

## WEB 2.0 USE IN HIGHER EDUCATION

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### Abstract

This study analyzed current uses of emerging Web 2.0 technologies in higher education with the intent to better understand which tools teachers are using in the classroom. A total of 189 faculty in higher education from three western US universities were invited to participate, with 54 completing the survey. The survey included open-ended questions as well to offer an alternative analysis approach. In this study, the respondents claimed that the intrinsic factors of a lack of time and training were the main barriers to use, and reported positive views of Web 2.0 use in class, with 75% saying that these tools would benefit students and 83% saying they would benefit teacher-student interactions. In contrast to these results only 44% of the respondents used at least 4 of the 13 listed Web 2.0 tools with students. The reported uses did not match with the reported benefits, and this would support the results that extrinsic factors (time, training, support), instead of intrinsic factors (beliefs, motivation, confidence) are the main barriers to faculty in this study using more Web 2.0 in education. The top five Web 2.0 tools used, in order of preference, follow: (a) video sharing with tools like YouTube; (b) instant messaging; (c) blogs; (d) social communities, such as Facebook; and (e) podcasts or video casts. This data was originally submitted to the Abraham S. Fischler School of Education in Partial Fulfillment of the Requirements for the Degree of Doctor of Education.

### Introduction

Student learning styles are beginning to change with increased access to media and digital devices (Dede et al., 2007; Restak, 2003). With the evolution of new interactive and socially constructed Web 2.0 tools on the Internet, teachers have access to a greater number of free tools for teaching and learning support (Ajjan & Hartshorne, 2008; Anderson, 2007; Maloney, 2007; O'Reilly, 2005). Allen and Seaman (2009) reported an annual growth in online course enrolments between 2002 and 2007, with a 12% increase from 2006 to 2007 alone. Allen and Seaman (2009) reported that there was a 17% increase in students taking online courses from 2007 to 2008. According to Allen and Seaman (2009), one in four higher education students were taking at least one course online in 2009. With increased distance learning, there is an increased need to use different types of technologies to build functional online courses and learning communities. It was shown in research that the interest and satisfaction of students increased when Web 2.0 tools were implemented in the curriculum (Cocciolo, 2010; Wheeler, 2009a, 2009b, 2010). Web 2.0 tools represent one tool useful in enhancing learning accessibility and quality.

Using a variety of media in distance learning allows faculty to connect with students so that transactional distance is reduced, peer-to-peer rapport is expanded, different learning styles are addressed, and a strong learning community is built (Dede et al., 2007; Moore, 1989, 2007; Wheeler, 2010). According to Dede et al. (2007), students' "participation in multifaceted, distributed, and mediated learning experiences outside of classrooms and courses cause them to see more traditional school learning as rather mundane" (p. 339). Online instructors can adopt Web 2.0 tools as a means of increasing student interactions and connections (Dede et al., 2007; Restak, 2003). In this study self-reported faculty uses or barriers to use of Web 2.0 tools were analyzed in an effort to shed light upon intrinsic versus extrinsic factors affecting Web 2.0 use in education. A total of 189 faculty from three Western US universities were invited to participate,

and 59 completed the survey. The data were analyzed to look for patterns and relationships. The results benefit professional development leaders and administrative teams that want to work towards increasing emerging technology use in educational programs. This data was originally submitted to the Abraham S. Fischler School of Education in Partial Fulfilment of the Requirements for the Degree of Doctor of Education.

## Literature Review

Innovativeness is the willingness to try new things (Hurt, Joseph & Cook, 1977) and Rogers (2003) defined an innovation as any idea, concept, or technology perceived as new by the user and characterizes innovativeness as willingness to adopt new innovations sooner than others in the same system. According to Bernoff et al. (2008), 75% of the adults surveyed in 2008 in the United States reported using Web 2.0 tools online for personal and professional reasons; this was up from 56% in 2007. Web 2.0 tools are relatively new in education and, thus, are still an emerging technology for many faculty. The term *Web 2.0* generally describes the new way that users interact on the Internet. Wheeler (2010) explained *Web 2.0* as a term used to describe the participative and social elements of the World Wide Web. Web 2.0 tools allow for interactive, global, multicultural, and social connections online. In this study, the term *Web 2.0* is defined as Web-based technologies that allow users to view content and to generate content with each other through virtual social connections (Ajjan & Hartshorne, 2008; Anderson, 2007; Bell, 2009; Klamma et al., 2007; Maloney, 2007; O'Reilly, 2005; Yan, 2008).

