WEB 2.0 SOCIAL NETWORKING TECHNOLOGIES & STUDENT ENGAGEMENT: AN EVALUATION OF AN IN-CLASS QUESTION-ANSWER SMS TEXT MESSAGING SYSTEM

C. Matt Graham, University of Maine
George Miaoulis, Jr., University of Maine*

Abstract

This paper provides a synthesis of the current literature about using Web 2.0 technologies for social networking and how these tools combined with Short-Message-Service (SMS) texting can lead to increased participation from students in the classroom. Additionally this study shares the results of a survey that measured the ease of use, comprehensiveness and level of interest, and participation of a webpage that receives SMS text messages. The results of the survey showed that most students agreed that the blog page was easy to use, that the SMS text receiver in the blog page increased class participation and interest in class discussions, and that the blog page combined with student text messaging improved class discussions. Interestingly enough, the results showed that while the SMS enabled webpage increased class participation, individual students did not feel that the website increased their personal participation or improved their personal understanding of course material

INTRODUCTION

Just think back over last semester, how many times were you standing in the front of the classroom lecturing or discussing a case and noticed one or more of your students' texting a message. What if we could harness that student's energy and interest and bring it right back into the classroom, right into that very session and stimulate learning. This article discusses the use a Short-Messaging-System (SMS) that allows students to send anonymous texts during the class and have them appear on a blog page for use during the class session with the goal of increasing class participation and student learning. This learning experiment was conducted during the fall semester of 2009 at the Maine School of Business, University of Maine, in a sophomore management information systems course. The results of this initial experiment are presented below.

EVOLUTION OF TECHNOLOGY

It is useful to begin with a brief review of the evolution web technology. Web 2.0, the Internet's next generation of Web technologies, has radically transformed how internet content is developed, accessed, and used by individuals and groups today, especially college students. When comparing Web 2.0 internet development to the previous Web 1.0 generation it is easy to see how technology has evolved from one generation to the next. For example, Siddiqui (2009) noted that in the Web 1.0 generation, developing and adding web content to the Internet required some degree of technical expertise. This meant creating web pages required developers to have training in some web development tools like hypertext markup language (HTML) and cascading style sheets (CSS). If the web page was to be dynamic, for example, if it changed regularly or had content that was active on the page such as a video or a moving image; the web developer required even more expertise with working with more sophisticated web development tools such as Dreamweaver™ or Flash content as a few examples.

Contrast that to developing web content for the Internet today using Web 2.0 technologies. Siddiqui (2009) stated that Web 2.0 technologies make it much easier to develop web content through the use of user interfaces labeled what you see is what you get (WYSIWYG) interfaces and technologies. These Web 2.0 development tools have according to Siddiqui reduced and in some cases eliminated entirely the need for web developers to have technical expertise in the area of web development.

One of the major outcomes of the emergence of Web 2.0 technologies is the phenomena called social networking. Dix and Cowen (2007) described many Web 2.0 sites as being about social networking. This is acknowledged by the recognition of many popular websites today like MySpace, Facebook, and Twitter. These are Web 2.0 sites that run interactively online and allow friends, family, co-workers, and others to customize their personal web pages to include stories, pictures, videos, and blogs about themselves or organizations that they then share with the world around them.

Siddiqui (2009) stated that social networks provide two types of socializing utilities: 1) professional networks, in which users use sites like LinkedIn to post professional profiles and add other co-workers and friends to their network. This professional use of social networking tools

allows the user to introduce themselves to the larger community of people and professionals in their field of work. The second type of social network utility is 2) personal networks that allow users to post information of a more personal nature to their site such as interests, hobbies, and daily logs about what they are doing. The personal site allows the user to connect and stay connected with friends and families.

Both types of social networking sites demonstrates that Web 2.0 technologies have thus far not only provided a set of easy to use development tools for creating web content, but it has also provided a forum that has introduced a number of web-based communication tools between the developer and the community of people it wants to reach. According to Jones and Graham (2009) another communication tool that has the potential for use within a social networking site used in an educational environment is short messenger services (SMS) texting. SMS texting is a mobile phone application used to send quick, concise, text based messages. For example, Wains and Mahmood (2008) observed that researchers at the University of Lancaster explored the use of SMS texting as a means for students and instructors to communicate with each other about course work and took quizzes via their mobile phones texting services. By communicating with each other via mobile phones and participating in actual course work the school had developed a type of hybrid classroom allowed for greater participation and engagement from its students.

