http://dx.doi.org/10.5392/IJoC.2014.10.2.018

Reticence and Communication Preferences in the Classroom: Comparing "E-mail" and "Face-to-face" Interactions

Jae-sik Ha
Dept. of Communication
University of Illinois at Springfield, 1 William Maxwell Ln, Springfield, IL 62703

Dong-Hee Shin*
Department of Interaction Science
Sungkyunkwan University, Seoul, Korea

Chung Gun Lee
Postdoctoral Researcher, Department of Applied Health Science,
Indiana University at Bloomington

ABSTRACT

This study examines underlying factors that influence undergraduate students' willingness to enhance communication with their instructor by comparing the frequency of e-mail and face-to-face interaction between students and instructors. Data was collected through a survey of 322 undergraduate journalism students at a large Midwestern university. The findings showed that the more passive students were in expressing their opinion during the class, the less likely they were to send e-mails to their instructor (Coef. = -0.180, $p < .01$) or to communicate with their instructor face-to-face (Coef. = -0.262, $p < .01$). The findings also showed that the more students described their personality as "shy," the less likely they were to e-mail their instructor (Coef. = -0.157, $p < .05$) or communicate with their instructor face-to-face (Coef. = -0.210, $p < .01$). It is noteworthy that the degrees of both passivity and shyness had a more negative effect on the probability of face-to-face interaction than they did on email interaction. In summary, e-mail usage follows similar broader patterns of social interaction, rather than introducing a different trend in communication. This finding implies that the importance of e-mail should not be exaggerated as a communication tool for reticent students.

Key words*: Personality, Communication Skills, Internet, E-mail, Classroom.*

1. INTRODUCTION

The rapid emergence of innovative smart technologies such as smartphones or e-Books has remarkably expanded the options individuals have for communicating with others, particularly through e-mail. Over the last twenty years, the explosive growth of e-mail communication has changed the landscape of the classroom in the 21st century. While students still visit teachers' offices, e-mail has remarkably expanded the possibility for frequent teacher-student communication. Duran, Kelly, and Keaten explain that, "[e]-mail, by providing an accessible, easy-to-use channel of communication, may be opening the door to much greater levels of out-of-class communication between faculty and students" [5].

The use of e-mail, however, seems fraught with both potential and peril. Ruggiero argues that "[i]f the Internet is a technology that many predict will be genuinely transformative, it will lead to profound changes in media users' personal and social habits and roles" [20]. In this context, D'Souza asserts that e-mail can allow instructors to offer personalized attention and encourage students to express themselves freely [4]. These benefits seem especially applicable in large class settings, where teachers often do not know every student's name and thus individual, face-to-face contact is limited. In comparison, the increase in e-mail contact between students and teachers might lead to a loss of appreciation for the positive aspects of face-to-face communication between students and teachers.

Nevertheless, Shin [21] argues that there has not been enough research to examine reasons that information communication technologies (ICTs), such as e-mail, have become the preferred communication channels in higher education, or whether these channels can adequately replace traditional face-to-face communication between teachers and

* *Corresponding author, Email:dshin@skku.edu*
Manuscript received Sep. 16, 2013; revised May. 30, 2014; accepted Jun. 05, 2014

students. Communication scholars need to actively investigate how e-mail can meet the needs of students and teachers, not only because this area remains undefined, but also because these findings could contribute to enhancing student learning in the future.

This study surveyed 322 journalism students in order to investigate how students' shyness and passivity affect their e-mail and face-to-face contact with their instructors, and to explore the dynamic relationship between e-mail interaction and contextual factors, such as students' reticence, face-to-face contact, and class size. Thus, this study aims not only to examine the factors that may influence students' preference for e-mail, but also to provide insight into the relationship between e-mail use and face-to-face contact. The insights gained from this study will help teachers make more informed evaluations that can be applied to their personal use of digital communications.

This study also explores the transition from face-to-face communication to online communication in a digital age, and the communicative functions of the e-mail medium within the classroom environment. This study focuses on online communication, specifically e-mail, as a form of supplementary learning and extends the applicability of e-learning. This focused inquiry can provide new insights that may assist in the implementation of effective pedagogy in a smart technology era.

2. U&G THEORY AND E-MAIL AS A COMMUNICATION MEDIUM

This study is grounded on the uses and gratification theory (U&G), which holds that individuals are not passive users of media, but rather that they actively engage in using media to satisfy various emotional or intellectual needs. It is widely accepted that U&G is useful for examining not only why people use media, but also how a communication medium impacts people and society [20], [21]. U&G has been used to analyze mass media based on the contention that "people use communication media to satisfy specific needs; the strength of these needs (gratification sought) is thought to determine the impact of a medium". While traditional mass communication research routinely started with the question of "What does mass communication do to people?" the U&G studies ask, "What do people do with mass communication?" With the emergence of smart media, such question is changed to "How do users experience with media?" [21].

More importantly, U&G sees direct media effects as being constrained by individual differences, such as intelligence, personality, and companionship. Since U&G assumes people actively seek out media that satisfy their needs for information, social interaction, and entertainment, the spread of ICTs has inspired communication scholars to explore communication phenomena by using the theoretical framework of U&G. In particular, interpersonal communication is being rapidly encouraged by information technologies [17]. Thus, U&G can function as a theoretical framework to analyze why people are willing to use certain media among available media channels for interpersonal communication and companionship with other people.

