Which is a better choice for student-faculty interaction: synchronous or asynchronous communication?

Lei Li
Columbus State University

John Finley
Columbus State University

Jennifer Pitts
Columbus State University

Rong Guo
Columbus State University

ABSTRACT

The use of computer-mediated communication (CMC) technology has dramatically changed the ways for students to interact with their professors, especially for communications occurring outside of the classroom. A recent study investigated the impact of offering virtual office hours by using instant messaging (IM) software for student-faculty interaction. The study found that participants in classes that offered virtual office hours reported higher levels of satisfaction with office hours than students in classes that offered only traditional face-to-face office hours. Also revealed, however, was that students' use of virtual office hours is not significantly different from their use of traditional office hours. The study further reported that students prefer asynchronous tools such as email to communicate with the professor. This paper extends this line of research by studying the use of email to enhance student-faculty interaction. Participants in the study are drawn from undergraduate students enrolled in on-campus MIS courses at a public university in the U.S. Southeast. The findings suggested that students who were offered an email-turnaround-time guarantee reported significantly higher level of satisfaction on getting help outside of the classroom than the participants who were not offered such a guarantee. The study also found that, when participants were offered both virtual office hours and an email-turnaround-time guarantee, they prefer the latter for communication. The implications of the findings are discussed.

Keywords: student-faculty interaction, computer-mediated communication, email, virtual office hours, student satisfaction.

Introduction

As universities and colleges increasingly embrace new technologies and leverage them not only to enhance their traditional curriculums but also to extend course offerings beyond the college campus, opportunities for increased student-faculty interaction have been created. Previous research has shown the positive benefits of informal student-faculty interaction outside the classroom including higher levels of student satisfaction, retention, and academic performance (Cotten and Wilson 2006; Nadler and Nadler 2000;Wingard 2004). More specifically, researchers have also found support for the benefits of computer-mediated communication (CMC) as a means to facilitate and increase the amount of interaction and communication between students and their professors (Chou 2001; Klassen and Vogel 2003).

The traditional approach of face-to-face office hours has been shown in previous studies to be infrequently used by students, who cite lack of convenience or accessibility as the main deterrents (Pascarella 1980; Nadler and Nadler 2000). Beyond the formal classroom environment, however, few opportunities exist for students and professors to interact and communicate, thereby reducing the potential impact of positive outcomes that have been shown to impact students' success in higher education. As faculty increasingly embrace computer-mediated communications and become more proficient in the use of CMC, its value in extending the boundaries of the traditional classroom has become more pronounced.

In this study, we explore the utility and value of communicating with students outside the traditional classroom environment by comparing students' preferences, satisfaction, and utilization of two common types of CMC. The changing characteristics and needs of today's college students, as well as the ways in which they learn and communicate, offer faculty new opportunities and challenges in understanding how to most effectively leverage CMC to positively influence students' satisfaction with their college experience.

Literature Review

Interaction between Student-Instructor outside the Classroom

Research endeavoring to comprehend what exactly influences student satisfaction, attention and retention in an academic environment is extensive. Studies have revealed that student engagement in college activities outside the classroom and interactions with other students and faculty tends to have a substantial impact in terms of student retention, academic performance, and overall satisfaction (Astin, 1999). In his study of the effects of out of classroom experiences, Kuh (1995) found that participation in college activities, living on campus, and conversing frequently with other students and faculty positively influenced students' learning and personal development. Also to consider is the variety of student personalities whose differing preferred means of communication may be addressed with increased use of CMCs (Kelly, 2004). Quite simply, reticent students tend toward the use of CMCs and it is therefore less probable that a face-to-face visit take place (Kelly 2004).

Research on the effects of student-faculty interaction outside the classroom have consistently found that informal contact between professors and their students was positively associated with personal, social, and intellectual outcomes as well as students' overall satisfaction with their college experience (Pascarella, 1980; Endo and Harpel, 1982; Fusani, 1994; Myers, Martin, and Knapp, 2005; Halawah, 2006). In their meta-analysis of student-

faculty interaction, Kuh and Hu (2001) explored the frequency and nature of out-of-class interactions between students and faculty over a period of time and found a positive correlation between the interactions and positive student outcomes despite the myriad of changes that have taken place in higher education over time. The richness of media choice bears mention. While effective in many ways, albeit less rich, the CMC media outlet entails less feedback potential which, in some cases, may impede message transfer (Huett, 2004).

