Abstract

In this paper we explore a combination of social technologies and their use within higher education. Our research builds atop ongoing design science research looking to expand an existing online learning community (OLC) used at our university. Our new design implements the latest version of Elgg, an online social learning platform and integrates it with the popular microblogging site Twitter. The overarching goal of this research is to measure the impact these technologies have on levels of learning and social interaction inside and outside the classroom. We measure this impact across two undergraduate classes taking upper-division information systems courses. Initial findings indicate that while the blogging component of our OLC continues to provide high levels of learning and social interaction in the classroom, microblogging, while effective in bringing new information into the classroom, failed to have a significant impact on learning or interaction.

1. Introduction

Today’s higher learning is fueled by advanced technical environments offering instructors and students powerful new features to support learning and interaction. Some of these technologies provide synchronous interaction such as clickers, which can be used for in-class querying and real-time participation. Other technologies, such as online chatting allow for individuals to interact synchronously outside the classroom and can be used to supplement instructors’ office hours or allow students to connect with one another in real-time. This research focuses on asynchronous technologies; or those technologies where students and instructors utilize technologies outside the classroom at their own discretion. Asynchronous technologies alleviate the requirement for individuals, or groups, to participate in real-time. Instead, participants can interact and share knowledge from different locations and at different times.

Many asynchronous learning technologies, such as online discussion boards and blogs, are facilitated by Web 2.0 software, which allow students and instructors to use advanced, yet quick and simple-to-use, web technologies to create and share knowledge outside the classroom. Consequently, course designers and web developers continually manipulate these online environments to enhance learning through interaction.

One particular piece of social networking software, having a profound impact around the globe, is Twitter, the microblogging engine. While Twitter is not the only microblogging engine on the market today, it is unarguably the most popular. This research aims to integrate Twitter functionality into an existing course’s online learning community (OLC). More specifically, we design, develop and evaluate the integration of Twitter and Elgg, an online social learning platform, in an effort to change attitudes and perceptions towards online learning and interaction. Our system provides users with an asynchronous method of bringing new information into the course community, where individuals can continue the conversation in a closed academic environment.

2. Background

Within higher education, the Internet and information systems play a vital role. While some institutions offer complete online degree programs, more traditional institutions look to use Internet technologies to provide students with all types of information and services. Some traditional institutions even offer full courses online. Regardless of the institution, online courses, even hybrid courses, utilize specialized software catered specifically to the needs of the institution. Known commonly as course management software (CMS), it is estimated that the adoption of CMS software among today’s institutions of higher learning is above 96% [1].

As for today’s students, they enter colleges and universities with greater technical prowess than their predecessors, many having already participated in multiple online social networking sites such as Facebook, MySpace or Twitter [2]. Consequently, as these numbers continue to rise, students have come to expect information systems to play a more active and strategic role in their education. Furthermore, as the adoption of social software also rises, so, too, will the influence social software has on educational software, particularly within the realm of the
CMS. While their levels of sophistication vary, recent releases of popular CMS platforms of Blackboard and Angel already include Web 2.0 social software components, such as blogs, profiles and wikis.

2.1 Social Software Used in Education

Studies in online collaboration have shown that virtual communication patterns correspond in similar fashion to real-life communication [3, 4]. Research by Stacey [5] found that a higher quality of electronic communication helps to engage students and aids in their learning of the course material. As in face-to-face communication, members of online social learning environments are able to state what they think, comment on what others have said, collaborate on common statements, and share information in many forms. Additionally, as members of a learning community, students have the right to comment on what others have said, collaborate on common interests, and share information in many forms. Accordingly, online social learning environments offer a valid form of learning and offer many different methods for students to interact with instructors and their peers [6].

Web 2.0 technologies, such as blogs, microblogs and wikis along with peer-to-peer networking discussion boards and file sharing, empower individuals to take ownership of the content they create while also making it easier to pursue social or scholastic ties with their peers. And increasingly, more individuals are gaining access and familiarizing themselves with these technologies making their introduction into the classroom more-or-less seamless [2].

In one study, Brescia and Miller [7] found that the benefits to using blogging in the classroom included enhanced student reflection, increased student engagement, portfolio building, and better synthesis across multiple activities. Kirkup [8] argues that academic blogs can lead to the construction of an intellectual identity.

