

# IMPLEMENTATION OF NEW COMMUNICATION TOOLS TO AN ONLINE CHEMISTRY COURSE

Karno Ng, California State University, San Marcos

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## ABSTRACT

*Online courses provide flexibility and convenience for students and have become very popular in recent years. With the advance of technology and change of habits for the uses of traditional communication tools among students, there is a need for educators to explore effective ways to communicate with students that fit their social-media life styles. Two communication tools—web-based text messaging via cellular phone and real-time webinar software—were implemented in a fully online preparatory chemistry course with a full-time working student body. The text messaging system allows the instructor to send short text messages directly to all students' cellular phones while keeping the students' phone numbers anonymous. Important announcements and information were texted to the students' phone number throughout the course. In addition, the instructor conducted individual appointments with each student via webinar software. The number of students who contacted the instructor for course-related inquiries increased 25% after the webinars and 96% of the students turned in all the assignments on time. With the implementation of these two communication tools, the drop-out rate of the course was decreased by 42%. It was concluded that these tools enhanced student engagement and increased the retention rate.*

## INTRODUCTION

Online courses have become more and more popular over the past several years due to technological advances and the desire of many students to seek greater flexibility in their course schedules. In a study of 2,500 universities and colleges conducted by the Sloan Foundation, online enrollment in 2009 grew 21%. This increase far exceeds the 2% growth in the overall higher education student population (Allen, 2010).

Online courses provide new opportunities to attract students, but they also lead to new challenges. One of the challenges involves the lack of face-to-face interaction between students and instructors. It has been reported that the social presence of students and instructors is a key element for successful online teaching and learning (Dennen, 2007; Goertzen & Kristjanson, 2007; Hughes, 2007; Kehrword, 2008; Shea, Li, & Pickett, 2006). A previous study has shown that student performances were enhanced by instructor interaction (Zhao, Lei, Yan, Lai, & Tan, 2005). In addition, Dixson (2010) has shown that student engagements were enhanced by providing more than one method for communicating among

students and between students and instructors. The purpose of this study is to explore the effectiveness of two new technology tools to enhance interactions between instructors and students.

Typical communication tools used in online courses are: (1) e-mail messages sent to students' campus e-mail accounts, (2) announcements posted on the Learning Management System (LMS), and (3) the chat feature of the LMS. However, these tools may not be the most effective way to communicate with students. A survey conducted in 2005 indicated that e-mail usage among teenagers started to decline, and a preference for instant messaging grew (Lenhart, Hitlin, & Madden, 2005). An article in the New York Times indicated that young people prefer online chats and text messaging over e-mail (Richtel, 2010). Young people turned away from e-mail due to the long process of signing into the e-mail account, the formal writing styles for e-mail messages, which includes a subject line, and the relatively long response time after sending (Richtel, 2010). Another study by Carnevale also showed that students did not check their campus e-mail accounts as often as they should, and they often end up missing important messages

about deadlines, upcoming quizzes/tests, class cancellations, etc. (Carnevale, 2006). According to a study conducted in 2013, college students only spent six minutes per day on average using e-mail (Junco, 2014).

The above phenomena show that it is important for educators and universities to find new ways to reach out to students. Colleges and universities are using cell phone text messages to send important campus information to students, such as campus closures, emergency evacuations, etc. In addition, colleges and universities are using popular social media, such as Twitter and Facebook, to advertise campus social events. Some instructors are using live chat and other instant-messaging features of the LMS to hold office hours.

In a study that was conducted among the higher education institutions in 45 states within the United States, it was shown that 86% of undergraduate students own a smart phone (Dahlstrom & Bichsel, 2014). Since smart phones are an essential part of college-students' daily lives, they can be used as an effective communication channel with students. Research has shown that sending text messages to community college students reminding them to complete their re-enrollment and financial aid forms helps keep them from dropping out of college (Dynarski, 2015). The project described in this article extends the use of text messaging to the individual course level. An open source, cloud-based text messaging service—Remind—was implemented and used to communicate with students via smart phones.

