2009

Implementing Technological Communication for Online Class Group Work

Denise H. Bauer

Gül E. Kremer, *Iowa State University*

Implementing Technological Communication for Online Class Group Work

Denise H. Bauer and Gül E. Okudan
School of Engineering Design
Pennsylvania State University, University Park, PA 16802, USA

Abstract

As more colleges and universities begin to offer traditional engineering courses online, there will be a need to conduct remote group work effectively. Online collaborative methods were implemented into two online classes requiring group case studies. Every group used each method at least once, after which, students completed a survey asking them about their thoughts on the importance, effectiveness, and efficiency of the various communication methods. Overall, the students felt the implementation of the technological communication was beneficial, but also offered suggestions for improvement.

Keywords
Technology for group work, instant messaging, Google documents, communication, engineering education

1. Introduction
Many engineering classes require either small case studies or larger projects that are usually completed in a group. When these classes are conducted on-campus, the students are able to meet face-to-face during the assignment. However, as more colleges and universities are moving towards offering traditional engineering courses online and more students are enrolling in online courses [1], the idea of working as a group on a project becomes complicated. If the students are located all over the world, there is usually little to no option of meeting face-to-face. Therefore, there must be another way for students to communicate and collaborate on course projects. However, the methods must be readily available, cost effective, and easy to use so that all students can receive the same benefit.

In this study, three types of technological communication methods were implemented into two online Industrial Engineering courses that contain case studies normally completed as a group on-campus. The three methods chosen were based on availability, cost, and endorsement of the university. The technological communication methods were the university's online course management system (ANGEL), an instant messaging (IM) program from any provider, and Google documents. The two courses were a Methods and Work Design course that is one of the first courses required in the Industrial Engineering curriculum and a Safety and Production course that is an elective for students later in the curriculum.

1.1 Technological Communication Methods
ANGEL was an obvious choice to use as a method since all courses are given online space for course lessons, assignments, etc. ANGEL also allows the instructor to create teams within the class, after which each team is provided a team file folder where they can upload, save, and share files. The instructor can then setup team discussion boards were the team members can post comments and questions or a team live chat room so that the team members can chat in real time through ANGEL. Instant messaging was chosen as the second method because many students already use some IM platform to chat with their friends in a social setting. Most IM programs are also free to download and use, so the students would not have to pay for the service. The last method chosen was Google documents. This method was suggested by the university as a way for students to share and collaborate on Microsoft Office documents (Word, Excel, and PowerPoint) in real time. The service is also free and does not require the students to create a separate Google account if they join through the university's account. Google documents allows students to add a document to their account and then share the document with other users. Students can also add their group members as collaborators so that everyone can edit and save the document at any time. The changes can be tracked and each member can view the changes instantaneously. Two members can also work on the document at the same time as changes are updated in real time and a built in chat system allows them to communicate during the process.

1.2 Courses

The two Industrial Engineering courses that were used in the study were chosen because they are courses that require group work and are normally taken on-campus. Over the summer session, the two courses are offered online to students on-campus, working at co-ops, internships, and summer jobs, and to others in industry working on a certificate program or further their education. Since most students are in remote locations across the world, it is difficult to complete the assignments in groups. In fact, the course case studies were originally completed individually when taken online. This created two issues: 1) the requirements were lenient due to the amount of work that could reasonably be completed by one person; 2) the students did not get the experience of group dynamics in the courses. From this, technological communication was considered as a way to bring back the group experience and ensure the requirements were equal during the regular school year and the summer session.

The first course was the Methods and Work Design course that is one of the first courses taken in the Industrial Engineering curriculum. If an engineering student on-campus takes this course, it is most likely the very first course in the discipline so the students are not accustomed to the requirements, amount of time that must be devoted, and overall feel of the department. A majority of the students also lack the maturity required to be self-accountable and find that they fall behind in the lecture videos and assignments.

The second course was the Safety and Production course that is an elective for most of the students and is taken later in the curriculum. Many of the students in the class are taking the course during the summer so that they can graduate early or stay on track to graduate on time regardless of going on co-ops or internships. Therefore, the maturity level of the students in this course is sufficient for them to succeed even though they must be responsible for watching the lectures on their own and complete the assignments on time. Some of the students also know each other from previous courses in the department, which helps when they want to ask another student for help.