With the proliferation of the Internet, the boundaries between face-to-face and online communication have become blurred. Whether computer-mediated communication (CMC) can be a substitutive conduit of face-to-face communication is one of the major research areas in U&G studies. One of the important assumptions of U&G is that "The media compete with other forms of communication-or, functional alternatives-such as interpersonal interaction for selection, attention, and use to gratify our needs or wants" (Rubin, 2009, p. 167). Therefore, Rubin (2009) also points out that "How well the media satisfy needs, motives, or desires varies based on individuals' social and psychological circumstances" (p. 167). Thus, Williams, Phillips, and Lum suggested that communication scholars examine whether interactive communication media could be a substitute (i.e., a functional alternative) for face-to-face communication [24].

Indeed, the differences in the functions of various communication media options have been of research interest to more recent communication scholars. By surveying a sample of Internet users, Flaherty, Pearce, and Rubin examined whether CMC could be a functional alternative to face-to-face communication. Flaherty et al. concluded that face-to-face communication is "not necessarily a functional alternative to the Internet" because the primary function of face-to-face communication is "to fulfill information needs," while "the Internet seemed to fulfill entertainment needs". These scholars argue that the Internet cannot be "a true functional alternative to face-to-face interaction," because the motives of interpersonal and mediated communication are discrete [6].

On the other hand, Papacharissi and Rubin proposed a different result. They performed a study on the predictors of Internet use and found that "Internet users who avoided face-to-face interaction, or found it to be less rewarding, chose the Internet as a functional alternative channel to fulfill interpersonal needs" [17]. This discrepancy between results that show Internet usage as functionally separate from in-person communication and results that show Internet usage as a functional substitute for some personal interaction suggests that more finely focused research on Internet usage, as it appears in specific functional contexts, such as education, is needed. Papacharissi and Rubin suggest that "[w]ith the widespread use of such technologies, we require greater understanding of the personal and social attributes that affect why people use CMC and the outcomes of CMC-related behavior" [17]. Similarly, Shin emphasizes the importance of people's motivations in adopting and using ICT and argues that CMC studies should be ground on user motivations and experiences [21]. In summary, these researchers confirm the need to investigate not only usage trends but also the users themselves in order to understand the human motivations behind the use of changing technology.

3. COLLEGE STUDENTS' MOTIVES FOR E-MAIL USE

Communication scholars have explored the potential of CMC in an education context by examining a variety of issues, such as student's motives for communicating [12], students'

use of instant messaging, the impact of Facebook on student-teacher relations, instructor's email strategies [23], and the characteristics of parent-teacher e-mail use. Some studies have examined the reasons why students use e-mail to communicate with their teachers [15].

Martin, Myers, and Mottet examined students' motives for communicating with their teachers, and their findings show that the most important reason for student-teacher communication is relational: "[c]ollege students may have the need to know their instructors as 'real people,' with this understanding leading to a more productive relationship and learning". These scholars add that "[t]his finding also supports the proposition that a positive relationship between teacher and student influences the students' affective learning". Martin et al. list three additional reasons for communication, which the authors claimed "may have a stronger link to cognitive learning". These reasons include functional (seeking information about course material and assignments), excusing (attempting to explain problems arising from their own behavior or to contest the teacher's grading), and participating (trying to demonstrate their engagement with the course and understanding of the material) [15].

Shin (2011) found that the primary reason for students' use of e-mail was "procedural or [a] clarification," explaining that "[s]tudents use e-mail to ask their teachers for information about course policies, guidance on specific tasks such as papers and projects, and feedback regarding their performance" (p. 65). Efficiency and convenience are both motivating factors for using e-mail to fulfill these functions. The authors note that "[s]tudents rely on electronic communication to avoid travel to campus, or uncomfortable face-to-face or telephone contact with instructors" (p. 66). They also noted that students are willing to communicate online when their teachers immediately respond to their needs. To investigate whether e-mail is a substitute for or a complement to face-to-face communication, Haworth analyzed survey data collected from 577 students and concluded that "[n]o matter the frequency of use, e-mail appears to be a viable substitute. Only infrequent users, however, appear to view e-mail as a complement to existing means of contact" [7].

Young, Kelsey, and Lancaster (2011) examined how e-mail builds student-teacher ties and concluded that it effectively fosters the development of professional relationships between students and teachers. According to Young et al. (2011), since students are motivated to maintain those relationships when they predict positive relational outcomes, they "try to predict what their communication outcomes with professors will be like" (p. 373), and that they also tend to develop a student-teacher relationship when their teachers frequently email them and immediately respond to their emails.

These findings are consistent with those of Thompson (2008), who studied the characteristics of emails between parents and teachers, including the most common topics and the frequency of the emails. According to Thompson, both parents and teachers believe that emails worked most effectively to communicate because the messages involved simple, concrete information explored the differences between instructors' and students' perceptions of email messages and found that overly casual email messages bothered instructors more than they did students. They also claimed that casual messages negatively affected the instructors' perceptions of students' credibility more than formally written email messages. Furthermore, instructors were less willing to meet with a student if their email was written casually rather than more formally.