According to the American Distance Education Consortium (2009), an integral component of a quality online program is excellent course design that engages students in active and effective learning. Many researchers analyzed the importance of instructional design that supports quality student-teacher interactions and strong social connections (Moore, 1989; 2007; Shin, 2003; Swan, 2002). Active and effective learning should also include design that accounts for different learning styles. Dede et al. (2007; Dede, 2005) noted that design that engages active learning should include aspects of modern technologies, which students consider integral to a quality-learning program. This is true of any delivery format using technology, whether face-to-face, hybrid, or online. In this study the *Low-innovation tools* refers to low-innovation technologies that teachers have already been using for 15 or more years; it would be difficult to find any teacher that does not already use them in education, such as email. The high innovation Web 2.0 tools in this study included tools such as blogs and Twitter (see the methods section for the full list) (Bell, 2009; Solomon & Schrum, 2007).

The main advantages of Web 2.0 tools are the collective intelligence gathering, the lifelong learning opportunities afforded to the user, and the learning and connection opportunities for teachers and students in and outside the classroom (Klamma et al., 2007; O'Reilly, 2005; Wheeler, 2009a, 2009b; Yan, 2008). Faculty who use Web 2.0 tools become models of responsible and productive ways to use them because Web 2.0 tools are used in professional organizations and businesses, so faculty who integrate them into education, thus, mimic professional requirements in the real world. The use of Web 2.0 affords the instructor stronger connections and learning communities in online learning contexts (Wheeler, 2009a, 2010). Often faculty members do not need to train students on how to use Web 2.0 tools because three in four adults in the United States are already using them (Bernoff et al., 2008). Faculty can also better communicate with students in hybrid and online learning contexts because these tools are already principal forms of communication for many people. As outlined by Yan (2008).

Technologies adopted in schools today, including blogs, wikis, social networking, and online learning communities, are keeping teachers and students connected in and out of class. They are creating opportunities for groups to share, collaborate, showcase and grow together. In addition,

they allow exchange of information and ideas not only within the confines of a classroom, but across schools, districts, states and the world. (p.30)

Another benefit is that some Web 2.0 tools directly enhance classroom management, such as the use of Really Simple Syndication (RSS) to offer instant updates and course materials access (Bell, 2009). Faculty can also increase interactivity and educational quality through Web 2.0 tools because they attend to constructivist and social learning theories through building stronger connections in virtual contexts (Ajjan & Hartshorne, 2008; Bell, 2009; Klamma et al., 2007; Smaldino, Lowther & Russell, 2008; Wheeler, 2009a, 2009b). Stronger teacher-student connections can lead to less transactional distance between the students and the course, which leads to lower attrition rates (Moore, 1989, 2007; Palloff & Pratt, 2007). While all these benefits align with use of Web 2.0 tools in education, Ajjan and Hartshorne (2008) found that faculty members are not readily adopting their use regardless of the fact that the same faculty reported the benefits of Web 2.0 to education.

Finally, Web 2.0 tools are, by nature, socially constructed, collaborative, and support collective information gathering. Their use integrates constructivist and social learning theories into the classroom (Ajjan & Hartshorne, 2008; Wheeler, 2009a, 2009b, 2010). Experts in the field emphasized the importance of electronic learning design that supports social student-teacher interactions and connections in distance learning (Moore, 1989, 2007; Shin, 2003; Swan, 2002). Through the use of Web 2.0 tools, stronger social and collaborative interactions and connections can be easily created.