Faulkner and Culwin (2004) identified SMS text messaging as one of the largest growth areas in communication technology. In the study they conducted of 565 users of mobile devices they found that many mobile devices users preferred texting over other means of communication such as actually talking on the phone. This research provides evidence that SMS texting can be and is being used in educational settings.

Given the ease at which Web 2.0 technologies allows an individual to build and develop web content and the potential web 2.0 technologies have on how individuals and groups to communicate, this article will summarize how Web 2.0 communication technologies has been used in higher education and describes how the development and use of a SMS texting tool within a blog site to enhance classroom participation and communication. The primary purpose of this study is to begin to understand student / technology interaction in the development of an

interactive web-based texting SMS tool and its effectiveness in increasing classroom participation.

Problem Statement

Professors, instructors, and trainers with large classrooms often observe that a significant proportion of students do not attend classes regularly and are not engaged in the classroom discussion when they are there. Some of the factors contributing to the lack of class participation include "the fear' of asking a "dumb" question (embarrassment in a peer setting), disinterest in class discussion, and feelings that the lecture is a "one-way" instructor led discussion in which student are expected not to be active participants (Friedman, Rodriguez, McComb, 2001), (Markett, Sánchez, Weber, and Tangney, 2006). A few consequences of disinterested / non-participating students is the observation that they will 1) often busying themselves with non-class work such an assignment for another class, doodling, etc…, 2) distract other members of the class by socializing with friends next to them or 3) surfing the web, answering emails, or texting friends while in class. As a result professors, instructors, teachers, and trainers often look for ways to increase interactivity in their classrooms. Markett, Sanchez, Weber, and Tangney (2006) describe classroom interactivity as " …yielding benefits in relationship to the promotion of more active learning environments, the building of learning communities, the provision of greater feedback for lecturers, and it also contributes toward student motivation."

Liu, Wang, Liang, Chan, and Yang (2002) also addressed student interactivity in their research that looked at applying wireless technologies for building a highly interactive learning environment. Liu, et.al believe that "in order for meaningful learning to be achieved in the classroom lots of effective interaction between participants and other participants and interaction between the participants and the instructor is crucial". Their research found that educational technologies such as Blackboard, WebCT, and Moodle used in the classroom had a positive impact on students learning. This conclusion from their research suggested that technology-enabled collaborative learning leads to superior learning outcomes compared to learning that is not technology enabled.

Software being evaluated: SMS Texting Website

Today several social networking sites such as FaceBook, MySpace, and Twitter have made creating a personalized social networking site easy for even the most technologically challenged person. Additionally several open-source technologies have emerged that embed easily into a variety of social networking development tool like Facebook, MySpace, and Google blogger. To determine whether large classes would benefit from including social networking technologies in the classroom a blog page was developed for use in this study that combines: 1) a Google blog page, 2) Slide Share, which is a free open-source technology that converts PowerPoint presentations into a HTML format that can be embedded into blog pages, and 3) Poll Everywhere, which is another open-source technology that allows a SMS text receiver to be embedded into blog pages as well. These three social networking technologies were combined to create the "SMS texting website". A diagram of the messaging system used in this experiment is presented below.
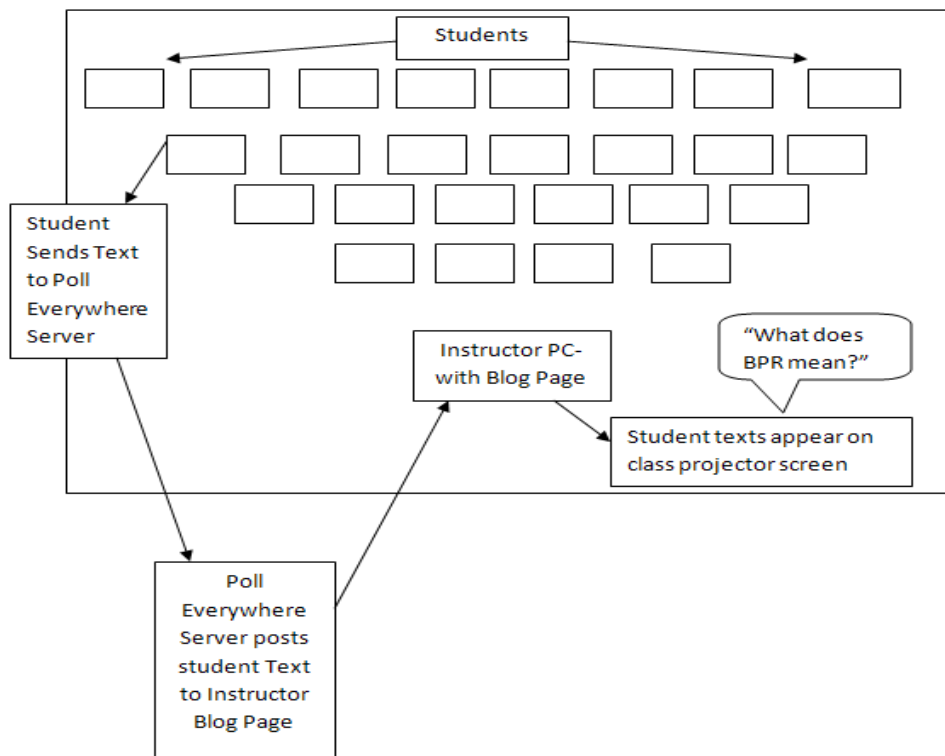
Research Methodology