To date, blogging has been a critical component of our own OLC. Over the past five years our research has shown that with the correct formula of software, along with proper alignment with course learning objects, social software offers students the ability to reflect on course material and expand in-class discussions to virtual spaces [9, 10]. Our results have also shown that blogging works particularly well to help improve learning, enhance social interaction and help build course community.

As researchers in social learning software, we look to continue enhancing our existing design, one that has already shown great success in the classroom, to discover how new technologies can further engage students. And with the widespread popularity of microblogging in recent years, the integration of microblogging into the OLC was a natural extension.

3. Microblogging

With the success of our OLC in recent design iterations, particularly with the blogging component, we looked to further enhance our OLC to incorporate a microblogging component and measure its effect on learning, social interaction and community. Microblogging sites such as Twitter, Tumblr and Jaiku are largely popular and provide individuals with innovative ways to share information. The goal of each and any microblog is to limit the amount of information that can be shared during any given post. This, in turn, requires that the content generator be more selective with what he or she shares.

In this research, we have selected the most popular microblogging engine Twitter for a couple different reasons. The first reason was due to its sheer popularity. Since it is already so popular, there was a greater chance that individuals would already have accounts or at least be familiar with the Twitter interface. Additionally, Twitter has an advanced application developer interface (API), which allows third-party developers to easily integrate Twitter into their own applications.

3.1 Twitter

According to Twitter’s official blog [11], on March 21, 2011, Twitter celebrated its 5th birthday. Twitter allows any user with a valid email address to create an account for free. Once users have an account they are able to post content or view or subscribe to other Twitter account holders. Detailed in Figure 1, Twitter has a very user-friendly web interface. Not illustrated are screenshots for Twitter’s equally user-friendly mobile applications, which are available to download for free for cell phones and smartphones.

![Twitter System](image)

Figure 1 - Twitter System

Currently, the average number of Twitter posts, or tweets, per day is in the neighborhood of 140 million and approximately 1 billion tweets are made each week.
Additionally, the site averages over 175 million accounts. While it is easy to argue against the quality or content of these tweets, for good or bad, Twitter has been successfully utilized across many industries. Some industries utilize the microblogging site as a primary mechanism for marketing and to alert customers to upcoming events or promotions. Another popular area for the microblogging site has been real-time news coverage. Twitter, along with Facebook and YouTube, was at the forefront of the Arab Spring, or the series of civil government protests that took place in spring 2011 and showcased just how effective the site was for communicating information in real-time [12]. Within more cooperative settings, such as workplace environments, Twitter helps create virtual water coolers and helps colleagues to get to know one another better [13].

3.2 Microblogging in Education

With the widespread adoption of Twitter and other microblogging sites, so, too, came their adoption in the classroom. Recent research suggests that within an academic environment microblogging adds to community building by offering individuals the ability to continually inform others to what you are doing, discovering or experiencing [14].

This notion is supported by empirical data and a number of studies have looked at the inclusion of Twitter in academic environments. Grosseck and Holotescu [15] argue that the incorporation of microblogs models good pedagogy and can be responsive to a student's learning needs. Specifically, they argue that Twitter can change the classroom dynamic and offer a useful tool to share information. Ebner et al. [16] concluded that microblogging can support learning beyond the traditional classroom through a constant flow of information between students and between students and teachers. And Dunlap and Lowenthal [17] found microblogging to be a powerful tool for enhancing social presence in addition to establishing informal, free-flowing, just-in-time communication between and among students and faculty.

As elaborated in the next section, our primary goal is to utilize microblogging, specifically Twitter, as a mechanism to facilitate knowledge sharing outside the classroom with the hopes of aiding learning and building strong social ties among students.

4. Theoretical Model

Theory has been an important driver in the creation of our OLC and the addition of new software components. During the course of our research we have developed a working theoretical model to help guide how new sub-components can facilitate learning, social interaction and community within an academic environment [18]. What has emerged is a model based on three fundamental theories of learning and is illustrated by Figure 2.

In today’s classroom, hands-on learning, represented in our model by activity theory, is common where students and faculty combine the use of technology to accomplish course tasks. Activity theory also considers aspects of motivation and engagement. In activity theory activities are goal-directed, where multiple ways exist to achieve those goals, oftentimes through adaptive means [19]. For this research, we use blogging and microblogging as specific activities for learning and social interaction, which students can use in different fashions to accomplish course goals.