As an emerging technology, Web 2.0 tools are already being successfully used as a benefit to education by some institutions and faculty. In a study of two English language classrooms, blogs, wikis, podcasts, and RSS were integrated into the course curriculum (Shihab, 2008). The teachers utilized these tools as journal writing opportunities for students, for group facilitation tactics, and for recording important poetry recitals and interviews that students needed to listen to. The teachers reported that Web 2.0 technologies made them more efficient teachers and the results found that both the teachers and students reported high satisfaction with Web 2.0 tools in the classroom and improved learning experiences (Shihab, 2008). In a study by Cocciolo (2010), the use of Web 2.0 tools to enhance community participation was explored. Columbia University created two different institutional repositories. One was based on Web 2.0 tools while the other was not. The study found that the use of Web 2.0 tools in the repository related to a significant increase in community participation (Cocciolo, 2010). In other studies by Wheeler (2009a, 2009b, 2010), blogs and wikis were blended into the course curriculum to enhance student learning and increase the collaborative social learning context of the courses. Wheeler noted that students who are geographically separated can still interact and help form communities of practice through the use of wikis and other Web 2.0 tools. Wheeler further noted that Web 2.0 tools benefit student learning in the new media-driven world.

However, some research suggests that faculty are not using educational technology in a way students perceive as useful to their learning (Keengwe, 2007), or not implementing emerging technologies at all (Ajjan & Hartshorne, 2008). Even with training, faculty members are slow to adopt higher tech tools (presentation software, digital imaging, video) over low-tech tools (Internet searching, electronic mail [e-mail]; Ertmer, 2005). In a study looking at university faculty's perceptions and uses of Web 2.0 tools in higher education, Ajjan and Harshorn (2008) found that, even though many of the faculty in the study indicated positive views of Web 2.0 use in education that in reality few were actually using them with their students. The discrepancy is that while many of the faculty surveyed in Ajjan and Harshorn's study saw a benefit to using Web 2.0 in the classroom, they did not plan to use those tools. Of the faculty surveyed, 47% and 46% felt that the use of blogs would improve student learning and would increase classroom

interactions, respectively, but 62% of those surveyed did not use them and did not plan to use them. Knowledge of the usefulness of Web 2.0 does not necessarily lead to its diffusion in educational contexts.

### **Methods**

In this study, the self-reported uses of and barriers to use of Web 2.0 technologies by faculty were examined. Faculty from three universities in the Western USA were contacted with invitations to participate. A total of 189 faculties were contacted and 54 completed the survey. The study had the following research questions:

1. What are faculty members' self-reported uses of Web 2.0 technologies as reported on the survey?
2. What are participants' perceived barriers to the use of Web 2.0 technologies as reported on the survey?

The purpose of this study was to analyze self-reported uses or barriers to use of Web 2.0 tools in an effort to shed light upon intrinsic versus extrinsic reasons why faculty do or do not use Web 2.0 in the classroom. Open-ended survey questions were included to offer an alternative analysis approach.

The research was a nonprobabilist and nonexperimental self-report sampling method and survey of study volunteers, including open-ended questions attached to the quantitative tools used to obtain information on the participant perspectives about and uses of Web 2.0 technologies in education were included (Creswell & Clark, 2007; Fowler, 2009; Trochim, 2006). A requirement to participate was that the faculty member was already using some of the lower innovation technologies in the classroom, including: (a) computers, (b) e-mail, (c) databases, (d) Internet, (e) word processing software, (f) overheads, (g) slide projectors, (h) audio labs, (i) microfiche, and (j) DVDs or film. The innovative emerging Web 2.0 technologies in this study included (a) blogs, (b) wikis, (c) social communities, such as Facebook and LinkedIN, (d) RSS feeds, (e) social bookmarking and tagging, (f) photo sharing, (g) video sharing, (h) podcasting and video casting, (i) virtual office applications, (j) multiuser virtual environments, (k) and instant chatting. Participation was voluntary. A 189 study participants included faculty members from three higher education institutions in the western United States that taught face-to-face, hybrid, and online.

