experience

Data collection and analysis. An online survey was created by the researchers using Google Survey tool to gather and store data. The survey consisted of two parts: demographic information and teachers’ perceptions of the use of blogs, wikis, social networks, podcasts, and video-sharing tools. The questions about perceptions were grouped according to each web-based tool and each grouping had seven questions specifically geared to capture individuals’ responses to that specific tool. The questionnaire was closed-ended, Likert scale format (Strongly Disagree, Disagree, Neutral, Agree and Strongly Agree). The snowball sampling technique was used to recruit participants through the social networking website, Facebook. A Facebook group named “Please Help Me Find K-12 Teachers” was created by the researchers. Detailed description and the link of the survey were published on the group posting wall. The Facebook group was popularized among the researchers’ current Facebook friends, who were asked to share the group link and information to their friends and other potential participants through Facebook wall postings. Data collection was concluded after 12 weeks.

Results and Discussion

The purpose of this study was to examine K-12 teacher perceptions of web based tools for collaborative learning and how these perceptions affect the utilization of the tools both within and outside of the classroom environment. Conclusions are based on the self-reported frequency of tool usage and the Likert scale correlation of survey responses.
Tool usage

Tables 2 and 3 show how often the participants utilizing the various tools for classroom activities (Table 2) and outside of the classroom (Table 3).

<table>
<thead>
<tr>
<th>In class usage</th>
<th>Never</th>
<th>Very Rarely</th>
<th>Sometimes</th>
<th>Frequently</th>
<th>Very Frequently</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blogs</td>
<td>42.6%</td>
<td>23.5%</td>
<td>23.5%</td>
<td>4.4%</td>
<td>5.9%</td>
</tr>
<tr>
<td>Wiki</td>
<td>42.6%</td>
<td>19.1%</td>
<td>22.1%</td>
<td>8.8%</td>
<td>7.4%</td>
</tr>
<tr>
<td>Social networks</td>
<td>44.1%</td>
<td>20.6%</td>
<td>14.7%</td>
<td>10.3%</td>
<td>10.3%</td>
</tr>
<tr>
<td>Podcasts</td>
<td>42.6%</td>
<td>19.1%</td>
<td>26.5%</td>
<td>10.3%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Video sharing</td>
<td>14.7%</td>
<td>10.3%</td>
<td>35.3%</td>
<td>23.5%</td>
<td>16.2%</td>
</tr>
</tbody>
</table>

*Table 2: Percentage of usage in classroom activities*

<table>
<thead>
<tr>
<th>Outside of class usage</th>
<th>Never</th>
<th>Very Rarely</th>
<th>Sometimes</th>
<th>Frequently</th>
<th>Very Frequently</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blogs</td>
<td>27.9%</td>
<td>19.1%</td>
<td>26.5%</td>
<td>16.2%</td>
<td>10.3%</td>
</tr>
<tr>
<td>Wiki</td>
<td>38.2%</td>
<td>19.1%</td>
<td>23.5%</td>
<td>10.3%</td>
<td>8.8%</td>
</tr>
<tr>
<td>Social networks</td>
<td>17.6%</td>
<td>5.9%</td>
<td>2.9%</td>
<td>26.5%</td>
<td>47.1%</td>
</tr>
<tr>
<td>Podcasts</td>
<td>42.6%</td>
<td>17.6%</td>
<td>20.6%</td>
<td>14.7%</td>
<td>4.4%</td>
</tr>
<tr>
<td>Video sharing</td>
<td>14.7%</td>
<td>14.7%</td>
<td>23.5%</td>
<td>26.5%</td>
<td>20.6%</td>
</tr>
</tbody>
</table>

*Table 3: Percentage of usage outside of the classroom*

According to the results of the survey the most commonly used online collaboration tool outside of the classroom is Social Networking. This is not surprising since the survey was shared and accessed via a Facebook page. What is surprising is that 17.6% of participants responded that they never use Social Networks. This would indicate a flaw in the data collection methodology since participants were either able to access by other means or the definition of Social Network or Usage frequency was not clearly defined in the survey.

Of greater interest was the in-class usage of Video Sharing Tools. This was the only tool which the majority of participants indicated a Sometimes or more often usage. All other tools were used Rarely or Vary Rarely by the majority. In all cases more than 40% indicated that they never use the tool in class.

For graphical comparison, responses on the Likert scale were converted to numerical values. This ranged from 1 for Never or Strongly Disagree to 5 for Very Frequently or Strongly Agree. Figure 1 shows a graphical representation comparing the usage frequency average of the various tool by participants.
The survey asked participants to rate their agreement with the following statements for each of the five tools (Blogs, Wikis, Social Networks, Video sharing and Podcasts).

- Does the tool help the learners develop language and communication skills
- Does the tool facilitate feedback between learners and teachers
- Does the tool develop skills needed in today’s modern technology world
- Does the tool promote learner interaction and build a learning community
- Does the tool provide collaborative learning opportunities

Figure 2 shows a comparison of teacher perception of the utility of each of the tools. Video sharing tools and Blogs were consistently ranked highly in each category while Social Network tools were nearly always the lowest ranked in each category.
Correlations

Table 4 shows the correlations of responses to all questions. The factor that most highly correlates with use of a tool in class is if the participant uses the tool outside of class.

