IM, Therefore I Am

Eddie Gose
Department of Educational Technology
University of Hawaii at Manoa
Honolulu, HI, USA
gose@hawaii.edu

Abstract: The Information Age has created an information-based society which demands of our young people to have the ability to think, problem-solve, and adapt. Instant Messaging (IM) is one of the newest information technology mediums that is being used by college students for communication exchanges. The purpose of the study is to examine the adoption and educational use intentions of IM by college students based on Roger's (1995) Diffusion of Innovation theory, Davis' (1989) Technology Acceptance Model, and Moore and Benbasat's (1991) Perceptions of Adopting an Information Technology Innovation. From the aforementioned theories, four constructs were used. The constructs were perceived: (a) relative advantage (Rogers, 1995); (b) ease of use (Davis, 1989; Rogers, 1995); (c) visibility (Rogers, 1995; Moore & Benbasat, 1991); and (d) result demonstrability (Moore & Benbasat, 1991). Perceived relative advantage ($p = .058$) and perceived result demonstrability ($p = .08$) were the only constructs that showed significance ($p > .05$). The study concluded that gender does not play a significant role in adopting IM in terms of perceived relative advantage and perceived result demonstrability.

Introduction

In the Information Age, people can communicate with each other in many different ways. Two-way radios, fax, telephones, cellular phones, electronic mail, and other computer mediated communication (CMC) systems are some examples of modern day communication mediums. Among CMCs, a recent tool is Instant Messaging (IM). With the advent of IM, data communication is now synchronous and grants users real-time information exchange.

IM has become an affordable means of communication via it being a free application for an internet connected computer or as a low cost cell phone service. IM is primarily a computer-based text messaging system. IM gained popularity among teenagers, as the personal computer and the internet entered the household. IM systems consist of two main parts: a chat function and a buddy list. The buddy list displays the availability of buddies collected by the user to whom they may freely communicate with. IM systems provide multiple ways of communicating which include real-time chat, point-to-point

conversation, group chat, or joining a dedicated chat room. IM chat clients require both users to use a chat application in order to send and receive messages.

Popular instant messaging services on the internet include AOL Instant Messenger, MSN Messenger, Yahoo! Messenger, Skype, Google Talk, .NET Messenger, iChat, and ICQ. According to Pew Internet & American Life Project (2004), about 42% of all American adult internet users, more than 53 million adults, report using IM. Between the years 2000 and 2004 there was a 29% growth rate of adults using IM. Also, two-thirds of American teenagers using the internet, 14 million teenagers, use IM.

IM enables synchronous communication with friends, family, colleagues, and coworkers. Through an IM client via the Internet or cellular phone, two or more participants can connect with text communication messages, also known as chats. IM messages are usually text only messages, but users may also send files, voice, and video. An IM client can simultaneously run in the background of other computer applications.

The use of IM is growing at a phenomenal rate. As of 2004, Pew Internet and American Life Project (2004) has reported that 12% of Internet users also use IM. That translates to about 13 million people IM at least once per week. The numbers revealed that four in ten online Americans also instant message. Fourteen million American teenagers use IM, and 32% of college graduates use IM in the workplace.

People are using IM for social networking and work-based collaboration, but the communications field lacks academic research on its adoption and diffusion among college students. Teenagers have been using the technology as a means to communicate with their friends. While other research focuses on the professional world, it has been summarized that businesses have been adopting the technology in the workplace for better workflow and communication amongst coworkers.

Even with the handful of available research on IM, another topic of interest is examining gender adoption of new information technologies. A particular study that looks into the adoption of information technology according to gender (Ilie, Van Slyke, Green, & Lou, 2005) is limited to business students. The study observed business students adoption of IM based on gender. The rationale behind this study was to see whether or not the results of Ilie et al.'s study hold true for college of education students.

Literature Review

There are varying studies on the rate of adoption of an innovation. One such theoretical construct model is Rogers' (1995) Diffusion of Innovation theory. It is a well accepted theory that helps examine the user's perceptions of an innovation's characteristics and how those characteristics affect adoption. The most common characteristics include relative advantage, compatibility, complexity, triability, and observability.

In terms of adoption, relative advantage is a common characteristic examined when studying adoption of an innovation. The characteristic reflects the degree to which an

innovation is perceived as being better than the idea it supersedes. Perceived relative advantage is a common factor in showing positive influence on adoption and use intentions (Prescott & Conger, 1995). This influence is widely tested in IT adoption studies which include adoption of groupware (Plouffe, Hulland, & Vandenbosch, 2001), smart cards (Van Slyke, Lou, & Day, 2002), and information retrieval systems (Venkatesh & Morris, 2000).