This article also describes the use of a videoconferencing tool—Zoom—that is integrated in the LMS as a communication tool. The seven principles for good practice in undergraduate education proposed by Chickering and Gamson (1987) include:

1. Encourages contact between students and instructors;
2. Develops reciprocity and cooperation among students;
3. Encourages active learning;
4. Gives prompt feedback;
5. Emphasizes time on task;
6. Communicates high expectations; and
7. Respects diverse talents and ways of learning.

The described mechanism in this article for conducting videoconferencing may help to achieve

some of these good practices in an online learning environment.

## **COURSE DESCRIPTION**

This was a three-unit preparatory chemistry course that was offered in a fully online version for the first time in the Spring 2014 semester (taught by another instructor) through Extended Learning for the students participating in the Ben Hudnall Memorial Trust Program ([www.benhudnallmemorialtrust.org](http://www.benhudnallmemorialtrust.org)). Students participating in this program are registered nurses (RN) who are seeking a Bachelor of Science (BSN) degree. This course was developed and taught by the author using her own online version in the Fall 2014 semester with the implementation of text messaging and webinar. The findings are reported in this article.

All the students enrolled in the course were full-time registered nurses and none of them have ever visited the campus or met with each other. It was quite challenging to cultivate a sense of community among the students in the study. Also, it was recognized that the demanding work schedule of the registered nurses might make it challenging for the students to keep up with all the material and required assignments for the course. Thus, it was important for the instructor to provide appropriate coaching and support for students through effective communication tools. Besides the commonly used discussion forum, group discussion, and live chat, one-on-one appointments were conducted via webinar to provide further student-instructor interactions. Furthermore, to ensure that students did not miss important deadlines for assignments, quizzes, and tests, text messages were sent to students' smart phones via a cloud-based text messaging service.

## **DESIGN OF THE COURSE**

This course was delivered via Moodle ([www.moodle.com](http://www.moodle.com)), an open source and free LMS adopted by the university. Course material was delivered in the form of learning modules with each learning module released one week prior to the due date for all the items in it (Friday at 5 p.m.) A typical learning module includes: Lecture Videos (recorded via Camtasia [[www.techsmith.com/camtasia.html](http://www.techsmith.com/camtasia.html)]), Lecture Handouts, Activities, Homework, Quizzes, and Discussion Forum.

## IMPLEMENTATION OF THE NEW COMMUNICATION TOOLS

This study was conducted during the Fall 2014 semester. A total of 15 students were enrolled in the course. The students that registered for this course were working full time off campus, and they never or seldom came to campus for instruction. Unlike the traditional full-time students who might take a combination of face-to-face and fully online courses, the majority of students enrolled in this course had no prior experience with the LMS and communication system used on campus.

To effectively communicate with this full-time, working student population, two tools were used in addition to the common communication tools (e-mail, announcement posting at LMS, online chatting, etc.): (1) Remind, a cloud-base free texting system ([www.remind.com](http://www.remind.com)), and (2) Zoom, a webinar tool ([www.zoom.us](http://www.zoom.us)).

### *Remind*

This system allows the instructor to send short text messages (100 characters) to students via the Internet. The cellular phone numbers of students and the instructor remain confidential (i.e., the instructor and peer students did not know each other's phone numbers).

Instructors can use the Remind system by signing up for a free instructor account. Once the account is set up, the instructor can create "classes" (one class corresponding to one course) in the Remind system. The system will automatically generate a class code and an internet link specific for the "class." These two pieces of information are included in an automatically generated invitation e-mail that the instructor can send to all the students. Once the students received the invitation e-mail, they can click on the internet link and register to the "class" in the Remind system.

The registration process for students is very simple and can be completed via smart phone. Students were required to sign up to the system by the end of the first week of the course. All the students in the class had signed up to the system and used the system regularly throughout the semester. The simplicity of the registration process was reflected in the fact that none of the student in the course had reported any difficulty or required any assistance registering. Text messages were sent out weekly to students to remind them about upcoming due dates and other important course information.

Besides delivering general class announcements to all students in the course, the system allows text messaging between the instructor and an individual student or a group of students. The effectiveness of the text messaging system as a reminder tool was evaluated by recording the percent of students who turned in assignments on time for each week of the course. The result is shown in Figure 1.