4. EFFECTS OF PERSONALITY ON E-MAIL USE

As CMC channels have drastically expanded, communication researchers have become interested in how other factors, including personality, influence the face-to-face and e-mail communications between teachers and students. CMC is noteworthy because it provides opportunities that allow shy and apprehensive people to communicate with others without feeling a great deal of stress or anxiety. In this context, Kelly and Keaten pointed out that "by removing the face-to-face aspect of communication, shy individuals will not experience the fear or awkwardness associated with interaction". They explained the context of reticence as an instance "[w]hen people avoid communication because they believe it is better to remain silent than to risk appearing foolish" [11]. The present study explores the degree to which shy and passive students use e-mail as a kind of CMC, in comparison with face-to-face communication, and to what extent they prefer CMC as a method of communication.

Undeniably, the proliferation of computer-mediated channels has expanded extroverts' active interactions with others [14]. Some studies have also shown that shy individuals are more willing to communicate with others and are more comfortable when they feel less threatened physically and feel a lesser degree of negative evaluation from others [19], [22]. However, Kelly, Keaten, and Palmer found that there is not much difference in the forms of CMC or the times of CMC usage between reticent and non-reticent individuals. Nevertheless, the reticent students were more willing to use CMC compared to face-to-face or telephone communication [9]. Previous studies have also indicated that shy and anxious people may be more willing to communicate online than through the use of face-to-face methods [10], [11], [19], [22].

Several studies have examined whether more reticent students show a preference for e-mail over talking to teachers [8], [10]. These studies were interested in whether there is a difference in e-mail frequency between reticent and non-reticent students. Kelly et al. conducted surveys of 345 undergraduate and graduate students in three eastern universities after dividing the students into two groups, based on their responses according to the Reticence Scale (RS). The RS measured "six dimensions of reticence experienced in social situations". Teachers from the three universities distributed the survey, which asked their students "how much experience they [have] had using e-mail since their arrival at the university," and rated their responses on a scale ranging from 1 (no experience) to 5 (use it daily or almost daily) [8].

Kelly and colleagues predicted that reticent students would have a higher preference for e-mail than the non-reticent students for their interactions with faculty. While the

researchers found that there were no significant differences between the student groups in e-mail, the findings did show a difference in their preferences: "[n]ot only do they prefer to use e-mail over an office visit, reticent students report actually going to faculty offices less often than non-reticents" [8]. In another study, Kelly et al. explain this trend in terms of students' strategies for dealing with communication anxiety: e-mail is a medium that seems to mediate anxiety. They also claim that "reticent may feel less anxious because they do not feel the pressure to speak spontaneously since e-mail enables planning and editing of messages…" [10].

Kelly and Keaten found that "e-mail helps reduce anxiety and inhibition while at the same time providing increased preparation and control, both of which undoubtedly appeal to the reticent person, who experiences anxiety about communication and fear of negative evaluation" [11]. They concluded that a reticent student can benefit from e-mail communication because of various inherent advantages in the function of e-mails:

> *As an asynchronous channel of communication, e-mail affords the opportunity to think of what to say, organize those thoughts, and deliver one's words as planned; it eliminates concerns about timing one's remarks to fit into the flow of interaction. Thus, the increased preparation and control of e-mail may help high reticents compensate for their problems of timing, organization, delivery, memory, and knowledge. As a consequence, reticent individuals may perceive themselves to be more competent communicators when using e-mail as compared to when they engage in face-to-face interaction (p. 363).*

In a similar context, O'Sullivan claims that individuals prefer to use mediated channels when a desired impression is threatened rather than when a desired impression is supported. In this study, respondents were asked to give their interpersonal communication channel preference (telephone, answering machine, electronic mail, or letters). O'Sullivan found that "individuals' perceptions of their own poor writing skills might affect preferences for letters or email whereas weak conversational abilities might steer someone away from the telephone" [16]. Based on this hypothesis, mediated channels can be used for communication without causing discomfort and unappealing situations.

Kelly et al. examined the effect of communication anxiety on undergraduate students' use of instant messaging (IM) and found that "individuals with communication anxiety problems (such as reticence) report positive effect[s] for the mediated channel of instant messaging". Furthermore, they pointed out that "the on-line channel of instant messaging appears to narrow the self-perceived competence gap between high and low reticent individuals that exists in face-to-face communication". According to their research, the use of IM can reduce communication anxiety for reticent individuals. However, when reticent individuals lack specific communication skills, such as how to deliver and discuss an opinion, the reduced anxiety and shyness does not solve the communication problems, which are due to an absence of communication skills [12].

Rice distinguishes the communication channels that are used according to two dimensions: interpersonal-mediated and synchronous-asynchronous [18]. These dimensions classify e-mail as a mediated and asynchronous medium, while face-to-face contact is interpersonal and synchronous. E-mail can be preferred by students that are apprehensive about communication as a medium to communicate with their teachers because it can be useful for "reducing perceived face threats, increasing self-perceived competence, and producing a positive effect for e-mail" [11]. We expect that this study's examination of the possible role of e-mail in enhancing learning in classroom environments will provide insight into how students' reticence and apprehensions about communication affect their communication preferences and patterns, in particular, when e-mail is being used.