These activities, in turn, help accommodate the unique learning styles of the individual, represented in our model by constructivism. Constructivism states that learning can be based on the interaction and experiences of the learner [20, 21]. These interactions and experiences can be directly influenced by blogging and microblogging. Some learners may benefit from the search and retrieval process of blogging and microblogging, while others may be more interested in reviewing the content created by their peers. The combination of these activities means that the learner is presented with multiple paths to learn and interact.

Activity theory also triggers engagement in an online community, represented in our model by social presence theory. The theory of social presence considers the degree to which an individual’s perception of the online community affects his or her participation in that community [22, 23]. As briefly touched upon above, some users may only participate in an OLC if there is an active level of participation. Microblogging, which includes a student icon, link to the student’s profile and short burst of student-generated content can be a direct method for students to create a steady stream of activity across the course OLC.

Together, these three theories provide a well-rounded model that considers the community, the individual and how each can be influenced and enhanced with technology.
5. System Design

5.1 CMS versus OLC

Since the onset of our research we have continued an uphill battle to distinguish our software from traditional CMS platforms. Our goal as social software researchers was never about producing an institutional resource, but to offer a learner-centric and self-sustaining social learning environment for students to interact and share knowledge. While our school’s CMS platform, Angel, offers advanced grade book capabilities, the software fails to provide engaging social learning capabilities. Figure 3 shows the blogging engine for Angel, which provides little in terms of social networking capabilities. A significant downfall with Angel is in its blog design, and a lack of student-to-student networking capabilities. As illustrated in Figure 3, blog posts lack avatars and they also lack the ability to embed images or video. Angel, overall, offers limited capabilities to generate user profiles as well. Therefore an important aspect of our research, which has shown measured success, has been to construct software that is more aligned with social software, than course management software [9, 10].

Figure 3. Angel Blog Component

5.2 Elgg Online Learning Community

Our initial review of social software began in 2006, when we evaluated a variety of proprietary and open source social networking software. We compared these technologies based on cost, usability, extensibility, customizability and the range of features each offered. We ultimately decided on Elgg, a relatively nascent tool at the time, for its range of social features and easy-to-use interface. Available through SourceForge.com and Elgg.org, the social network platform comes bundled with blogging, file sharing, the ability to create unlimited sub-communities and peer-to-peer (P2P) networking capabilities. Additionally, Elgg provides for the ability to restrict access to data across a number of levels, including individual-level, group-level, logged-in user-level and custom levels of restriction.

Since 2006 our research team has had great success with the Elgg system. One major limitation of our studies centered on the fact that we relied on primitive beta version of the software, which, since 2006, had undergone tremendous changes in both number of features and user interface design. After measuring the impact on earlier versions of the software, our research team decided to upgrade to the latest stable version available, 1.7.6 (1.8 is in beta mode). The upgrade has provided for a much cleaner user interface and more advanced features such as Twitter integration.

To date, our research has shown Elgg to function particularly well in higher education and has helped compliment aspects where CMS systems have fallen short. Illustrated in Figure 4, the ability for any user to create a sub-community, known in Elgg as ‘groups’, allows both instructors to create as many groups as they have classes. Additionally, students can create groups for classroom group activities. Each group has dedicated resources only available to assigned members of the sub-group.

Figure 4. Elgg 1.7.6 Course Communities

5.3 Accessing the Twitter Feed

Integrating Twitter with Elgg was not complex due to the adoption of Internet standards and the openness of both systems. Twitter provides an application programming interface (API) for developers. The API allows developers to build tailored software which can pull information directly from the Twitter feed. The information is returned in XML format and can easily be customized to any application interface. Consequently, applications can make specific search queries to query the Twitter live feed for certain tweets. This feature allows developers to construct queries to extract tweets containing specific words, ‘BCS300’, or from a specific user, ‘BCS300_Instructor’, or even to a specific user, ‘BCS300_Instructor’. Furthermore, these search parameters can be combined to generate even more complex queries.
As application developers for Elgg, the API provides the capability to generate custom Twitter modules. One limitation we discovered was that while posts made to Twitter.com are real-time, retrieving posts from the Twitter feed is not and, in some cases, can be delayed up to one hour. Additionally, for some unknown reason, we found that tweets from some users never reached the data feed. And lastly, unless a tweet is re-tweeted (resent), the Twitter feed will only keep one week’s worth of tweets.