### *Zoom*

At the eighth week of the course, Instructional & Information Technology informed the instructor that the university had adopted a new webinar tool, Zoom, for both staff and students to use. Zoom provides free webinar service for up to 50 participants for 40 minutes per meeting. Students can access Zoom by using the same login credential for all campus online systems, such as the LMS and the campus library system. Although there are other free webinar tools, such as Google hangouts, Skype, Webex, or FaceTime, these tools require users to create an account before they can use the service. Zoom allows convenient access without the trouble of setting up a new account and provides an app that allows access via smart phones, i-pads, or tablets. This feature was particularly useful for the student body of this course as they were full-time workers. In fact, about one-third of the students used the smart phone app to attend the one-on-one appointments with the instructor (see details below).

To further connect with the students, the instructor conducted one-on-one appointments with each student using Zoom. A link specific for this course was posted on the LMS and students accessed the appointment by clicking on the link. The "Scheduler" tool in Moodle was used to facilitate the scheduling appointments process and allowed the instructor to post available time slots for students. An automatically generated reminder e-mail was sent to each student twenty-four hours prior to their appointments. The instructor could also type in the notes and outcomes of the appointments with a grade recording option. In order to ensure that all the students in the class would participate in this one-on-one appointment via webinar, students were informed that their midterm exam grades would be released during the individual webinar session, during which they would have the chance to discuss and review their graded midterm exams with the instructor. All the

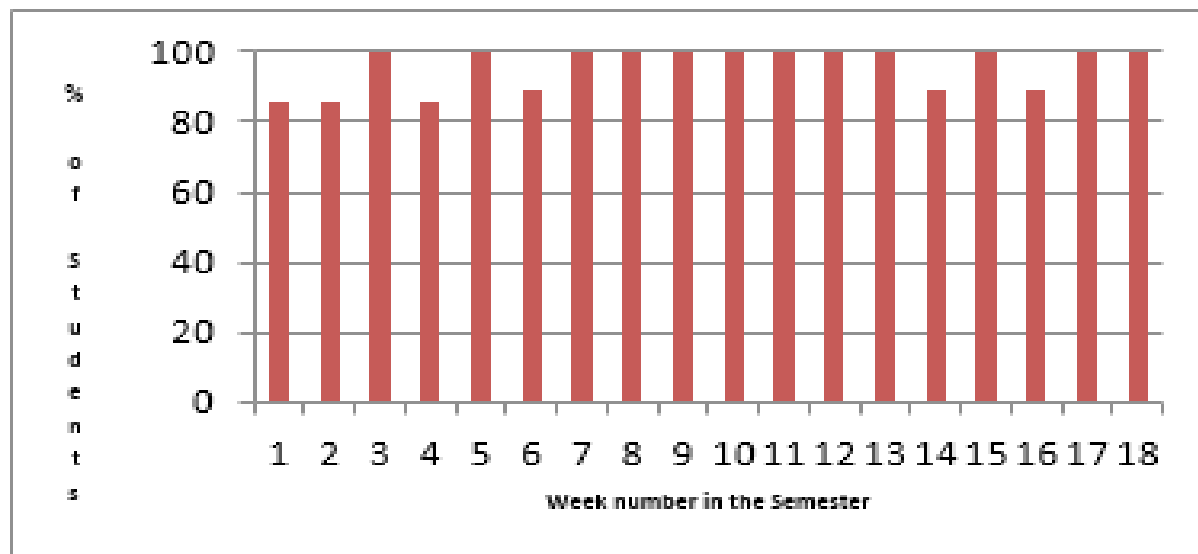


Figure 1. Percentage of Students that Turned in Assignments and Quizzes on Time

students in the class signed up and completed the individual webinar session.

At the beginning of the appointment, the student was asked to introduce him- or herself. The instructor then reviewed the graded midterm with the student by using the “share desktop” feature. The student could discuss any struggles he or she had with the missed questions. The instructor could then reinforce key concepts and help the student to analyze the questions correctly and reach the correct conclusions or answers for the question. In order to facilitate a discussion that involved complicated concepts, such as drawing chemical bonds, derivation, or the application of equations, the instructor used a tablet and electronic pen along with the share desktop feature so the student could follow the process and raise questions in real time. Using Zoom enhanced students’ engagement and having real-time interactions with the instructor, the students felt better connected with the instructor and more comfortable approaching the instructor with questions.