5. HYPOTHESES AND RESEARCH QUESTIONS

Reticence is an important variable in predicting the frequency of e-mail use between teachers and students because shy and passive students do express a stronger preference for e-mail in some situations and tend to feel less anxiety about e-mail than about face-to-face communication [9]-[11], [19], [22]. Even though e-mail is a medium which reduces communication anxiety, shy and passive students are still less willing to contact their instructors by e-mail than outgoing and active students because of their communication anxiety [11]. CMC also provided more opportunities for extroverts to express their views actively than for introverts [14]. Thus, we propose the following hypotheses:

H1a: The more students are passive in expressing their opinion during a class, the less likely they are to send e-mail to their instructors.

H1b: The more students describe their own personality as shy, the less likely they are to send e-mail to their instructors.

Previous studies have shown that reticent students visit faculty offices less frequently than non-reticent students (Kelly et al., 2001; Kelly et al., 2004). Thus, it is probable that outgoing and active students contact their instructors face-to-face more frequently than do passive and shy students. Therefore, this study proposes the following hypotheses:

H2a: The more students are passive in expressing their opinion during the class, the less likely they are to communicate with their instructors face-to-face.

H2b: The more students describe their personality as shy, the less likely they are to communicate with their instructors face-to-face.

Previous studies have shown that reticent students are more likely to use and prefer e-mail communication with their teachers rather than face-to-face communication [8], [11]. This is because e-mail communication can allow shy and passive

students to communicate with their instructors without feeling anxiety [10], [11]. In addition, the reticent students tend to prefer CMC to face-to-face or telephone communication [9]. Thus, we propose the following hypothesis:

H3: Students' passivity and shyness have a stronger effect on the frequency of face-to-face communication than on the frequency of sending e-mail.

This study is also concerned with one additional factor that might influence student's communication patterns. It is likely that it is more difficult for students in a large class to have face-to-face communication with their teacher than students in a small class because of the limitations on a teacher's time and the greater degree of anonymity for individual students. Bourne et al. (1997) discuss the advantages of a small class: "[t]he ability to discuss issues, dissect problems, work through questions and engage in free association is far better with a small group of learners than in a classroom containing a large number of students" (p. 45). The relationship between students and teachers in small classes often becomes intimate and friendly. Thus, it is possible that students in a small class would use the option of e-mail contact more often than would students in a large class. Based on this, it was hypothesized that:

H4a: The larger the size of a class that students are taking, the less likely they are to send e-mail to their instructors.

H4b: The larger the size of a class, the less likely students are to communicate with their instructors face-to face.

6. METHODS

6.1 Participants

Three hundred and twenty-two undergraduate students in a journalism program at a Midwestern University participated in the survey. The participants were limited journalism majors. These students were taking both lower and upper division classes. The sample consisted of freshman (n = 49, 15.5%), sophomores (n = 85, 26.8%), juniors (n =99, 31.2%), and seniors (n=84, 26.5%). The participants included 205 (66.8%) females and 102 males (33.2%).

6.2 Procedures

Human subject approval (IRB) was acquired prior to the beginning of the survey. The data-collection was conducted for two weeks during the eleventh and twelfth week of the fall semester of 2009. The researchers visited classrooms at the beginning of the class. The classes were various journalism courses including Introduction to Mass Communication and Public Relations. Students were assured that the survey was voluntary and was not related to the grades they would receive in the classes. The survey participants did not receive extra credit for their participation. Students were asked to answer the survey questionnaire asking how often they communicated with the teacher (through both e-mail and face-to-face encounters) of the specific class that they attended from August 30th to mid-November, 2009. The survey also included questionnaires asking about the size of each class and measuring the student's shyness and passivity.

6.3 Measurement

A five-point frequency scale was used to measure the frequency of sending e-mail to course instructors and the frequency of face-to-face communication between students and instructors. The frequency of sending e-mail to a course instructor was measured by asking the students "How many times did you e-mail your course instructors (including professors, lecturers, and associate instructors) during this semester?" The response options were: Never (1), Once (2), 2 to 5 times (3), 6 to 10 times (4), and more than 10 times (5). The frequency of face-to-face communication between student and instructor was measured by asking the question "Not counting e-mail, how often did you consult with your course instructor outside of class during this semester?" The response options were: Never (1), Once (2), 2 to 5 times (3), 6 to 10 times (4), and more than 10 times (5).

The measurements of students' passivity and shyness were developed by examining the items used to measure personality traits in previous studies [10]. To assess students' passivity, students were asked to rate how much they agree with the following statement: "I am very active in expressing my opinion during class." The response options were: Strongly Agree (1), Agree (2), Neutral (3), Disagree (4), and Strongly Disagree (5). To assess their shyness, the students were asked to describe their personality from the following choices: Very Outgoing (1), Outgoing (2), Neutral/don't know (3), Shy (4), and Very Shy (5). The size of the class that the students were taking was measured by the question, "What is the size of this class that you are taking?" The response options were: Less than 20 (10.5), 21 to 50 (35.5), and 101 to 200 (150.5). Demographic characteristics, such as gender (male or female) and class standing (Freshman, Sophomore, Junior, and Senior), were also considered as control variables.