Illustrated in Figure 5, students participating in course assignments would make tweets with the @SocialXYZ syntax. This syntax, @TwitterUser, is more commonly referred to as a ‘shout-at’. Consequently, in order for an individual to shout at members of the course and have those tweets feed into the Elgg system, they would need to prepend each tweet with @SocialXYZ.1

Figure 5. Twitter Shout-At

5.4 Microblog / Blog Integration

Prior to the construction of our microblogging module, we investigated an available third-party plugin for Elgg. Unfortunately, we found the plugin to be very limited. It did not have a mechanism to filter tweets based on content. The module also offered no way to collectively showcase tweets by specific Elgg group. Therefore, we decided to construct our own module that extracted shout-ats to BCS300_Instructor and displayed each tweet in chronological order on the OLC dashboard.

As an initial step towards unifying microblogs with blogs, we further enhanced the Twitter module. Illustrated in Figure 6 is a portion of the OLC dashboard and the view a user would see upon logging into the system. In the left column, immediately underneath Group memberships, a user would see a complete list of recent community tweets posted. The module presents users with the tweet, the OLC user name and icon with a link to the user profile, the Twitter account name, with a link to their external Twitter profile and an additional link, “Blog It,” which allows individuals to create a new blog post based on any tweet.

Figure 6 – OLC Dashboard

Figure 7 provides a snapshot of the blog entry screen. In this particular screenshot, a user has chosen to create a new blog post based on a recent twitter post. To accommodate this feature, a new database table was created to store the tweet and the associated blog post.

Figure 7 – OLC-Twitter Blog Post

Additionally, keeping with our OLC design of prior versions of Elgg, we added modules to the OLC dashboard to present users with a randomized summary of blog content from across the site. Detailed in the next section, students were required to review blog posts weekly for asynchronous participation credit and the dashboard module helped facilitate these activities.

1 FSC.SocialXYZ.com was the course website and SocialXYZ was the associated Twitter name used.
6. Research Design

Our research design is categorized as a one-group pretest-posttest quasi-experimental design. Similar to the characteristics of a field experiment [24, 25], we measure the effects of our system on a specific population within an existing organization. While the organization, a U.S.-based institution, is not a “naturally” occurring setting, it is pre-existing and baselines exist for which to compare results. In this research we specifically explore the following questions:

1. What impact will microblogging have on course learning?
2. What impact will microblogging have on social interaction?
3. What impact will microblogging have on course community motivation?

To explore these questions, microblogging was incorporated into the course learning objectives and required for course credit. Assignments were divided into two parts and dubbed technology assignments, students were required to blog and tweet bi-weekly based on a specific topic created by the course instructor. For example, Part 1 of Technology Assignment 7 was for students to tweet about one article they found that raises ethical considerations surrounding information systems. Students were instructed to provide a one line summary and a link to the article. Part 2 was to provide a 5-8 sentence blog response to a classmates’ tweet.

We relied on a variety of methods for collecting and analyzing data, including a quantitative pretest and posttest data, qualitative posttest data, system log files and database data. Although limited to varying degrees, each offered a different perspective of the impact our system was having on learning, social interaction and building community.

7. Results

7.1 User Population

The OLC was implemented across two sections of BCS300, a capstone course in information systems required for all business majors. Each section contained 25 students and was conducted by the same instructor.

7.2 Quantitative Pretest Results

A pretest was conducted to gather student demographics and also measure students initial perceptions of the technologies incorporated into the course OLC. Survey responses indicated that 97% of students were between ages 20 and 25, with only 3% over the age of 40. Additionally, 71% were male and 29% female.

In addition to demographic data, pretest data looked at student experiences and perceptions of online learning using blogging and microblogging. Detailed in Figure 8, responses showed that 98% of students had experience with social networking software, and 80% indicated high levels of experience. Surprisingly, while 67% had some experience blogging, only 8% had high levels of experience. More students had experience microblogging (90%) with 49% indicating high levels of experience. One possible reason for such high adoptions of microblogging was that Facebook status updates were considered as a form of microblogging.