    1. Communication Methodology

A blog page was developed using Google BlogSpot with an embedded SMS text receiver at the bottom of the blog page. Students from two sophomore classes at the University of Maine's School of Business were encouraged to use the blog page during class sessions of a management information course by sending questions and comments to its SMS text receiver over a period of two weeks. At the end of the two-week period students that participated in these classes were asked to complete a web-based 10 question survey that measured the blog pages ease of use, comprehension and interest level, and participation. For the purpose of this study ease of use, comprehension and interest level, and participation were defined as;

TABLE 1
Definitions for Study

Ease of Use	The degree to which students felt the class blog page was easy to use and send messages to. Usability here also addresses how easy it is to read SMS text messages received by the blog page
Comprehension and Interest level	The degree to which students found the information stored in the blog page including SMS text messages received by it useful in understanding class material better and or did the blog page make the class discussions more interesting and more engaging?
Participation	The degree to which students felt that the class blog page that receives SMS text messages did accomplish its attended goal of increasing student participation in class discussions (including individual participation) and improved classroom discussion.

2. Research Subjects

The participants in this study were students enrolled in 1.) A sophomore introduction to management information systems class

and 2.) A sophomore management class, at the University of Maine's Maine School of Business. To participate in the study, all students agreed with and signed the university's approved human subject research informed consent form. The consent form was provided to all participating students via an email that also contained a hyperlink to the web-based survey instrument. All of the 175 students enrolled in these two classes participated in this study, virtually a census.

3. Research Setting

The lecture halls used in this study are setup with an LCD projector system suspended from the ceiling and that can be connected to the instructor's or professor's laptop.Wireless internet access is provided in these lecture halls so that accessing the Internet class Blog Page was possible. The Class blog page was projected onto a white screen located at the front of the lecture hall and is visible to all students and the professor in attendance.

4. Requirements for Voluntary Participation in the Study

At the end of the two-week research study period in which students were asked to complete a 10 question web-based survey that measured the ease of use, comprehension and interest level, and participation of the class blog page that received SMS text messages. The 10 attribution questions used the point scale 1 = strongly agree and 5 = strongly disagree included:

TABLE 2
The following tasks were required of participants:

1.	During class discussions participants were encouraged to ask questions or make comments by speaking or sending SMS text messages to the class blog page
2.	Read comments posted to the class blog page via SMS text messages
3.	Comment either verbally or through SMS texting about the information posted to the class blog page.

Ease of Use

1. I thought that the SMS texting website was easy to use.
2. Sending a SMS text to the Webpage was easy
3. SMS texts posted to the SMS texting website from other students was easy to read

Comprehension and Level of Interest

4. The SMS texting website provided me with useful information
5. The SMS texting website was interesting and engaging.
6. Using the SMS texting website improved my understanding of course material
7. I think that I would use this SMS texting website frequently in class

Participation

8. I found that the SMS texting website motivated me to participate more in class
9. I felt that SMS texting questions sent by students improved classroom discussions
10. I felt that more students participated in class because of the SMS texting website

STUDY FINDINGS

This section presents the findings of the study based upon the responses of the students in the two classes. We will divide our analysis into three subsections examining 1.) Ease of use, 2.) Comprehension and level of interest and 3.) Participation. At the end of the two-week observation period the results of the survey generated the responses presented below.

Analysis of the SMS Texting Websites Ease of Use

In this study we defined ease of use as the degree to which students felt the class blog page was easy to use and send messages to. Ease of use here also addresses how readable SMS text messages received by the blog page were. The results of the three attribution questions asked to identify perceptions of usability are presented below:

In terms of ease of use, just over half (50.9%) of the students that participated in the study found that the SMS texting website was easy to use. See table 3 below.