<table>
<thead>
<tr>
<th>Use in class</th>
<th>Use out of class</th>
<th>Help learners develop communication and language skills.</th>
<th>Facilitate communication and feedback between learners and teachers.</th>
<th>Develop skills needed in today’s modern, technological world.</th>
<th>Promote learner interaction and build a learning community.</th>
<th>Provide collaborative learning opportunities.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use in class</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use out of class</td>
<td>0.5490</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Help learners develop communication and language skills.</td>
<td>0.4732</td>
<td>0.2235</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Facilitate communication and feedback between learners and teachers.</td>
<td>0.4164</td>
<td>0.2196</td>
<td>0.6308</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Develop skills needed in today’s modern, technological world.</td>
<td>0.4483</td>
<td>0.2801</td>
<td>0.6716</td>
<td>0.6174</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Promote learner interaction and build a learning community.</td>
<td>0.3911</td>
<td>0.2285</td>
<td>0.6466</td>
<td>0.7195</td>
<td>0.6577</td>
<td>1</td>
</tr>
<tr>
<td>Provide collaborative learning opportunities.</td>
<td>0.3979</td>
<td>0.2687</td>
<td>0.6843</td>
<td>0.6667</td>
<td>0.6525</td>
<td>0.7814</td>
</tr>
</tbody>
</table>
Table 5 shows the correlations of classroom usage and the perception of utility of each tool. In general, the trend of highest correlation of in-class usage with non-school usage continues. The exception is in Wiki usage. For this tool, the highest correlation of in-class usage is with the instructor’s perception of how useful it is in developing communication and language skills as well as its ability to facilitate communication between learners and the instructor. These findings are similar to Sadaf, et al. (2012), who found that teacher’s likelihood of using web based tools in their classrooms highly depended on whether they thought it had the potential of positively impacting and improving students learning and engagement.

<table>
<thead>
<tr>
<th>Utilization for classroom related activities</th>
<th>Blogs</th>
<th>Wiki</th>
<th>Social Networks</th>
<th>Podcasts</th>
<th>Video Sharing</th>
</tr>
</thead>
<tbody>
<tr>
<td>I utilize for non-school activities.</td>
<td>0.6494</td>
<td>0.4557</td>
<td>0.4696</td>
<td>0.6426</td>
<td>0.6882</td>
</tr>
<tr>
<td>Help learners develop communication and language skills.</td>
<td>0.3509</td>
<td>0.6608</td>
<td>0.4892</td>
<td>0.4704</td>
<td>0.3960</td>
</tr>
<tr>
<td>Facilitate communication and feedback between learner and instructor</td>
<td>0.3033</td>
<td>0.6103</td>
<td>0.5315</td>
<td>0.3504</td>
<td>0.3062</td>
</tr>
<tr>
<td>Develop skills needed in today’s modern, technological world.</td>
<td>0.2627</td>
<td>0.5918</td>
<td>0.4356</td>
<td>0.4442</td>
<td>0.4610</td>
</tr>
<tr>
<td>Promote learner interaction and build a learning community.</td>
<td>0.2329</td>
<td>0.5114</td>
<td>0.5312</td>
<td>0.3685</td>
<td>0.3257</td>
</tr>
<tr>
<td>Provide collaborative learning opportunities.</td>
<td>0.2450</td>
<td>0.4806</td>
<td>0.5016</td>
<td>0.4417</td>
<td>0.3515</td>
</tr>
</tbody>
</table>

*Table 5: Correlation by specific tool*

**Conclusion**

The result of this study shows that the factor that most highly correlates with K-12 instructor usage of tools within the classroom is the instructor’s usage of the tool outside of the classroom. Therefore, the familiarity with tool outside the classroom and prior experience with such tools are determining factors on whether or not an instructor will use the tool in his/her classroom. These findings corresponds to Yuen, Yaoyuneyong, and Yuen (2011), who found that teacher’s additional experience using a given tool increases his/her perception and likelihood of using the tool in the classroom. It is recommended therefore, that departmental administration, policy makers and educators strive to provide more professional development and an environment that allows teachers to integrate these resources in their classrooms. Similar studies share this suggestion and show that teachers experience and proper guidance in the use of new technologies gives them confidence to help their students explore these tools (Ajjan and Hartshorne, 2008; Ertmera, et al. 2012; Yuen et al. 2011). Past surveys lumped all tools together and referred to them as “Web 2.0”. This may overly simplify the results given the variation in the perceived utility of the tools seen in this study.

**Limitations**

There was a very low response rate to this survey. There were only 68 useful respondents despite extending the collection period to twelve weeks from the planned six. Others have had greater success utilizing Facebook to contact potential participants. The concept was to facilitate an expanding network of contacts. Based on the limited number this was unsuccessful. In addition, this method of contacting potential participants creates an inherent bias in
the representation of the opinions of users of Social Network sites. A preferred method would be to utilize each tool for the initial contact or an alternative method that with a more equal tool utilization distribution.

For all tools except Video Sharing, most respondents indicated that they rarely or never use the tool. While the goal of this project was to measure instructor’s perceptions of collaborative tools, this lack of familiarity is a confounding issue.

**Areas for further study**

Given the low correlations between teacher perception of the usefulness of the tools and the usage in the classroom none of the factors identified in survey are strong driving factors in adoption. There were additional questions in the study this one was based on (Yuen, Yaoyuneyong, & Yuen 2011) that were omitted in an effort to create a more targeted survey. It is possible that this effort to create specificity eliminated relevant factors. Areas of consideration are cost of adoption, department or administration directives regarding the tool and technical challenges associated with incorporating the tool in the curriculum.

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