1.3 Research Presented

The research presented in this paper will discuss how the students' perceptions of different communication methods for group work did or did not change by using the three selected methods during their respective courses. The goals of the study were to discover which technological communication methods students already use, whether they use them for course work or not, and if they believe the methods should be integrated into the course. Comparisons were made among gender, year in school, and the course in which they were enrolled. Gender is examined as many still believe that women are less receptive to using technology for learning than men are [2]. A major component of this paper will be an examination of what the students thought about being required to use a certain communication method and if they believed it would be beneficial to them and their success as an engineer.

2. Methodology

Students in two online Industrial Engineering courses were asked to complete an initial survey on what types of communication technology they had used before. There were questions relating to social use as well as to use in class and group work. The students were also asked how important, efficient, and effective they thought each type of communication, including face-to-face meetings, were in accomplishing group activities. This initial survey was used as a baseline for how much technological communication the students had already experienced in other classes. The students for each course were then assigned a group to work with throughout the summer. Each group was then told which form of technological communication to use for each case study; proof of use (e.g., a transcript) was included in the grading of each report. After each case study, the students completed another survey on if they actually used the method, why or why not, and how they believed it helped or hurt the collaboration process. The communication technology used was the university's online course management system (ANGEL), an instant messaging program, and Google documents. At the end of the courses, the students were asked to complete one last survey similar to the initial survey to discover if their perceptions of the communication technology changed based on their experiences in the course. The students were also asked for suggestions on ways to improve the use of communication technology and if they thought it was beneficial to their learning.

In the first course, there were ten case studies that were completed as a group, five of which required a written report. The first two case studies did not have any communication method; instead the groups could complete them any way they liked as we were more interested in letting the students get to know each other. Each group consisted of three to four students and all groups used the same communication method for six of the given case studies. The three communication technology methods were each used twice, once for a short case study and once for a case

study requiring a written report. The other two case studies were completed using an assigned method (each group assigned a different method) or the method of their choice.

In the second course, there were only three case studies, all of which required a written report from the groups of three to four students. Since many of the students were familiar with each other in this course and thus did not need an initial "getting to know you" period, each case study required the use of an assigned technological communication method. For the first case study, five groups were required to use ANGEL, six used instant messaging, and five used Google documents. The groups then rotated for the second and third case studies so that each group used every method during the course.

The students' perceptions for each class was examined before and after the course to determine if there was a change after using the technological communication methods to complete the case studies. Comparisons were made based on which course they were enrolled and the students' gender and year in school. Suggestions for improvement from the students were also evaluated to find possible ways to change the requirements so that students would be more comfortable using the methods.

3. Results

Twenty-six students (out of 59 total students enrolled) completed both the initial and final surveys, of which 21 were male and five were female. For the first course, six out of 11 students completed the surveys while 20 of the 48 students in the second course completed the surveys. Seven of the students were in their third year in school (usually the first year in the major), 15 in their fourth year, and four students were in their fifth year.

Students were asked to rate each of the technological communication methods on how important is was to learn to use the method and how effective and efficient each method was in group communication. Face-to-face communication was included as a comparison and email and phone were included because they are traditional forms of technological communication. Table 1 and Figures 1-3 show the average overall ratings before the class (listed first in the table) and after the class (listed second in the table). It can be seen that the average ratings for IM and Google documents increased after taking the course, whereas the ratings for ANGEL dropped. When examining the more traditional forms of communication, there were slight drops for all except the average rating of effectiveness for email. Similar trends were found for each of the sub-groups with the exception of ANGEL for the 3rd year students. These students rated ANGEL higher at the end of the course than before the course.