This study applied descriptive research methods. Lodico et al. (2010) stated, "Descriptive survey research aims to describe behaviours and to gather people's perceptions, opinions, attitudes, and beliefs about a current issue in education" (p.26). Participants were given a demographic survey analyzing the faculty use of Web 2.0 tools. The survey contained several qualitative questions centred on the use of and barriers to use of Web 2.0. This was to help clarify responses and to reduce interpretation errors through a deeper understanding about why participants do or do not use emerging technologies in education. The open-ended questions pertaining to uses of and barriers to use of Web 2.0 tools were integral to offering a multiple-approach method to analyzing the research questions and helped highlight positive and negative attitudes about Web 2.0 tools. Faculty members were emailed the online survey links. After the 3-week study time was concluded, the data were compiled and analyzed using descriptive statistics. The qualitative question data were analyzed for themes that pertained to the study results, such as barriers to Web 2.0 use (Gay et al., 2006; Larson & Farber, 2000; Lodico et al., 2010). Relationships between reported barriers and lack of use were compared to the overall responses.

## Results

A total of 189 study invitations were sent out with eighty-one attempts. After removing abandoned attempts and incomplete survey data a total of fifty-four fully completed surveys were available for analysis, with a final 29% response rate. The following demographics comprised the study: 25 (53.7%) females and 29 (46.3%) males ages 18 to over 55, of which over 83% were Caucasian and US citizens. As expected of higher education faculty, respondents had high levels of education, with 96% having a bachelor's degree or above. The respondents included a lot of newer teachers, with 55% having taught 15 courses or less at the time of the study. Another 32% had from 7-20 years of experience, and 13% of respondents were veterans having taught 46 courses or more. Only 30% of respondents were a part of any online personal learning networks or social groups, though 64% were members of professional organizations related to their teaching area. Of the respondents, 89% taught face-to-face, 65% taught technology-integrated face-to-face, and 41% taught online.

**Research Question 1:** What are faculty members' self-reported uses of Web 2.0 technologies as reported on the survey?

The faculty members were asked which Web 2.0 tools they used with students and to rate their level of use and experience in their use with students on a 5-point scale, ranging from 1 (*no use at all*) to 5 (*expert use*) of that tool in the classroom with students.

The top five Web 2.0 tools most used Web 2.0 tools follow: (a) video sharing, with 70% of participants used this tool with students; (b) instant messaging and chatting, with 48%; (c) blogs at 39%; (d) social communities at 37%); and, (e) podcasts or video casts at 30%. The full results of reported Web 2.0 uses can be viewed in Table 1.

The faculty respondents were also asked the following open-ended question in which they listed one use of a Web 2.0 tool in class: "Please describe one way you use a Web 2.0 tool in your classroom. In what context and with whom?"

Thirty (55%) participants listed ten Web 2.0 uses in class:

1. **YouTube:** searching for YouTube videos relevant to course topics. This was listed by several faculty members who claimed it as useful in showing videos that highlighted course topics, with one specifying that the lack of classroom videos available to teachers makes YouTube that much more useful.
2. **Instant messaging and chat:** using Bigbluebutton and Skype for virtual office hours and virtual classroom instruction, and for communication with students.
3. **RSS feeds:** gathering student information.
4. **Podcasts:** using as a method for groups to plan projects and to reflect on learning and experiences in the format of an audio learning journal.
5. **Blogs:** using for discussion of course topics and information. One faculty member described using student blogs in class to help increase student participation on the topics. A second faculty member outlined the method of using student blogs for reflection and analysis of their community based service learning. A third faculty member had students use blogs as a course learning journal.
6. **Online grading, quiz and exam tools:** using online tools to create online quizzes for the end of each chapter reported by one teacher because these online tools give immediate results to the students. The specific tools used were not listed.