Office Hours and Student-Faculty Interaction

Notwithstanding the benefits of contact between student and faculty outside of the classroom, many studies have found that actual communication between faculty and their students is infrequent, and largely limited to formal and structured situations such as classroom lectures (Pascarella 1980; Jasma and Kopper, 1999; Nadler and Nadler 2000). The practice of holding office hours has traditionally been a component of a professor's teaching responsibilities, and is designed to provide students the opportunity for informal communication beyond the classroom (Acitelli, Black, and Axelson, 2003). In spite of the perceivable value of holding office hours in facilitating the student-faculty relationship, studies have shown that, in practice, students rarely take advantage of the opportunity and, when they do, the duration of the visits tend to be brief and concise in nature (Nadler and Nadler, 2000; Kuh and Hu, 2001; Bippus, Kearney, Plax, and Brooks, 2003). Studies by Jasma and Kopper (1999) and Fusani (1994) found that fewer than half of the students in the study reported visiting their professor outside the classroom.

Recently, the Internet and web-based course management systems have created a convenient alternative to traditional office hours for many students who have substituted email and discussion board postings for face-to-face meetings as a means to ask questions or obtain course-related information or additional help. These new, and arguably preferable, means of interacting with professors through web-based technologies have some researchers predicting the demise of traditional face-to-face office hours (Myers et al. 2004). Such management systems also offer an advantage of choice in terms of synchronous or asynchronous communication.

Little is known about the processes that facilitate and influence the occurrence of out-of-class interactions (Bippas et al., 2003; Cotten and Wilson, 2006). One main challenge for institutions of higher education is to discover how to better engage students in the communication processes that stimulate more substantial and frequent interaction with faculty. CMCs can be and are used to enhance traditional office hours. In a recent CDW study assessing technology usage in higher education, students indicated they wanted more regular and immediate communication with faculty, and rated online chat with professors as the capability they desired the most (CDW Government, 2008). In their study of e-learning environments, Jafari, McGee and Carmean (2006) found that students preferred free and popular communication technologies such as IM and podcasts, and wanted these tools included into the course for communication and collaboration.

Communication to Facilitate Student-Faculty Interaction - Synchronous or Asynchronous

CMCs at the college/university level tend to be considered a principle means of delivery of information and communication. This additionally entails the potential for extending the communication channels most commonly found in traditional learning environments. The most

common forms of communication used by faculty to facilitate interaction with students include the use of asynchronous (e.g., email and online discussion boards) and synchronous communication (e.g., chat or instant messaging). The majority of research related to the use of asynchronous communication in higher education has focused on distance learning courses that utilize web-based communication technologies to deliver course content virtually, and thus, involves extensive student-instructor communications (Dezhi, Bieber, and Hilz, 2008; Oomen-Early et al., 2008).

Synchronous online communications have been used with success in several studies of distance learning environments (Cox, Carr and Hall, 2004; Myers et al., 2004). The most common forms of such communication is via "chat" or instant messaging. In a comparative study of synchronous and asynchronous learning technologies, Schwier and Balbar (2002) found that synchronous chat created a feeling of community among students enrolled in a graduate course. Spencer and Hiltz (2003) conducted a field study of synchronous chat in an online course and found student satisfaction highest in courses where synchronous chat sessions were offered in addition to face-to-face methods. This finding was consistent with Cox, Carr, and Hall's (2004) study which found the "chat" function of commercial course management systems less effective for more in-depth topics.

The use of chat or IM to facilitate student-interaction and virtual office hours in online courses and traditional courses has also been explored in recent studies (Myers, et al., 2004; Jeong, 2007). Hooper, Pollanen, and Teismann (2006) found that virtual office hours increased effectiveness and participation of students enrolled in an online introductory mathematics course. In a study of the impact of offering virtual office hours within a traditional course, Meyers (2003) found that students who had participated in virtual class discussions had higher levels of comfort and confidence during traditional classroom discussions. In a recent experiment at Harvard Business School, virtual office hours were offered to students in an introductory computer science class with the intent of addressing the need for flexibility and convenience. Feedback from students was generally positive about the availability of help outside the classroom although professors indicated they did not foresee virtual office hours completely replacing traditional hours anytime soon (Riley, 2007).

Integration of web-based technologies in both online and traditional learning environments, while often successful, does entail possible usage issues. One potential drawback was increased workload and time commitment for faculty as a result of student expectations of "ubiquitous instructor access" (Farmer, 2003). Jeong (2007) noted issues related to miscommunication due to the lack of verbal cues and drawbacks associated with the lack of interoperability between IM clients. This also addresses the lower level of media richness that may be found in any non face-to-face communication media (Daft, 1987; Dennis, 1999). A recent study (Li and Pitts, 2009) found that, while offering virtual office hours improved students' satisfaction of outside-of-classroom student-faculty interaction, students' usage of virtual office hours was very limited. The study also reported that students prefer asynchronous tools such as email to communicate with professors.