Another one of Rogers' (1995) adoption characteristics is perceived observability, which defines a person's ability to accept or reject an innovation based on the degree to which an innovation is visible to others. Two empirical studies (Moore & Benbasat, 1991; Agarwal & Prasad, 1997) have equivocal support that better conceptualizes Rogers' characteristic of observability. Moore and Benbasat (1991) also proposed Roger's (1995) perceived observability be conceptualized into two separate constructs of visibility and result demonstrability. Visibility is defined as the innovation's apparent use, and result demonstrability is the degree to which the innovation's outcome is apparent. Agarwal and Prasad (1997) empirically supported the idea of conceptualizing observability into two separate constructs.

Another model on use intention of an innovation is the Technology Acceptance Model (TAM) by Davis (1986). This model focuses on the ease of use and perceived usefulness of an innovation, and how users will accept or reject the innovation. Perceived ease of use is defined as the degree to which an innovation is viewed as being easy to use. TAM has been a very attractive model that has been utilized in studies in e-mail (Davis, 1986) and graphics (Davis, 1989), voice-mail and word processing (Adams, Nelson, & Todd, 1992; Chin & Todd, 1995), and group support systems (Chin & Gopal, 1995).

Previous research findings indicate that men and women view information technology differently. Men have more favorable attitudes towards both information technologies (Schumacher & Morahan-Martin, 2001; Van-Slyke, Comunale & Belanger, 2002) and electronic commerce than women (Van-Slyke, Comunale & Belanger, 2002). Women appeal to the usefulness of email more than men (Gefen & Straub, 1997) but seemed to have higher levels of computer phobias (Rosen & Maguire, 1990).

Recent research on gender studies and technology has started to emerge. Ong (2006) successfully used TAM to make several conclusions on the impact of gender in the perceptions and decision-making processes for e-learning. The study found that both perceived usefulness and perceived ease of use were significant influences on intention to use e-learning. The study also found that men's perception of usefulness was a stronger determinant for adoption than women in the use of e-learning. On the other hand, women were more strongly influenced by perceptions of computer self-efficacy and ease of use to adopt e-learning.

Studies on Instant Messaging

Much of the focus of previous studies on the use of IM has been on teenagers adopting the technology (Rautiainen & Kasesniemi, 2000; Grinter & Palen, 2002; Lenhart, Rainie, & Lewis, 2001; Schiano, Chen, & Ginsberg, 2002). Another set of studies examined

with whom teenagers were communicating. These studies uncovered that teenagers were communicating with their peers more than they would with their family or strangers (Grinter & Eldridge, 2001; Ling 2004; Taylor & Harper, 2002). Other studies found that text messaging established a sense of independence with teenagers (Ito, 2001; Kasesniemi & Rautiainen, 2002). Adult studies focused on IM adoption in the workplace setting (Nardi, Whittaker, & Bradner, 2000; Jahnke, 2003). Another study studied the use and usefulness of instant messaging in an elementary statistics course and the findings were positive based on IM's support of facilitating communication between the students' online study groups (Cunliffe, 2006).

Gender Adoption

IM is a phenomenon that will continue to grow as the communication technology grows and as more internet users adopt the innovation. The attitudes found in the previous research suggest that there are growing numbers of IM users in both teenagers and adults. Research (Ilie et al., 2005) recommends that gender be added to investigate whether gender moderates the influence of adoption of a new communication technology.

Most studies conducted earlier during the emergence of IM have primarily focused on teenagers. A growing number of studies have transpired to investigate gender differences with respect to information technologies. Men and women were found to be influenced by different set of characteristics (Venkatesh & Morris, 2000).

Gender research on adolescent boys and girls found that they both were positive about computer use in schools (Meelissen & Drent, 2008). This study pointed out that gender differences in attitudes towards information and communication technology (ICT) was linked to the content of the subject matter. Meelissen and Drent (2008) found that girls found ICT less desirable due to the possibility that the subject covered by ICT was a hard science. Another study examined gender differences in computer use, computer self-efficacy, and computer performance (Imhof, Vollmeyer, & Beierlein, 2007). The research suggested that there was no significant gender gap in computer use and computer self-efficacy. In terms of computer performance, the researchers found evidence suggesting that males performed better than females in producing satisfactory results when using computer applications.

Men have more favorable attitudes towards information technologies (Schumacher & Morahan-Martin, 2001; Van Slyke et al., 2002). Women seem to suffer from a slight computer phobia over their male counterparts (Rosen & Maguire, 1990). Women find e-mail more useful than men, but men found e-mail easier to use than women (Gefen & Straub, 1997). Women's perceptions of consumer-oriented electronic commerce are less favorable than men's. (Van-Slyke et al., 2002). The literature supports that there is an inequity in information technology perceptions between males and females.