6.4 Purposes determining E-mail Use

Students' responses to the study's questionnaire show that they mostly use e-mail to communicate with their instructors for educational purposes. When asked the major reasons why they e-mailed their instructors 50.8% of the respondents answered, "To get details about an assignment or test." In addition, 12.3% chose, "To ask about course content" and 3.2% e-mailed, "To appeal or complain about the grade." These reasons have "a stronger link to cognitive learning" [15]. In the end, more than 60% of students contacted their instructors by e-mail to enhance their learning in the courses they were taking. In addition, when we consider that the survey respondents more frequently use e-mail than face-to-face contact to communicate with their teachers, it seems possible that e-mail acts as a substitute for face-to-face contact.

6.5 Data Analysis

The dependent variables were the frequency of sending e-mail to course instructors and the frequency of face-to-face communication between students and instructors, which is a continuous variable. As indicated in the hypotheses, the variables of interest were students' shyness, students' passivity, and the size of the class that the students were taking. Covariates that were controlled include students' gender and class standing. The correlations among the study's variables were calculated. The linear regression models were appropriate for examining the effects of the frequency of sending e-mail to course instructors, the frequency of face-to-face communication between students and instructors, students' passivity, students' shyness, and the size of the class on each dependent variable with and without adjusting for students' gender and class standing. The assumptions of linear regression, including absence of outliers, normality, linearity, homoscedasticity of the errors, absence of multicollinearity, and independence of the errors were tested. All the analyses were performed using SAS, version 9.2 (SAS Institute Inc, Cary, NC).

7. FINDINGS

Table 1 represents the descriptive statistics and correlations among the study variables (i.e., the frequency of sending e-mail to instructor, the frequency of face-to-face communication between student and instructor, student's passivity, student's shyness, the size of the class that the student is taking, student's gender, and student's class standing). The frequency of sending e-mail to an instructor was significantly correlated with all other variables. The frequency of face-to-face communication between student and instructor was significantly correlated with all other variables except student's gender and class standing. In addition, the correlations among study variables did not show excessive correlations among independent variables. When performing the linear regression analysis, the variance inflation factor (VIF) scores did not exceed 1.39, which is less than 5.

Table 1. Descriptive statistics and correlations among variables (N = 322)

	E-mail	Face-to-face	Passivity	Shy	Class size	Class standing
E-mail	-					
Face-to-face	.38**	-				
Passivity	-.19**	-.30**	-			
Shyness	-.13*	-.21**	.30**	-		
Class size	-.25**	-.13*	.28**	-.02	-	
Class standing	.14*	.04	-.07	.00	-.50**	-
M	2.73	1.93	3.04	2.20	90.81	2.69
SD	1.11	0.92	1.05	0.91	56.28	1.03

Note. M=Mean; SD=Standard Deviation.
*** p < .01, * p < .05.*

Table 2 shows the results of linear regression predicting the frequency of sending e-mail to course instructor. The frequency of face-to-face communication between student and instructor was positively associated with the frequency of sending e-mail to course instructor (Coef. [Coefficient] = 0.452, $p < .01$).

H1a: The more students are passive in expressing their opinion during a class, the less likely they are to send e-mail to their instructors.

H1b: The more students describe their own personality as shy, the less likely they are to send e-mail to their instructors.

H4a: The larger the size of a class that students are taking, the less likely they are to send e-mail to their instructors.

As Table 2 shows, the more students were passive in expressing their opinion during the class, the less likely they were to send e-mail to their instructor (Coef. = -0.196, $p < .01$). Thus, H1a is supported. In addition, the more students described their personality as shy, the less likely they were to send e-mail to their instructor (Coef. = -0.162, $p < .05$). Therefore, H1b is supported. According to Table 2, the larger the size of the class, the less likely they are to send e-mail to their instructor (Coef. = -0.005, $p < .01$). Thus, H3a is supported. All of these relationships were still significant after adjusting for student's gender and class standing (Table 2).

Table 2. Correlation between e-mail frequency and the number of face-to-face contacts

Independent variable	Model 1[a]		Model 2[b]	
	Coef.	(SE)	Coef.	(SE)
Frequency of face-to-face communication between student and instructor	0.452	(0.062)**	0.418	(0.064)**
Degree of passivity	-0.196	(0.058)**	-0.180	(0.059)**
Degree of shyness	-0.162	(0.068)*	-0.157	(0.068)*
Size of a class that student is taking	-0.005	(0.001)**	-0.004	(0.001)**

Note. Coef.=Coefficient; SE=Standard Error.
a Unadjusted model.
b Adjusted for student's gender and class standing.
*** p < .01, * p < .05.*

The results of linear regression predicting the frequency of face-to-face communication between student and course instructor are presented in Table 3. The frequency of sending e-mail to course instructor was positively related to the frequency of face-to-face communication between student and instructor (Coef. = 0.313, $p < .01$).

H2a: The more students are passive in expressing their opinion during the class, the less likely they are to communicate with their instructors face-to-face.

H2b: The more students describe their personality as shy, the less likely they are to communicate with their instructors face-to-face.

H4b: The larger the size of a class, the less likely students are to communicate with their instructors face-to face.