7.3 Site Usage

The software was utilized during the spring 2011 semester, from January 24, 2011 to May 12, 2011. Excluding the course instructor, the online environment averaged 50 active users (active users are users who logged into the system at least once during the semester). The site received 2,890 visitors averaging 27 visits a day. During this timeframe, and detailed in Figure 9, 285 blog posts were created, 78 of which linked to one or more of the 456 tweets. The OLC also generated 671 blog ratings and 342 blog comments. 94% of respondents indicated using the OLC daily or weekly with 3% using it monthly. 74% indicated blogging daily or weekly and 26% blogged bi-weekly or monthly. No student indicated that they did not post to the blog.
7.4 Quantitative Posttest Results

Survey questionnaires were distributed to two sections of BCS300, each consisting of 25 students. Section 1, was held on Mondays and Wednesdays, resulted in 17 usable responses, or a 68% response rate. Section 2 was held on Tuesdays and Thursdays and resulted in 18 usable responses, or a 72% response rate. Overall, the response rate was 70%. Unfortunately, we were unable to link posttest data with pretest data.

Table 1 – Posttest Results

<table>
<thead>
<tr>
<th>Technology Construct</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Neutral</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Twt</td>
<td>Blg</td>
<td>Olc</td>
<td>Twt</td>
<td>Blg</td>
</tr>
<tr>
<td>Increased course interaction.</td>
<td>6%</td>
<td>17%</td>
<td>11%</td>
<td>29%</td>
<td>60%</td>
</tr>
<tr>
<td>Increased course learning.</td>
<td>6%</td>
<td>14%</td>
<td>9%</td>
<td>37%</td>
<td>63%</td>
</tr>
<tr>
<td>Brought new info into the course.</td>
<td>12%</td>
<td>-</td>
<td>-</td>
<td>53%</td>
<td>-</td>
</tr>
<tr>
<td>Helped build course community.</td>
<td>9%</td>
<td>15%</td>
<td>11%</td>
<td>37%</td>
<td>62%</td>
</tr>
<tr>
<td>Helped explore outside info.</td>
<td>9%</td>
<td>-</td>
<td>-</td>
<td>57%</td>
<td>-</td>
</tr>
<tr>
<td>Helped discover new connections.</td>
<td>-</td>
<td>-</td>
<td>9%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Was tied to course learning objectives.</td>
<td>-</td>
<td>-</td>
<td>23%</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Was an excellent course addition.</td>
<td>6%</td>
<td>15%</td>
<td>-</td>
<td>43%</td>
<td>50%</td>
</tr>
<tr>
<td>My experience was positive.</td>
<td>18%</td>
<td>24%</td>
<td>24%</td>
<td>56%</td>
<td>59%</td>
</tr>
</tbody>
</table>

* Twt = Twitter, Blg = Blogging, Olc = Online Learning Community.
** Questions were not asked across construct are denoted with -.

7.4.1 Survey Results: Microblogging

Detailed completely in Table 1, survey items asked specific questions regarding microblogging and their use of Twitter throughout the semester. In terms of use, 49% indicated that they tweeted frequently, 40% indicating that they tweeted sometimes. 6% indicated that they rarely tweeted, with another 6% stating that they never tweeted.

Overall, 74% of respondents stated that their experience using Twitter was positive. However, responses to survey items measuring interaction, learning and community, responses were not so strong. When asked if Twitter increased interaction with classmates, 35% of respondents agreed, with 29% disagreeing. When asked if Twitter increased learning, 43% of respondents agreed with 35% disagreeing. And when asked whether Twitter was an excellent tool for building course community, 46% agreed, with 17% disagreeing. Overall, respondents did indicate that Twitter was effective in bringing new information into the course, with 65% agreeing with this statement and only 15% disagreeing.

7.4.2 Survey Results: Blogging

Since this was the first implementation of Elgg 1.7.6, a radical transformation from previous installations, we also measured the impact of the new blogging engine on learning and social interaction. Detailed in Table 1, blogging remains to be the most effective feature of the
OLC and responses across survey items were favorable. When asked if blogging increased interaction with classmates, 77% of respondents agreed, with only 9% disagreeing. On items related to learning, 77% agreed that blogging increased learning, with 14% disagreeing. Regarding course community, 77% agreed that blogging helped build community, with 15% disagreeing. And, overall, the majority of respondents indicated a positive experience blogging (83%).