7. **Social media:** outlining how one class set up a class Facebook page so that students could share pictures and comments in one online location. The use of social networks was also listed as a means to build connections and relationships with online students.
8. **Twitter:** using tool to print a list of tweets from Twitter and having students discuss emerging themes among them (listed by a communications professor). Another respondent listed Twitter as a method to keep in quick contact with students concerning course announcements and supplemental online material and links related to class topics.
9. **Social media tools:** using online social media to connect with guest lecture and professionals so as to show students the role that Web 2.0 plays in current communication (research). [This was listed by a communications professor. The specific tools used were not given.]
10. **Social publishing:** using Scribd as a way to disseminate Open Educational Resources to students more quickly.

Table 1: Faculty Reported Use and Experience of Web 2.0 Applications

Web 2.0 tool	M (5-pt.)				
	f	% using	scale	Max.	SD
Video sharing (YouTube, etc.)	38	70	2.69	5	1.357
Instant messaging and chatting	26	48	2.07	5	1.301
Blogs	21	39	1.63	5	1.087
Social communities (Facebook, Myspace, etc.)	20	37	1.85	5	1.295
Podcasts or video casts (iTunes, Podcast Alley, etc.)	16	30	1.59	4	1.019
Virtual office applications	13	24	1.46	5	0.946
Other (LMSs, such as Moodle and Blackboard were listed—not Web 2.0 tools, but 47 participants listed them, seeming to think they are).	12	22	1.70	5	1.317
Microblogging (such as twitter)	11	20	1.39	5	0.878
Mobile education (m-education)	11	20	1.43	5	0.964
Wikis (Not use of Wikipedia, but use of a wiki with students)	10	19	1.43	5	1.002
Multiuse environments / virtual worlds	9	17	1.26	5	0.620
RSS (Really Simple Syndicate feeds)	8	15	1.26	5	0.757
Photo sharing (Flickr, Photo Bucket, etc.)	8	15	1.31	4	0.797
Social bookmarking and tagging (Delicious, Digg, etc.).	5	9	1.22	4	0.691

Note: N= 54, except for 'other', where n = 47. The minimum for all categories was 1. f= frequency, LMS = learning management system

**Research Question 2:** What are participants' perceived barriers to the use of Web 2.0 technologies as reported on the survey?

Study participants were asked to select any barriers to using Web 2.0 tools in the classroom. The top two reported barriers were, first, no training on how to use them (31.5%), and, second, no time to learn how to use them (29.6%). The full results are documented in Table 2.

For the Other choice concerning barriers, seven faculty members listed the following reasons (these are quotes so spelling errors were left in place):

*“Cost associated with their implementation or that they do not server the purpose that we desire.” [Female]*

*“I have trained on some of these (e.g., shifting my PowerPoint lectures to more disability-friendly formats, such as voice-over recordings for visually impaired, etc., but I cannot find the time to do all the other things necessary for professional development and these).” [Male]*

*“I think the students would need training more so than me and the amount of time that would take outweighs the benefits.” [Female]*

*“I use the Web 2.0 that I deem relevant / easy to use for me: Youtube, e-mail, etc. I do not use blogs, wikis, or podcasts because I do not have any experience with them. They may be more beneficial, but I never took the time to learn them.” [Female]*

*“Class time is not always enough, not all topics relevant to using Web 2.0.” [Female]*

*“See my response to question 35, [which was] . . . It’s time consuming to design and may not have much ROI if participation by the students is not required. They will mostly ignore any sort of participation that is not rewarded. They also do not need classes to use Web 2.0 technology, so it doesn’t have much inherent incentive for them.” [Male]*

*“There are concerns about privacy, copyright issues, and FERPA.” [Male]*

Table 2: Faculty Reported Barriers to the Use of Web 2.0 Applications

Barrier	Total f	Total %
No training on how to use them.	17	31.5
No time to learn how to use them.	16	29.6
Lack of administrative support	12	22.2
No technology support for using them.	11	20.4
I see no barriers to Web 2.0 use.	10	18.5
There is never any need or point to use them.	9	16.7
No interest in using them.	8	14.8
Other (cost to implement, time, training, some tools used and some not, class time, time consuming, concerns for privacy, copyright, FERPA).	7	13.0
No response / prefer not to respond.	3	5.6

Note: N= 54. f = frequency

The participants were asked if they felt Web 2.0 technologies would benefit student learning, and if they would benefit teacher-student interactions (see Table 3). Seventy-six percent of the respondents said, “Yes, that they felt these tools could benefit student learning,” and 83% said, “Yes, they felt such tools could also benefit learning community connections.” Forty-one percent (11) of the female participants and 48% (12) of the male participants used at least four of the 13 listed Web 2.0 tools (44%) of the 54 total participants.