Table 3 shows that the more students were passive in expressing their opinion during the class, the less likely they were to communicate with their instructor face-to-face (Coef. = -0.266, $p < .01$). Therefore, H2a is supported. Also, the more students described their personality as shy, the less likely they were to communicate with their instructor face-to-face (Coef. = -0.209, $p < .01$). Thus, H2b is supported. All these associations were significant, even after controlling for student's gender and class standing. However, the size of a class was not significantly associated with the frequency of face-to-face communication between student and course instructor after adjusting for student's gender and class standing. Thus, H3b is not supported.

H3: Students' passivity and shyness have a stronger effect on the frequency of face-to-face communication than on the frequency of sending e-mail.

We used the correct statistical test for the equality of regression coefficients. It is noteworthy that the effects of student's passivity (Coef. = -0.262, SE [Standard Error] = 0.048) and shyness (Coef. = -0.210, SE = 0.056) on the frequency of face-to-face communication between student and instructor were much stronger than the effects of student's passivity (Coef. = -0.180, SE = 0.059) and shyness (Coef. = -0.157, SE = 0.068) on the frequency of sending e-mail to their instructor. The findings show that the degree of both passivity and shyness influenced the face-to-face interaction more negatively than they did the email interaction. Therefore, H4 is supported.

Table 3. Linear regression predicting the frequency of face-to-face communication between student and course instructor (N = 322)

Independent variable	Model 1[a]		Model 2[b]	
	Coef.	(SE)	Coef.	(SE)
Frequency of sending e-mail to course instructor	0.313	(0.043)**	0.296	(0.045)**
Degree of passivity	-0.266	(0.047)**	-0.262	(0.048)**
Degree of shyness	-0.209	(0.056)**	-0.210	(0.056)**
Size of a class that student is taking	-0.002	(0.001)*	-0.002	(0.001)

Note. Coef.=Coefficient; SE=Standard Error.
[a] Unadjusted model.
[b] Adjusted for student's gender and class standing.
** $p < .01$, * $p < .05$.

8. DISCUSSION

There has been limited research in communication studies that focuses on students' e-mail use in an educational context [5]. This scarcity has led a deepening gap between instructional communication and education. This is a somewhat surprising gap given the current, widespread use of email. The goal of this study is to investigate the trends of student e-mail use in the context of the present media environment, and also to suggest better alternatives to e-mail contact between students and teachers in order to promote student learning. This study, therefore, examined important issues that previous studies have either neglected or failed to examine in an educational context.

In particular, this study explored the following aspects: how students' reticence affects their e-mail usage and their communication preferences; how differently students' passivity and shyness influence both face-to-face and e-mail interactions with their instructors; and how class standing impacts student-teacher interactions. The findings propose insights about student e-mail and face-to-face communication.

One conclusion that the present study draws is that the effects on learning of e-mail communication between teacher and student should not be overestimated. Undeniably, it is true that more and more students accept e-mail contact as a pivotal method for communicating with teachers and asking whatever they want to ask. In this survey, approximately 80% of the respondents had e-mailed their teachers in just one class during the semester. Also, students tend to prefer e-mail to face-to-face contact with their teachers, demonstrating that the culture of online communication has deeply permeated the class environment.

8.1 Reticence and E-mail Use

With the proliferation of CMC, there has been an expectation that mediated and asynchronous email communication would help shy and apprehensive students avoid the fear of interacting with their instructors. Actually, previous studies have shown that shy and reticent individuals tend to have a preference for computer-mediated channels of communication, such as email [9], [11], [22]. Some studies have also found that there is no significant difference in e-mail frequency between reticent and non-reticent individuals [8], [10].

However, this study found that shy and passive students send e-mails to their teachers less frequently than non-reticent students, just as they are also less likely to communicate with their instructor face-to-face, compared to non-reticent students. The findings indicate that e-mail might not be functioning as a communication tool that connects teachers and students to the degree that has been proposed by communication scholars and teachers. The results also suggest that e-mail should not be exaggerated as a communication tool for reticent students, and that teaching better communication skills might be necessary in order to enhance student-teacher relationships for effective learning.

Nevertheless, it should be noted that the differences in the findings between this study and previous ones could be attributable to other reasons, such as the survey subjects, the measurements used, and the statistical method employed. For example, Kelly et al.'s study not only measured reticence by asking its respondents their feelings and skills regarding social interactions, it also conducted a Chi-Square analysis to compare reticent and non-reticent groups [10]. Therefore, we cannot not claim that the results of the present study differ from –or even contradict– the previous studies. Nevertheless, the findings in this study do imply that the effects of passivity and shyness on students' communication preferences cannot be underestimated in asynchronous e-mail communication, as well as in synchronous in-person communication.

8.2 Preferences for E-mail vs. Face-to-face

This study also found that shy and passive students prefer online communication over face-to-face contact. As H3 shows, reticent students preferred e-mail communication to face-to-face communication. In particular, the degree of students' passivity and shyness has restricted face-to-face communication more often than e-mail communication. In other words, the more shy and passive students are in their personality, the more they tend to select e-mail as a communication channel with their instructors rather than visit their instructor's offices.

These findings are consistent with the findings of Kelly et al. [8], [10], in which reticent students prefer e-mail communication to face-to-face contact, although this study and the study by Kelly et al. used different methods to measure reticence. Kelly et al. separated reticent and non-reticent students using a Reticence Scale (RS) [8]. This study measured the degree of reticence by asking students to self-identify how active they might be in expressing their own opinions in the classroom and whether they considered their own personalities to be outgoing or shy. Additional studies are needed to determine the relationship between students' reticence and e-mail use. Nevertheless, both studies have identified a robust relationship between e-mail frequency and students' reticence in consideration of the face-to-face interaction.