Table 1: Average perceptions of technological communication methods: overall

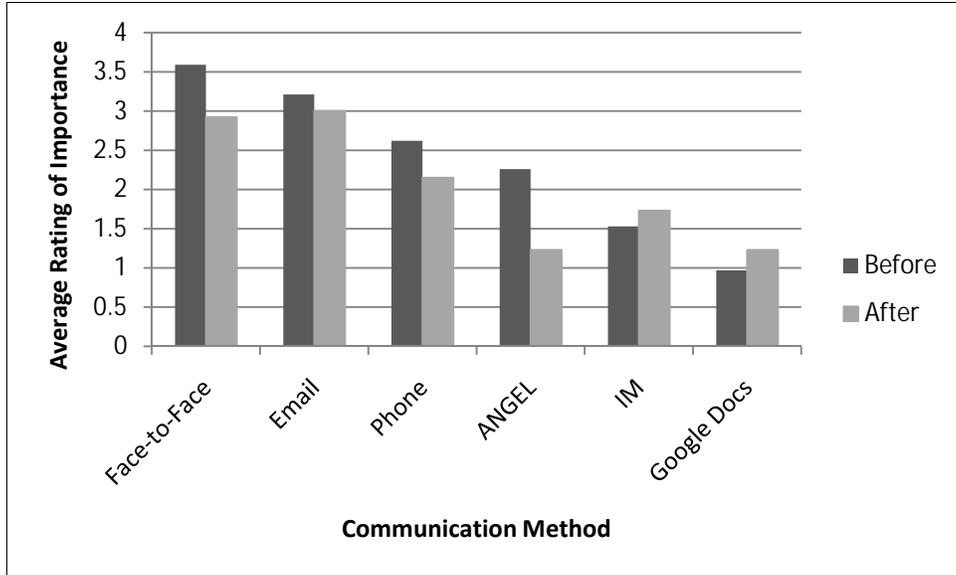|	Face-to-Face	Email	Phone	ANGEL	IM	Google Docs
Importance	3.59	3.21	2.62	2.26	1.53	0.97
	2.92	3.00	2.15	1.23	1.73	1.23
Effectiveness	3.74	2.74	2.76	2.09	1.68	1.03
	3.50	2.85	2.27	1.58	2.12	1.50
Efficiency	3.56	2.85	2.53	2.06	1.85	1.21
	3.38	2.62	2.23	1.54	2.15	1.46

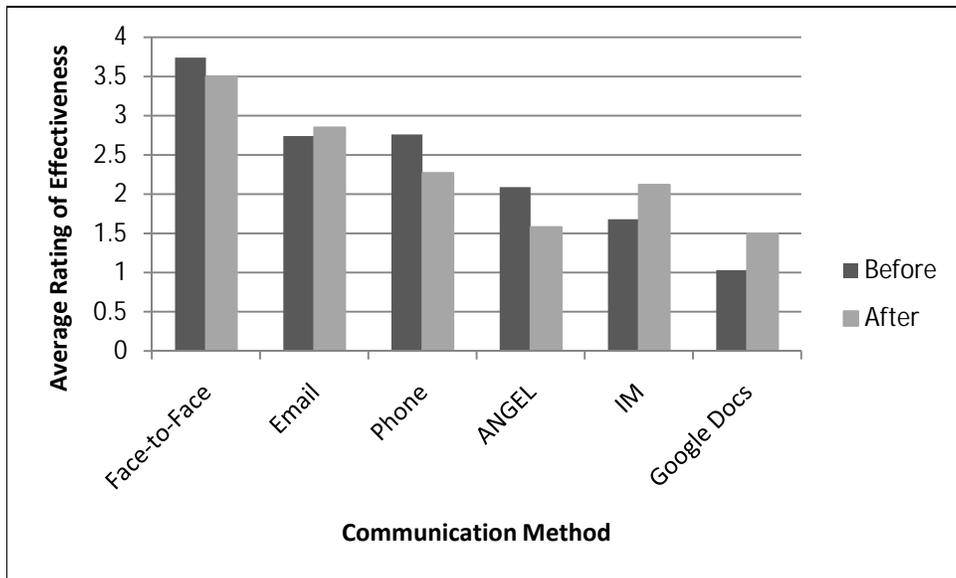Figure 1: Average rating of importance of technological communication methods: overall