Table 3: Faculty Perceptions on the Use of Web 2.0 in Education in Percentages (N = 54)

Question	Yes	No	Not sure
Do you feel that use of Web 2.0 technologies in education (any delivery formats, including online) can benefit student learning? Web 2.0 tools include blogs, microblogging (Twitter), podcasts, video casts, video, photos, RSS, Wikis, virtual worlds, etc.)	75.9	7.4	16.7
Do you feel that use of Web 2.0 technologies in education (any delivery formats, including online) could benefit teacher-student connections or interactions?	83.3	11.1	5.6

The faculty members were asked an open-ended survey question in which they gave any reasons they had for not using any Web 2.0 tools in the classroom. This question allowed analysis of the data from a different angle in which the instructor could highlight their own reasons for using or not using Web 2.0 technologies in the classroom. Thirty-five (65%) participants answered this open-ended survey question, providing the following reasons (where quotes were used, spelling errors were left in place):

*“Cost prohibitive to use or implement.”*

*“Need more training to feel comfortable with the formats and tools.”*

*“Not knowledgeable enough, lack of awareness, do not know how, lack of exposure, not tech savvy.”*

*“No preparation time, no time to research, develop them for effective incorporation.”*

*“Not available; not mainstreamed enough (it was unclear what participants meant by these two, but seems to have meant the infrastructure of being able to use such technologies within a classroom).”*

*“Web 2.0 content is too subjective to teach with.”*

*“Does not fit with the class type, not appropriate to the context of the class.”*

*“Not necessary to do so, would not improve learning, satisfied with current resources used, no return on investment.”*

*“Prefer face-to-face communication and feel students would be reluctant to add teachers to social networks.”*

*“Learning curve for students to use, which takes time away from them doing traditional assignments; Some are gimmicky fads.”*

*“I like to be more face-to-face in the classroom, I believe that students today are so exposed to Web 2.0 technologies that they do not need to be exposed to them constantly in the classroom as well.”*

*“The more toward technological means has adversely affected face-to-face interaction skills. I am trying to get people to talk to each other . . . the old fashion way.”*

*“Not structured into the curriculum, material, syllabus.”*

*“Too complicated to use in class.”*

And, for the final reason listed, a long comment left by one faculty member on the topic:

*“I barely have the time to keep up with clicker technologies, software upgrades to Windows, PowerPoint, Excel, Blackboard, Turnitin GradeMark, Turnitin Originality, all the online professional required training (e.g., sexual harassment, defensive driving), AND keep my existing technological hardware working (my iPhone is acting up, I just had to make an emergency trip to Fry’s to replace my keyboard, I upgraded my smart mouse to a green laser for better visual acuity, etc.). Add to this increasing assessment requirements in which we are expected to redesign our curricula and grading practices so that all the data we generate about student performance is now accessible for assessment reports, and I DO NOT HAVE*



*TIME! Finally, despite excellent efforts on my campus to provide training and access and support systems in place for these technologies, THERE IS LITTLE ACTUAL INCENTIVE to invest the time it requires in such learning curves, IF we also expect to maintain our grant writing, routine course development, triaging 50-100 emails a day, and of course, publishing (to avoid perishing)."*

## Discussion

In spite of the benefits to using Web 2.0 in education, members of faculty may or may not adopt them due to both extrinsic and intrinsic variables. In this study self-reported uses and barriers to use of Web 2.0 tools were also analyzed in an effort to shed further light upon intrinsic versus extrinsic factors as to why faculty did or did not use Web 2.0 tools. The data were analyzed to look for patterns and relationships. The most used Web 2.0 tools, in order of highest use, follow: (a) video sharing, such as YouTube, at 70%; (b) instant messaging and chatting, such as Skype, at 48%; (c) blogs at 39%; (d) social communities, such as Facebook, at 37%; and (e) podcasts or video casts, such as found at iTunes or Podcast Alley, at 30%.