TABLE 3
I thought that the SMS texting website was easy to use.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	5: Strongly Agree	89	50.9	51.4	51.4
	4	61	34.9	35.3	86.7
	3	22	12.6	12.7	99.4
	2	1	.6	.6	100.0
	Total	173	98.9	100.0	
Missing	System	2	1.1		
Total		175	100.0		

In addition to finding the website easy to use, over half of the students (57.1%) that participated in the study also stated it was easy to send texts to the SMS texting website. See table 4 below.

TABLE 4
Sending a SMS text to the Webpage was easy

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	5: Strongly Agree	100	57.1	57.8	57.8
	4	46	26.3	26.6	84.4
	3	25	14.3	14.5	98.8
	2	2	1.1	1.2	100.0
	Total	173	98.9	100.0	
Missing	System	2	1.1		
Total		175	100.0		

Students participating in the study also found that SMS text messages posted to the SMS texting website from other students was easy to read. See table 5 below.

TABLE 5
SMS texts posted to the SMS texting website from other students was easy to read

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	5: Strongly Agree	99	56.6	57.9	57.9
	4	41	23.4	24.0	81.9
	3	23	13.1	13.5	95.3
	2	8	4.6	4.7	100.0
	Total	171	97.7	100.0	
Missing	System	4	2.3		
Total		175	100.0		

Analysis of Ease of Use Results

With over 80% of all students strongly agreeing or agreeing on all three ease of use measures, we conclude that "ease of use" of the SMS texting website did not present a barrier to student participation.

Comprehension and Level of Interest

In terms of the attributes related to comprehension and level of interest, students reported that the SMS texting website did provide them with useful information. See table 6 below.

TABLE 6
The SMS texting website provided me with useful information

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	5: Strongly Agree	48	27.4	27.9	27.9
	4	80	45.7	46.5	74.4
	3	36	20.6	20.9	95.3
	2	6	3.4	3.5	98.8
	1: Strongly Disagree	2	1.1	1.2	100.0
	Total	172	98.3	100.0	
Missing	System	3	1.7		
Total		175	100.0		

Table 7 below demonstrates that most students found the SMS texting website interesting and engaging.

TABLE 7
The SMS texting website was interesting and engaging.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	5: Strongly Agree	63	36.0	36.8	36.8
	4	77	44.0	45.0	81.9
	3	25	14.3	14.6	96.5
	2	5	2.9	2.9	99.4
	1: Strongly Disagree	1	.6	.6	100.0
	Total	171	97.7	100.0	
Missing	System	4	2.3		
Total		175	100.0		

Table 8 showed that more than half of the students that participated in the study (56%) either strongly agreed (5) or agreed (4) that the SMS texting website improved their understanding of the course material. See table 8 below.

TABLE 8
Using the SMS texting website improved my understanding of course material

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	5: Strongly Agree	36	20.6	20.9	20.9
	4	62	35.4	36.0	57.0
	3	57	32.6	33.1	90.1
	2	11	6.3	6.4	96.5
	1: Strongly Disagree	6	3.4	3.5	100
	Total	172	98.3	100.0	
Missing	System	3	1.7		
Total		175	100.0		

Finally in terms of student comprehension and level of interest, most students either strongly agreed (5) or agreed (4) that they would use the SMS texting website frequently in class. See table 9 below.

TABLE 9
I think that I would use this SMS texting website frequently in class

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	5: Strongly Agree	28	16.0	16.2	16.2
	4	54	30.9	31.2	47.4
	3	62	35.4	35.8	83.2
	2	18	10.3	10.4	93.6
	1: Strongly Disagree	11	6.3	6.4	100.0
	Total	173	98.9	100.0	
Missing	System	2	1.1		
Total		175	100.0		

Comprehension and Interest Level

The findings above suggest that while the vast majority of students thought the SMS texting website provided useful information and that they found the site interesting and engaging, half or less of the students didn't necessarily feel that the website itself would improve their participation in class or improve their understanding of course material. This latter finding should not be unexpected as there is always a lag between the introduction of a new technology, texting questions, in a traditional setting (the classroom) and its adoption. It takes time to learn, accept, and fully integrate a technology as learning lifestyle.

Participation

The last attribute measured in this study sought to find out if the SMS texting website would encourage more students to participate in class. Table 10 below showed that less than half of the students (43.5%) found that the SMS texting website motivated them to participate more in class (Table 10).