Research Design

This paper extended the findings of Li and Pitts (2009) by further investigating the impact of different communication methods on student-faculty interaction outside of the classroom. Li and Pitts (2009) reported that students preferred email over office hours for getting

help outside of classroom and this study proposed to confirm the result. This study also proposed that giving students a guarantee on email-turnaround-time would have positive impact on students' satisfaction on outside-the-classroom student-faculty interaction. Thus, two research hypotheses were formed.

H1. In terms of getting academic help outside of the classroom, the students who enrolled in a class that offers an email-turnaround-time guarantee are more satisfied than the students who enrolled in a class doesn't offer an email-turnaround-time guarantee.

H2. Students are more likely to use an asynchronous communication method such as email to seek help outside of the classroom than use a synchronous communication method such as virtual office hours implemented using instant messaging software.

To test the research hypotheses, this paper applied a survey-based method. The participants of the study were drawn from three sections of a standardized skill-based information system course, namely class 1, class 2 and class 3. All sections were taught using the same material and similar teaching style. By such selection, this study not only reduced sample bias (all participants have similar background), but also minimized the impact of instructor's individual teaching practice.

The research design was illustrated in table 1. In study 1, class 1 and class 2 were used to investigate the impact email-turnaround-time guarantee. Participants from class 2 were used as treatment group in which the participants' emails were answered within promised period of time, while subjects from class 1 were assigned as control group. A pre-study and a post-study survey were conducted at the beginning and end of an academic semester respectively.

This paper studied which type of communication method was preferred by the participants in the study. Participants from class 3 were offered with both an email-turnaround-time guarantee and virtual office hours. The usage of virtual office hours and email was recorded. A follow up survey was conducted to investigate the factors that may impact participants' usage of virtual office hours.

Table 1 Research Design

Study	Class Sections	Settings	Hypothesis Tested	Number of Participants
Study 1	Class 1	No Email-turnaround time guarantee offered. No virtual office hours offered.	H1	35
	Class 2	Email-turnaround time guarantee offered. No virtual office hours offered.	H1	31
Study 2	Class 3	Email-turnaround time guarantee offered. Virtual office hours offered.	H2	28

Note: The number of participants was based on a post-study survey. The number of students who participated in pre-study and post-study survey was slightly different.

Research Results

Participants Demographic Information

There were 94 students that participated in this research (see table 1). 45.7% of the participants were sophomores and 34% were juniors. 38.3% of students are male and 61.7% are female. Most of students are younger (68.2% are less than 25 years old). Most (72.3%) of the students have either a full time or part time job. The demographic distribution among the three participating sections was similar.

Students' Expectation on Getting Help Outside of Classroom

The pre-study survey asked the participants to rate the importance of a list of factors that may impact their satisfaction on getting help outside of classrooms. The result is shown in table 2. The participants rated very high importance on "professors return student emails within a reasonable amount of time" (4.71 out of 5). The participants also gave high marks to "professors need to be available during office hours" and "professors need to make office hours more convenient". Surprisingly, the participants didn't consider offering virtual office hours in class as important factor (3.41 out of 5). The participants from class 1 and 2 rated different factors similarly which mean there was not embedded sample bias.

Table 2. Important Factors Impacting Students' Satisfaction on Getting Help Outside of Classroom

Factors Impacting Students' Satisfaction	Rated Importance		
	Class 1	Class 2	Average
"professors need to be available during office hours"	4.24	4.32	4.28
"professors return students emails within reasonable amount of time"	4.63	4.79	4.71
"professors need to make office hours more convenient"	3.76	4.21	3.97
"professors need to setup virtual office hours using online chat software"	3.45	3.36	3.41
"professors need to respond to student phone calls within reasonable amount of time"	3.73	3.57	3.65

Note: 1- less important, 3- neutral, 5 most important.

The post-study survey asked the participants their first action when they have a question outside of class time. As listed in table 3, when students have a question, the majority (65.2%) of them preferred email as communication medium. The participants also preferred asking questions before or after classes. Only small percentage of participants wanted to visit the professor during office hours or make an appointment.

Table 3. First Action When Students Have a Question

Actions Taken for Student Questions	Percentage of Selection		
	Class 1	Class 2	Average
Email the professor of the course	60%	71%	65.2%

Ask the question before the class starts or after the class ends	22.8%	9.7%	16.6%
Stop by professor's office during office hours	8.6%	9.7%	9.1%
Make an appointment with the professor	2.9%	3.2%	3.2%
Call the professor of the course	0%	0%	0%
Others	5.7%	6.4%	6%

In summary, the participants seemed to prefer a synchronous communication medium, particularly email, when they have questions. The participants expected their emails to be answered within a reasonable amount of time. This led to the first study of the paper.