A large portion of the faculty used YouTube, and it was the most often listed. Seventy percent of the faculty reported using YouTube as a way to enhance classroom teaching by having visual learning tools on the course concepts. Forty-eight percent of the study faculty reported using instant messaging and chatting tools, such as Skype, to communicate with students. Thirty-nine percent of the respondents reported using blogs to enhance student learning. They reported several different uses of blogs in the classroom. Some used blogs as a kind of personal learning journal in which students would create and run a blog on the course topics as a way to reflect on their learning. One faculty member outlined how that instructor's students would keep blogs to reflect on their community-based service learning. Another faculty member noted that student comments on blog posts on the course topics increased student participation on the topics. Thirty-seven percent of the faculty reported using social communities, such as Facebook to help enhance student-teacher connections and to build stronger learning communities. One faculty member noted that this was necessary because that instructor was an online instructor who would never meet the students face-to-face. Finally, 30% of study participants reported using podcasts or videocasts in their curriculum. One faculty member said podcasts were used by students as a kind of audio-learning journal on course topics.

The other eight Web 2.0 tools were used at lower frequencies (<24% of respondents), though one use of note is that a faculty member outlined the use of Twitter as a way to update students instantly on class announcements, online resource and weblinks, and other important course updates. A surprising find in this study was that only 9% (5) of the respondents used any social bookmarking and tagging sites, such as Delicious. Online social bookmarking tools by description would seem to be perfect resources for both students and teachers, as it would allow a teacher to bookmark the best resources and web sites online for students to easily find and use when they write papers and do other course work (Solomon & Schrum, 2007) and yet only 5 of 54 respondents reported using it with students.

The top five reported barriers to using Web 2.0 in the classroom follow: (a) no training on how to use them, at 32% or 17; (b) no time to learn how to use them, at 30% or 16; (c) no administrative support, at 22% or 12; (d) not enough technology support, at 20% or 11; and (e) never any need or point to use them, 16.7% or 9. No time and lack of knowledge or training were the most listed barriers to using more Web 2.0 in the classroom, both of which could be alleviated by administration if on-the-job training as a part of the normal workday were offered. Almost 19% (10) selected that they saw no barriers to using Web 2.0. Overall, the study participants listed more extrinsic barriers to using Web 2.0 in the classroom than intrinsic.

Approximately 75% (n=41) of the participants felt Web 2.0 technologies would benefit student learning, and about 83% (n=45) said that Web 2.0 tools would benefit teacher-student interactions. Interestingly though, while such a high percentage positively reported on the benefits to education with the use Web 2.0 tools, only 44% (n=54, including 29 females and 25 males) used at least four of the 13 listed Web 2.0 tools in their classrooms. So while, on average, 80% of the study participants said they do feel Web 2.0 can enhance student learning and student-teacher connections, only 48% are actually using Web 2.0 tools in the classroom. These findings are corroborated by the findings of Ajjan and Hartshorne (2008), whose study participants said that Web 2.0 would be a benefit to student learning, but the adoption rates did not match and reported teacher beliefs, and found that strong intrinsic factors shaped their motivation and willingness to successfully adopt new technologies with students. The difference between the findings of Ajjan and Hartshorne and this study was that they found intrinsic barriers to adoption to be more important while this study found extrinsic barriers to be more important.

In this study, extrinsic barriers were reported as the main barriers to Web 2.0 integration, such as lack of training and lack of time. The willingness and motivation (intrinsic factors) were present, but respondents reported needing more time and training in order to effectively use new technologies in the classroom.