Despite the finding that less than half of the students were motivated to participate more due to the SMS texting website, over 70% of the students that participated in the study found that the SMS texting website improved classroom discussions (Table 11).

TABLE 10
I found that the SMS texting website motivated me to participate more in class

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	5: Strongly Agree	29	16.6	17.0	17.0
	4	47	26.9	27.5	44.4
	3	60	34.3	35.1	79.5
	2	27	15.4	15.8	95.3
	1: Strongly Disagree	8	4.6	4.7	100.0
	Total	171	97.7	100.0	
Missing	System	4	2.3		
Total		175	100.0		

TABLE 11
I felt that SMS texting questions sent by students improved classroom discussions

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	5: Strongly Agree	60	34.3	34.7	34.7
	4	64	36.6	37.0	71.7
	3	35	20.0	20.2	91.9
	2	11	6.3	6.4	98.3
	1: Strongly Disagree	3	1.7	1.7	100.0
	Total	173	98.9	100.0	
Missing	System	2	1.1		
Total		175	100.0		

Lastly, as it relates to student participation, almost 60% of students also felt that more students participated in class because of the SMS texting website (Table 12).

Participation and Motivation

The findings above seem to suggest that the SMS texting website by itself did not necessarily encourage students individually to participate more in class discussions. However, the results suggest that students perceived that

TABLE 12
I felt that more students participated in class because of the SMS texting website

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	5: Strongly Agree	44	25.1	25.4	25.4
	4	60	34.3	34.7	60.1
	3	51	29.1	29.5	89.6
	2	14	8.0	8.1	97.7
	1: Strongly Disagree	4	2.3	2.3	100.0
	Total	173	98.9	100.0	
Missing	System	2	1.1		
Total		175	100.0		

other students in class participated more because of the SMS texting website and that this increased overall student participation which then improved classroom discussions.

Overall Results of the Study

The findings suggests that from an aggregate perspective allowing students to participate in class using SMS text messaging does increase class participation and improve the overall discussion held during class. This finding has two dimensions: 1) traditional student to student and instructor verbal discussion, and 2) student to student discussion texting which appear on the screen in front of the room. Thus, active student to student learning was taking place.

This exploratory research also suggests 1) that individual students perceive that using this SMS texting website in class encourages them to participate more and 2) does not appear to provide the additional benefits of improving individual students understanding of course material. These seemingly contradictory results warrant future research into the perceived benefits of incorporating social networking technologies into classroom discussions particularly in light of the well established technology adoption process concepts.

ENDNOTES

*C. Matt Graham (Christian.graham@umit.maine.edu) is a Lecturer of Management Information Systems at the Maine Business School at the University of Maine, Orono, ME. George Miaoulis (george.miaoulis@umit.maine.edu) is a Professor of Marketing at the Maine Business School at the University of Maine, Orono, ME.

REFERENCES

Dix, A. & Cowen, L. (2007). HCI 2.0?: usability meets web 2.0. Proceedings of the 21st British HCI Group Annual Conference on HCI 2008: *People and Computers XXI: HCI...but not as we know it - Volume 2.* University of Lancaster, United Kingdom, British Computer Society.

Faulkner, X. & Culwin, F. (2005). "When fingers do the talking: a study of text messaging." *Interacting with Computers* 17(2): 167-185.

Friedman, P., Rodriguez, F., & McComb, J. (2001). Why students do and do not attend classes: myths and realities. *College Teaching*, 49(4), 124-33.

Jones, N. & Graham, C.M. (2009). Improving Hybrid Course Delivery in Distance Education with Emerging Technologies. In Y.K. (1st Ed*.) Learning Management System Technologies and Software Solutions for Online Teaching: Tools and Applications.* Hershey, PA: IGI Publishing

Liu, T-C, Wang, H-Y, Liang, J-K, Chan, T-W, Yang, J-C. (2002). Applying Wireless Technologies to Build a Highly Interactive Learning Environment. *Proceedings IEEE International Workshop on Wireless and Mobile Technologies in Education, IEEE Computer Society.*

Markett, C., Sánchez, I., A., Weber, S., and Tangney, B. (2006). "Using short message service to encourage interactivity in the classroom." *Computers & Education* 46(3): 280-293.

Siddiqui, A. (2009). Using Web 2.0 Tools to Increase Your Productivity. *Chemical Engineering*, 116(3), 31-32.

Wains, S,.I. and Mahmood, W.(2008). Integrating m-learning with e-learning. *Proceedings of the 9th ACM SIGITE conference on Information technology education. Cincinnati, OH, USA, ACM.*