## RESULTS AND DISCUSSION

The percentage of students who contacted the instructor to inquire about course-related issues increased from 15% to 40% once the new webinar tool was implemented. Figure 1 shows the percent of students that turned in assignments and quizzes on time each week. For twelve out of a total of eighteen weeks for the semester, 100% of the

students turned in all the assignments and quizzes on time. Throughout the semester, an average of 96% of students turned in all the assignments and quizzes on time.

The effectiveness of text messaging and one-on-one webinar appointments on student retention was studied by comparing the drop-out rate of this course (Fall 2014) with the course that was taught in the previous semester (Spring 2014). In addition, the class average score and the percentage of students earning a grade of C or above in both semesters were compared. The results are shown in Table 1 and Figure 2. The drop-out rate decreased from 57% to 15% after implementing text messaging and webinars. On the other hand, there is little noticeable difference for the passing rate (with a C or above) and the class average score after implementing text messaging and webinars.

## CONCLUSIONS

The free text messaging tool that was implemented for this course (Remind) served as an effective tool to remind students about important due dates for their course assignments and to ensure that they stay on task. In addition, the webinar that was implemented for one-on-one appointments with students (Zoom) served as an effective tool to reach out to students and make them more comfortable approaching the instructor with questions. Zoom also enhanced student engagement with the course. In addition, both

Table 1. Comparison of Drop-out Rate, Passing Rate, and Class Average Score Before and After Implementing Text Messaging and Webinars.		
	After Implementing Text Messaging & Webinars	Before Implementing Text Messaging & Webinars
Drop-out rate	15%	57%
Passing rate with a C or above	83%	83%
Class Average Score	75%	79%

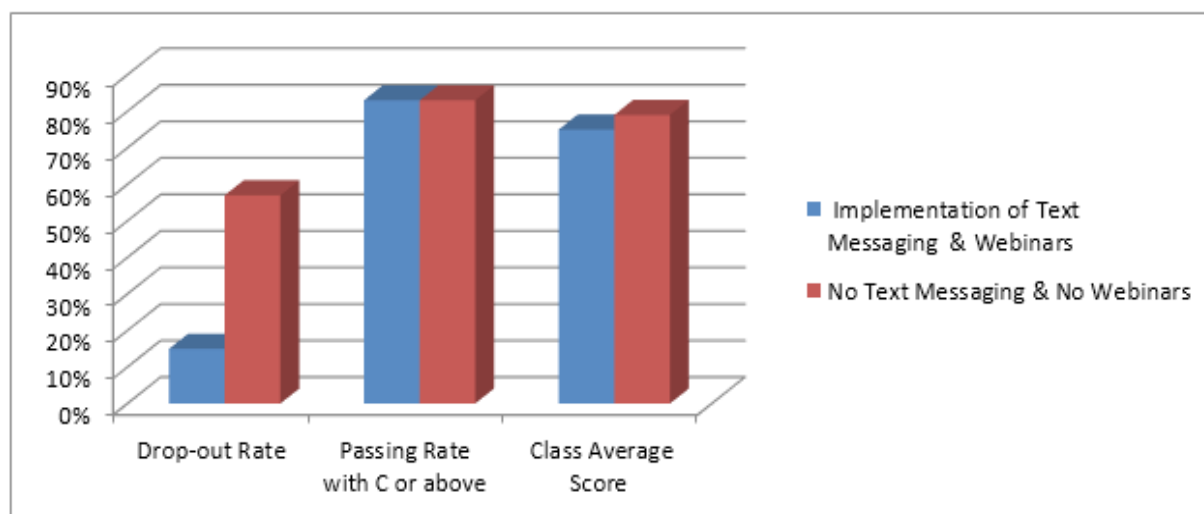


Figure 2. Drop-out Rate, Passing Rate, and Class Average Score Before and After Implementing Text Messaging and Webinars.

Remind and Zoom enhanced the students' success rate and promoted higher retention rates. Both tools can be used to conduct group projects, group discussions, and other group activities, to enhance student-student interactions in an online learning environment. In addition, both of these can easily be adapted for large enrollment courses. Further assessment on the learning outcomes of the students can be conducted by adopting the American Chemical Society (ACS) standardized test for General-Organic-Biochemistry courses for nursing/health science students.

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