7.4.3 Survey Results: Overall OLC

Similarly, the new installation of Elgg brought a new interface and social learning experience, so we also measured the impact of the overall site on learning and social interaction. Detailed in Table 1, responses related to overall OLC usefulness were favorable as well. When asked if the OLC increased interaction with classmates, 65% agreed with 14% disagreeing. On items related to learning, 59% of respondents felt that the OLC increased learning with 9% disagreeing. When asked if the OLC helped build course community, 82% agreed, while only 6% disagreed with this statement. And when asked if the OLC was closely tied with the learning objectives of the course, 83% agreed, with 9% disagreeing. Overall, 80% of respondents indicated that they had a positive experience with the OLC, with only 6% disagreeing.

7.5 Qualitative Data

We also collected qualitative feedback from students. As expected, open-ended responses mirrored quantitative responses and were mixed. One student stated, “[integration] between tweets and corresponding blogs should be stronger.” Another student mentioned that it was a good way to communicate but was confusing to use. Another stated, “I like everything about the community. The only thing was after a tweet was lost from posting volume, it was hard to get it back.” Another student suggested that the OLC use an instant messenger feature, instead of Twitter.

Some responses were more optimistic about the system, “It was hard to setup at first but after the first month it was fairly easier to use although I used Twitter more than [Elgg].” One student stated, “It was an attractive way of getting involved.” Regarding the OLC, one student said, “[I] thought it was useful and liked that you can create your own groups and upload files.” Another student suggested the OLC replace the existing course management site, “Plenty of potential. It should replace Angel, not supplement it.”

8. Discussion and Implications

Today’s World Wide Web is a dynamic environment fueled largely by user-driven sites that support peer networking, blogging and multimedia. During the past two years we have discovered the positive impact an OLC has had on graduate courses at our university [9, 10, 18]. In this research, we implement the OLC for undergraduate learning and added new features to support more active learning.

8.1 OLC and Blogging

It was encouraging to discover that the new version of Elgg was as successful as previous implementations. The new version is a more dynamic environment and provides students with greater profile capabilities and makes navigating in the OLC and communicating with other members more efficient and effective. The prior version of Elgg used across our research also lacked important features such as notifications and the ability to customize and rearrange modules. In recent versions of Elgg, the software is more student-centric where students can greater control their OLC environment. When it came to group assignments, where students worked with three or more team members, students constructed their own groups within Elgg. In total, 10 subgroups were formed where students could collaborate and share information separate from the course community. Therefore, it was not surprising to see overall agreement that the OLC aided in learning, social interaction and community.

Additionally, the new interface resulted in positive blogging results as well and an overall student response that the blogging tool facilitated learning, interaction and community. The new blogging engine allowed for an easier way to include external content such as images and video. Additionally, the blogging engine converts links automatically, so students do not need to figure out how to use the ‘Create Hyperlink’ button that confused students in previous versions of the software.

8.2 Microblogging

A pretest identified that students were already familiar with microblogging. These results are validated by the successful adoption of microblogging and the interesting content students created across the site. The information students brought into the course was timely, relevant to the course learning objectives and valuable to the community.

In Technology Assignment 7, students were required to discover new ethical dilemmas posed by advances in technology. One student tweeted, “Congressman calls for FTC investigation into iPhone's storage of location data. Source: (http://tinyurl.com/3hy8eal).” Another student tweeted, “Google anonymously collecting location data from Android phones http://tinyurl.com/3tejz7g.”
Understanding that only so much information can be conveyed under the 140 character tweet constraint, students decided to include hyperlinks for other students to discover more. The inclusion of hyperlinks, while not prevalent across the majority of tweets, was found in 34% of all posts and suggests that students, in addition to sharing their thoughts on the topic, were interested in sharing the original source with their classmates as well.