As an example, one male respondent said, "I have trained on some of these (e.g., shifting my PowerPoint lectures to more disability-friendly formats, such as voice-over recordings for visually impaired, etc.), but I cannot find the time to do all the other things necessary for professional development and these." In another example, a female respondent said "I use the Web 2.0 that I deem relevant/easy to use for me: Youtube, e-mail, etc. I do not use blogs, wikis, or podcasts because I do not have any experience with them. They may be more beneficial, but I never took the time to learn them." A particularly relevant comment left by a male clearly expressed personal frustration with the lack of time, "...I DO NOT HAVE TIME! Finally, despite excellent efforts on my campus to provide training and access and support systems in place for these technologies, THERE IS LITTLE ACTUAL INCENTIVE to invest the time it requires in such learning curves..."

Therefore, a large number of the study participants see a positive value in the use of Web 2.0 in education, but they require training and time (and external incentives) in order to feel more confident or knowledgeable about uses to be motivated to use them. These concerns could be alleviated with more on-the-job training programs, incentives for teachers, and release-time given to complete the training necessary. To highlight that point, in answer to the question about why Web 2.0 has never been used in class (if this were the case), one male respondent said personally he did not use them and replied, "It hasn't seemed appropriate to the context of the class yet." This same respondent did not list a single barrier to use of Web 2.0 in class selecting that he did not see any barriers to Web 2.0 use in education. This respondent also positively responded to the benefits of Web 2.0 for teacher-student interactions. Overall, this was an innovative and moderately optimistic person who was not using Web 2.0 in education not because the individual saw no value and not because the individual perceived any barriers. Instead the individual was not using Web 2.0 in education as the individual did not recognize the value to the learning needs of the students. In cases such as these training that included case studies would be invaluable for supplying best practice methods to effectively utilizing Web 2.0 for enhance student learning experiences and offering examples of use for instructors unsure how to integrate them into their curriculum but who are willing to try if they see the value.

## Conclusions

In this study, all respondents, regardless of gender, claimed that the extrinsic factors of a lack of time and training were the main barriers to integrating more Web 2.0 tools into their classrooms, rather than intrinsic factors (beliefs, motivation, confidence). Furthermore, when asked about the benefits of Web 2.0, the respondents, regardless of gender, reported positive views, with 75% saying that these tools would benefit students and 83% saying they would benefit teacher-student interactions.

This is in contrast to some other available studies. Such as in a study by Ertmer, Ottenbreit-Leftwich, and York (2006) where exemplary technology-using teachers were analyzed, they found that, even in the face of many extrinsic barriers, such as lack of funds and time; these teachers managed to overcome all problems and successfully implement technology into their classrooms. The teachers did not view the extrinsic barriers as a major problem. Ertmer et al. suggested that extrinsic factors are less important than intrinsic factors in people's behaviour choices. The motivation to succeed in technology adoption was possible through a more positive attitude about the usefulness of technology in education.

Only 44% of the respondents in this study used at least four of the 13 listed Web 2.0 tools with students, which is in contrast to 75% of the respondents reporting benefits to student learning with Web 2.0 tools. The reported uses did not match with the reported benefits, and this would support the results that extrinsic factors (time, training, support), instead of intrinsic factors (beliefs, motivation, confidence) are the main barriers to faculty using more Web 2.0 in education at these institutions. Many respondents saw the value in using Web 2.0 tools in education, but had not seen the value to their particular course. Training that included case-studies and examples of best practices would help motivate many willing and keen faculty to start using more Web 2.0 in the classroom.

An implication is that administration at universities needs to create professional development programs that are available during work hours, and that give employees the time off from regular duties in order to attend the trainings. Some limitations of this study was that due to a small population a random sample was not possible, and therefore the results cannot be generalized to the greater population. A second limitation is the low survey attempt and completion rate of 29%. A larger sample may have produced different results.

Some areas for future research would be to look closely at how release time may positively affect innovative teaching and learning practices. Another interesting area of research would be to evaluate how examples and case-studies would motivate teachers to implement more Web 2.0 tools, because as per Rogers (2003) people are more likely to implement new innovations they see their peers using successfully.

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