8.3 Relationship of E-mail and Face-to-Face Contact

The findings raise the question of why reticent students did not send e-mails to their teachers as often as the non-reticent students, even though they prefer e-mail communication to face-to-face contact. The answer to this question could be obtained by examining the correlations between e-mail and face-to-face contact.

This study also examined the difference in the frequency of face-to-face and e-mail contact in addition to the contextual factors that influence e-mail contact. As Table 1 indicates, there is a positive correlation between e-mail contact and face-to-face contact (Pearson's $r=0.38$, $p<0.01$). This was confirmed in a linear regression predicting both the frequency of sending e-mail and the frequency of face-to-face communication (Table 2 and Table 3). The findings show that students who frequently contact their instructors face-to-face are likely to communicate with their teachers by e-mail (Coef. = 0.452, $p < .01$). This is also true in the reverse case (Coef. = 0.313, $p < .01$). These results suggest that, as a channel for student-teacher interaction, there is basically no significant difference between the two primary means of communication, e-mail and face-to-face contact.

This study also showed that students in a small-size class are more willing to e-mail their teachers. A possible explanation for this is that there is a greater degree of face-to-face contact between students and teachers in small classes, which allows students to feel more comfortable when contacting their teachers in general. In comparison students in larger classes are more likely to feel alienated from teachers. Thus, teachers with a large class should work to increase their potential interactions with students, so that the students do not lose the benefits of individual communication with their teachers.

These findings imply that an appropriate combination of online and face-to-face communication can bring about more effective learning. Black conducted a survey that examined three delivery modes of teaching to determine which was more learning-effective: traditional classroom courses, Internet courses, or a hybrid of the two [1]. He found that "the use of hybrid methods of course delivery – incorporating elements of both the traditional classroom and web-based instruction – may provide an optimal 'mix' for student learning" (Journal of Business Administration online). Considering these results, this study implies that there are still some situations in which students may prefer face-to-face contact. Therefore, teachers may need to seriously consider how they can effectively combine the two communication methods in their class teaching, while considering that the functions of face-to-face and online communication can be different.

9. LIMITATIONS AND FUTURE STUDIES

The findings of this study suggest the following conclusion: underlying factors tend to determine a given student's willingness to initiate communication with a teacher in general, regardless of the communication medium that is used. Outgoing and sociable students are most active in class, send the most e-mails, and have the most face-to-face encounters with teachers; students' shyness and passivity can have a more negative impact on face-to-face interaction than on e-mail interaction between students and teachers; and small classes generate more communication between individual students and teachers than large classes. In summary, e-mail usage follows similar broad patterns of social communication, rather than introducing a different trend.

Although this study has insightful implications, we acknowledge that this study has inherent limitations and that its results should be interpreted cautiously for several reasons. The first limitation is that this study depends on students' own reports of e-mail frequency in the survey. In particular, students are asked how many times they e-mailed an instructor in one class during the semester. Students might have difficulty remembering which course and the number of times that they e-mailed their teachers. Self-reported data is restricted by the fact that it can rarely be independently verified. Self-reported data contain several potential sources of bias that should be noted as limitations, such as selective memory and untruthful responses. Future research needs to consider how to measure e-mail frequency more objectively and accurately.

Second, this study used only one question to measure each of the reticence variables (i.e., shyness and passivity). Thus, we acknowledge that these measurements could be oversimplified, raising a concern about their reliability and validity. However, we believe that it would be meaningful to see the respective impact of "passivity" or "shyness" on communication, since passivity and shyness are the major components used to measure an individual's reticence. Moreover, the hypotheses proposed in this study were supported in its results.

Third, this study did not examine different opinions about communication that were held by students and teachers. The different opinions were deliberately excluded because this study focused on the proposed topic and examined communication preferences. Future studies that include teachers' opinions about e-mail and face-to face contact will enrich this study because teachers' observations can also provide a valuable perspective regarding student-teacher interactions.

Finally, additional investigations are needed to corroborate the findings in this study in order to confirm the conclusions proposed in this study. A more in-depth inductive or deductive analysis of the emails could add value to the research. Future research which combines quantitative and qualitative data could improve the validity of the findings obtained in this study.

Despite these limitations, this study explored the importance of the relationships between students' e-mail use, reticence, and class size in an educational context. Examining these factors and comparing them against other potentially important factors that were not analyzed in this study will provide additional insight into understanding the future CMC research. In conclusion, re-testing these factors and comparing them with other factors that influence student communication and behaviors is a new paradigm of digital pedagogy and smart interaction. The results of this study can be considered as foundational material toward this research objective.

ACKNOWLEDGEMENT

This research was supported by the Ministry of Education, Korea, under the Brain Korea 21 Plus Project (Grant No. 10Z20130000013).