Responding to that same technology assignment on ethics, another student tweeted, “If you received info that a company’s stock was going to shoot up. Would you buy in?” Another tweeted, “Should Apple have to turn off location tracking on iPhone 4? http://cnet.co/i388jX.” Although we did not analyze this phenomenon in-depth, it was common across posts for students to attempt to interact with classmates through microblogging by posing questions within their tweets. Ultimately, 17% of blog posts created stemmed from an original tweet. Unfortunately, while the software allowed students to continue the conversation in a blog post, the software failed to provide an adequate platform for back-and-forth dialogue. Even so, 17% of students did use the blogging platform to continue the life of the tweet.

### 8.3 Microblogs and Course Integration

The primary goal of this research was to measure the impact of microblogging on learning, interaction and community. Our initial perceptions were that by challenging users to search and retrieve information from outside the classroom and microblog the results, the value of the OLC would increase. However, few respondents agreed that the software actually increased interaction (34%), community (46%) or learning (43%). This could be for a number of reasons. The introduction of an additional technology loosely coupled with the course OLC may have taken away from class cohesion. A powerful aspect of Elgg is that the course community and its participants are readily available on the course homepage. Twitter, on the other hand, doesn’t offer an ability to create dedicated private groups and the only way to stay connected on Twitter is to follow a user. It may have proven more successful had the microblogging component been directly integrated into the OLC, rather than have students use Twitter to post content.

This goes into the complicated combination of software used. While Twitter and social networking software are widely used by our demographic, the combination of Twitter with Elgg may have been too steep a learning curve for a 15-week course. As a result, students were often confused about where to post content, Twitter, or the OLC or both. Consequently, Twitter may have been more of a distraction than a facilitating technology. Going forwards we are exploring more innovative ways to integrate the microblog with course objectives such as integrating it with a discussion board as opposed to the blogging engine.

### 8.4 Social Dynamics / Course Dynamics

The results section details a high-level breakdown of survey responses across two sections of the same course. An interesting discovery, however, was that we found a large discrepancy in responses across these two sections. This leads us to believe that more is at play than the learning activities or the course objectives.

The response rate from both classes hovered around 70%, yet the general agreement across constructs differed drastically (in some cases, levels varied by over 40%). This was particularly surprising since both courses adopted the software under the exact same requirements, including assignments and timelines. However, results from Section 2, meeting on Tuesdays and Thursdays, were much more favorable to all aspects of the software than those of Section 1, meeting Mondays and Wednesdays. Overall, 56% of respondents in Section 2 agreed that Twitter increased interaction, versus only 12% in Section 1. Regarding learning, 61% of Section 2 agreed Twitter fostered learning, versus 24% from Section 1. Additionally, Section 2 agreed more that Twitter helped build course community (56%) versus Section 1 (35%). These numbers are also similar for other aspects of the site including blogging.

While more detailed analysis is required, initial analyses return us to social presence theory and how, particularly in smaller environments, the effect of one or two individuals not participating can have a significant impact on the entire course community. Overall, the content generated by Section 2 was slightly higher than that of Section 1, possibly leading to higher levels of perceived interaction and community in Section 2. Another possible reason could be the overall group dynamic. It was observed that Section 2 agreed more that Twitter helped build course community (56%) versus Section 1 (35%). These numbers are also similar for other aspects of the site including blogging.

### 9. Next Steps

The inclusion of Twitter into the course OLC seemed like a natural extension to enhance classroom learning and interaction. While the results of the study indicate that the feature was not as effective as planned, improvements to the current design are ongoing. As discussed, only 17% continued the microblog conversation in a traditional blog. A more natural extension for a microblog might be a discussion board for each microblog post. Therefore an immediate next step will be to integrate the microblog with the OLC discussion board, rather than its blogging engine. An additional component will be the ability to rate microblogs through the OLC to help further engage interaction.
10. Conclusion

In this research we design and evaluate the integration of Twitter, a microblog, with Elgg, an online social learning platform. Students utilized Twitter to bring new information into the course community where they could continue the conversation in a closed learning environment. The system was incorporated into upper-division undergraduate courses and measured for impact to course learning, interaction and community. Our initial findings indicate that, while the OLC overall and blogging provide powerful resources for students, the integration of Twitter had less of an impact.

As we continue to build and extend our OLC, we remain positive that through design modifications and better alignment with learning objectives, we can foster higher levels of system interest, in turn, fostering greater levels of learning, interaction and community across the OLC.

11. References