Study 1: Impact of Email-Turnaround-Time Guarantee

Study 1 examined if students' satisfaction on getting help outside of the classroom can be improved by having students' email answered within a reasonable amount of time. Participants from class 1 and 2 were involved in the study. Class 1 was given an email-turnaround-time guarantee where students' emails are promised to be answered within 12 hours of their sending time. There is no such guarantee in class 2 and the instructor used best effort strategy in replying to emails.

Table 4 shows the students' satisfaction on getting help outside of the classroom. The pre-study survey showed that both the control group (class 1) and the treatment group (class 2) have relatively low satisfaction on getting help outside of classroom from previous classes. However, based on the post-study survey, the participants' satisfaction on outside-classroom student-faculty interaction was greatly improved for the treatment group, while the students' satisfaction stayed almost the same for the control group. The t-test showed there was a significant difference between the control group and treatment group (p-value, 0.02). The participants in the treatment group were also more satisfied than the subjects in the control group were in terms of "professors return students' emails with reasonable amount of time" and "email can effectively solve problems outside of classroom". The students in class 2 rated very high on the effectiveness of 12-hour-email-turnaround policy on solving students' problems outside of the classroom.

The survey results showed that an email-turnaround-time guarantee is very effective on solving students' problem outside of the classroom and can significantly increase the students' satisfaction on getting help outside of the classroom. Thus, hypothesis 1 was supported.

Table 4. Students' Satisfaction on Getting Help Outside of Classroom

Assessment Items	Survey	Assessment		P value
		Class 1	Class 2	
Satisfaction on getting help outside of classroom	Pre-study	3.63	3.84	0.61
	Post-study	3.66	4.2	0.02
Experience of the availability of professors during office hours	Post-study	4.04	4.2	0.55
Professor return students emails within reasonable amount of time	Post-study	3.97	4.39	0.08

Effectiveness of using email to solve your problems outside of classroom	Post-study	3.89	4.58	0.01
Effectiveness of this class's 12-hour-email-turnaround policy on solving your problems outside of classroom	Post-study	NA	4.58	NA

Note: 1) Assessment score: 1- least satisfied/effective, 3 –neutral, 5- most satisfied/effective. 2) T-test: two-sample assuming unequal variances, two-tail, α=0.05.

Study 2: Asynchronous Communication vs. Synchronous Communication

Study 1 showed that an asynchronous communication medium such as email can effectively help students in solving problems outside of the classroom. Recently, synchronous communication such as virtual office hours using online chat was widely used in the classroom. In study 2, we used class 3 as research subjects and implemented both an email-turnaround-time guarantee and virtual office hours using online chat. The virtual office hours includes two one-hour sessions every week and a student can make virtual appointment with the instructor. Consistent with a previous study (Li and Pitts 2009), the usage of virtual office hours in this research is very limited: only one student asked questions during virtual office hours in the whole study period. In the mean time, there were more than 225 emails exchanged between students and the instructor.

This paper surveyed students on why they don't use virtual office hours and results were shown in table 5. The leading factor was that students didn't have a question. If they had a question, the students preferred emailing instructor and their questions got answered through email. The virtual session's time may not be convenient to the students, but students have the option to make a virtual appointment with the instructor. Technology wasn't a factor in the study: only 2.4% of the students had issues with the online chat tool.

Clearly, students preferred email over virtual office hours if they needed help outside of the classroom. Thus, hypothesis 2 was supported.

Table 5. Factors Preventing Students from Using Virtual Sessions effectively

Factors	Percentage
The virtual session's time isn't convenient for me.	12.2%
I have problem with using the CougarView online chat feature	2.4%
I don't have a question to ask	36.6%
I got my question answered by other means of communication such as email	19.5%
I prefer talk to professor face-to-face	12.2%
I prefer using email as communication medium	17.1%

Discussion

This paper investigated the impact of different communication (asynchronous versus synchronous) methods on student-faculty interaction outside of the classroom. This research surveyed more than ninety students enrolled in three skills-based information system courses. The findings showed that participants offered with email-turnaround-time guarantee reported a significantly higher level of satisfaction on getting help outside of classroom than the students

who weren't offered such a guarantee. In addition, this study discovered that when participants were offered with both virtual office hours and an email-turnaround-time guarantee, they prefer using the latter to communicate with professors.

The implication of this study could be profound. CMC technology, especially media-rich technology such as the virtual classroom is widely used to improve the effectiveness of course delivery and management. This study showed that, technology matters. However, what mattered most is how the technology is used. Email has been around for a very long time and it's not media-rich. However, email is simple to use and by providing students with guaranteed turnaround time on their emails, students' satisfaction on getting help outside of classroom was significantly improved.

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