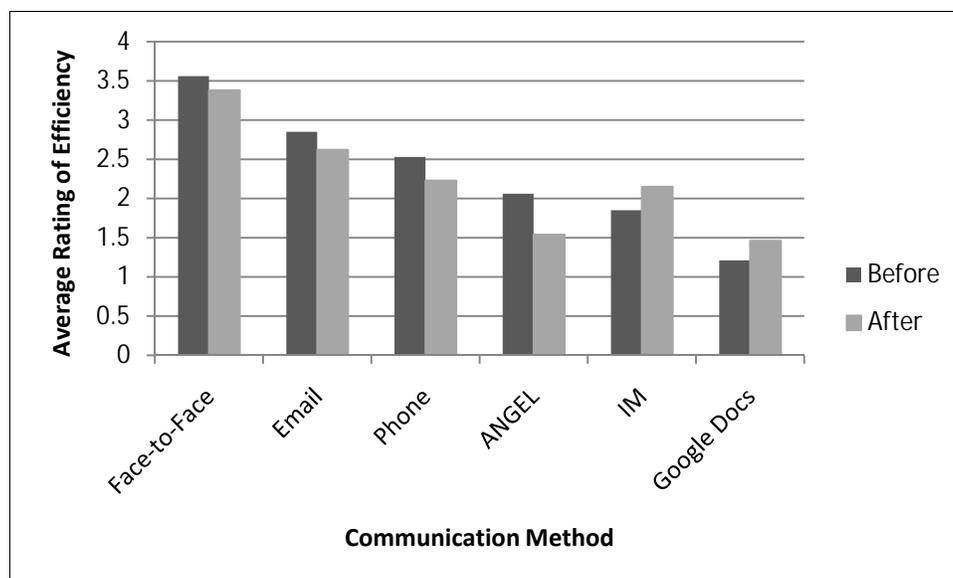Figure 2: Average rating of effectiveness of technological communication methods: overall

Figure 3: Average rating of efficiency of technological communication methods: overall

4. Discussion

The responses from the study show that implementing the technological communication methods may have a positive effect on the use of the methods in group communication. It appears that students are able to see how the different methods can aid them in collaborating with others when they cannot meet face-to-face. In fact, the average ratings for face-to-face meetings dropped slightly while the importance, effectiveness, and efficiency ratings for IM and Google docs increased. This indicates that the students realize that they can complete group work in ways other than the more traditional methods. The change in opinion for Google docs is especially encouraging as the university would like more students to use this platform for sharing files. Google docs is also something the students would be able to easily use after school. In fact, if the students take advantage of this communication method now, they can store their class files on Google and be able to open them anywhere there is internet access.

A very interesting result from the study was that the average ratings for ANGEL dropped for the upperclassmen. These students most likely had already used ANGEL in other classes on a limited basis so they were familiar with the platform. However, in the study additional features were introduced, such as the live chat. It seems that the limitations of this feature (you cannot see who is or is not online) may have negatively affected their confidence in the system or they realized other methods could do the same thing more effectively and efficiently. For the 3rd year students (first year in the Industrial Engineering program), it appears to be the opposite. These students most likely had not used ANGEL as extensively and through the course realized how the features could enhance their learning.

When asked for suggestions on improving the requirements for using the technological communication methods, the students' main concern was that they should be able to choose which method they used. The students liked the idea that different methods were introduced, but that each should be explained and then allow each group to choose the method that is most convenient for them. Some groups were located in different time zones and found it very difficult, if not impossible, to communicate through IM.

The students were also asked on how they believed implementing technological communication in any course would affect learning. The main response was that it would enhance learning and working in groups. A few of the students also mentioned that it would be beneficial for everyone to learn what communication methods were available so that they could use them if they were not able to meet on campus. Others mentioned that students already use technology and do not need to be taught how to use the communication methods. However, the survey answers say otherwise. Students may use technology, but mainly email, the phone, and IM for social communication. Most students reported that they did not use or even know about Google documents. This would indicate that introduction to these methods should be included in the classroom so that students are at the minimum aware of the methods.

Future analysis will include comparing the results based on learning styles to determine which style, if any, is more accepting of using technological communication methods. The methods will once again be implemented in the courses taking into consideration the suggestions and complaints from the students in the current study. Additional features, such as voice and video chat in Google, will be introduced so students can have the possibility of meeting through video conferencing for little to no cost.

5. Conclusions

The current study indicates that implementing technological communication methods in an online class enables students to not only work in groups more easily, but to also learn of various ways to collaborate with others in the future. The students feel that introducing the methods in class is beneficial but that they should be able to choose what method to use on their projects.

Acknowledgements

References

1. Smith, G.G., 2008, "E-learning commodity or community: Disciplinary differences between online courses," The Internet and Higher Education, 11, 152-159.
2. Wang, T.S. and Jong, D., 2008, "Gender differences in cyberlearning," 3rd International Conference on Innovative Computing Information and Control, 570.