REFERENCES

[1] G. Black, "A comparison of traditional, online, and hybrid methods of course delivery," Journal of Business Administration, vol. 1, no. 1, Retrieved Dec. 3, 2009, http://www.atu.edu/business/jbao/Spring2002/black.pdf

[2] J. R. Bourne, E. McMaster, J. Rieger, and J. O. Campbell, "Paradigms for on-line learning: A case study in the design and implementation of an asynchronous learning networks (ALN) course," Proc. the 27th Annual Conference Frontiers in Education Conference, vol. 1, 1997, pp. 245-255.

[3] D. Cowles, "Consumer perceptions of interactive media," Journal of Broadcasting & Electronic Media, vol. 33, no. 1, 1989, pp. 83-89.

[4] P. V. D'Souza, "E-mail's role in the learning process: A case study," Journal of Research on Computing in Education, vol. 25, 1992, pp.254-254.

[5] [5] R. L. Duran, L. Kelly, and J. A. Keaten, "College faculty use and perceptions of electronic mail to communicate with students," Communication Quarterly, vol. 53, no. 2, 2005, pp. 159-176.

[6] L. M. Flaherty, K. J. Pearce, and R. B. Rubin, "Internet and face-to-face communication: Not functional alternatives," Communication Quarterly, vol. 46, no. 3, 1998, pp. 250-268.

[7] B. Haworth, "An analysis of the determinants of student e-mail use," Journal of Education for Business, vol. 75, no. 1, 1999, pp. 55-59.

[8] L. Kelly, R. L. Duran, and J. J. Zolten, "The effect of reticence on college students' use of electronic mail to communicate with faculty," Communication Education, vol. 50, 2001, pp. 170-176.

[9] L. Kelly, J. A. Keaten, and D. L. Palmer, "The impact of reticence on use of computer-mediated communication," Paper presented at the annual convention of the National Communication Association, Miami Beach, FL, November 2003.

[10] L. Kelly, J. A. Keaten, and C. Finch, "Reticent and non-reticent college students' preferred communication channels for interacting with faculty," Communication Research Reports, vol. 21, no. 2, 2004, pp. 197-209.

[11] L. Kelly and J. A. Keaten, "Development of the affect for communication channels scale," Journal of Communication, vol. 57, no. 2, 2007, pp. 349-365.

[12] L. Kelly, J. A. Keaten, M. Hazel, and J. A. Williams, "Effects of reticence and affect for communication channels on usage of instant messaging and self-perceived competence," Paper presented at the annual meeting of the National Communication Association, Chicago, IL, 2007.

[13] J. T. Klapper, "Mass communication research: An old road resurveyed," Public Opinion Quarterly, vol. 27, no. 4, 1963, pp. 515-527.

[14] R. Kraut, S. Kiesler, B. Boneva, J. Cummings, V. Helgeson, and A. Crawford, "Internet paradox revisited," Journal of social issues, vol. 58, no. 1, 2002, pp. 49-74.

[15] M. M. Martin, S. A. Myers, and T. P. Mottet, "Students' motives for communicating with their instructors," Communication Education, vol. 48, no. 2, 1999, pp. 155-164.

[16] B. O'Sullivan, "What you don't know won't hurt me," Human Communication Research, vol. 26, no. 3, 2000, pp. 403-431.

[17] Z. Papacharissi and A. M. Rubin, "Predictors of Internet use," Journal of Broadcasting & Electronic Media, vol. 44, no. 2, 2000, pp. 175-196.

[18] R. E. Rice, "Media appropriateness," Human communication research, vol. 19, no. 4, 1993, pp. 451-484.

[19] L. D. Roberts, L. M. Smith, and C. M. Pollock, "U ra lot bolder on the net: shyness and Internet use," Shyness: Development, consolidation and change, 2000, pp. 121-138.

[20] [20] T. E. Ruggiero, "Uses and gratifications theory in the 21st century," Mass communication & society, vol. 3, no. 1, 2000, pp. 3-37.

[21] D. H. Shin, "Understanding e-book users: Uses and gratification expectancy model," New Media & Society, vol. 13, no. 2, 2011, pp. 260-278.

[22] W. G. Stritzke, A. Nguyen, and K. Durkin, "Shyness and computer-mediated communication: A self-presentational theory perspective," Media Psychology, vol. 6, no. 1, 2004, pp. 1-22.

[23] J. Waldeck, P. Kearney, and T. Plax, "Teacher e-mail message strategies and students' willingness to communicate online," Journal of Applied Communication Research, vol. 29, no. 1, 2001, pp. 54-70.
[24] F. Williams, A. F. Phillips, and P. Lum, "Gratifications associated with new communication technologies," Media gratifications research: Current perspectives, 1985, pp. 241-254.

Jaesik Ha
He is an Assistant Professor at University of Illinois, Springfield, Dept. of Communication. He acquired his Ph.D. in Journalism from Indiana University 2013.

Dong-Hee Shin
He received the M.S.. Ph.D. in Information and Telecommunications from Syracuse University, USA in 2004. He was an Assistant Professor in Pennsylvania State University, College of Information Sciences and Technology USA until 2009. Since then, he has been with interaction science from Sungkyunkwan University as a Professor. His main research interests digital communication, information science and HCI.

Chung Gun Lee
Dr. Chung Gun Lee has a Ph.D. degree from the Department of Applied Health Science, School of Public Health, Indiana University Bloomington. He holds a Master degree in Public Health.