Method

The researcher surveyed 24 participants who are in the College of Education at the University of Hawaii. Students volunteered to take a 20 minute survey that asked for demographic information, information on adoption of IM, and intent to use it for education.

The research question was "does gender impact a college student's perception to adopt a communication technology (Instant Messaging) according to use intention characteristics?" Four constructs were used to measure the use intention of adoption of the participants. Use intention is defined in this study as the participant's intention to use IM in their educational career. The constructs were perceived: (a) relative advantage (Rogers, 1995); (b) ease of use (Davis, 1989; Rogers, 1995); (c) visibility (Rogers, 1995; Moore & Benbasat, 1991); and (d) result demonstrability (Moore & Benbasat, 1991). To answer the research question, four null hypotheses based on adoption constructs were formulated. The hypotheses were:

> *H1: Perceptions of relative advantage will influence behavioral intent to use IM equally for men and women.*
> *H2: Perceptions of ease of use will influence behavioral intent to use IM equally for men and women.*
> *H3: Perceptions of visibility will influence behavioral intent to use IM more equally for men and women.*
> *H4: Perceptions of result demonstrability will influence behavioral intent to use IM equally for men and women.*

Perceived relative advantage and perceived visibility contained five item questions. Perceived ease of use and perceived result demonstrability both consisted of three items.

Results

The mean age of the sample was 30.25. The mean years of using a computer was 15.49. Respondents also reported spending an average of about 45 hours a week online. Of the number of respondents, 13 (54%) were females and 11 (46%) were males. Of the participants, 22 reported using email daily and two reported using it at least a few times a week. In terms of IM use, 15 used IM daily, three used IM weekly, one used IM at least once a month, and there were five respondents who do not use it. Figure 1 shows a graph displaying the amount of access versus the number of users per IT tool.

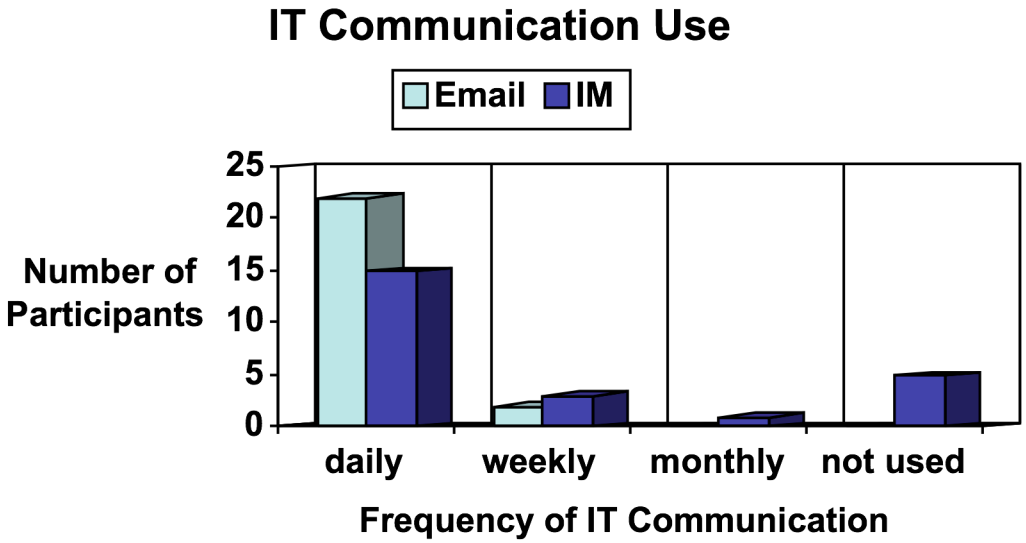

Figure 1. IT communication tool usage.

Using SPSS 15, the researcher found very interesting results. Model 1 (see Table 1) shows the constructs and results in a table. When looking for significance (p = .05), only perceived relative advantage (.058) and perceived result demonstrability (.080) were considered good predictors for adoption of IM. Without showing any significance, perceived ease of use (.559) and perceived visibility (.791) were removed.

Table 1
Model 1

Construct	S. Beta	T	Sig. (p = .05)	Keep/ Remove
Perceived Relative Advantage	.443	2.014	.058	Keep
Perceived Ease of Use	-.092	-.595	.559	Remove
Perceived Visibility	-.047	-.269	.791	Remove
Perceived Result Demonstrability	.395	1.852	.080	Keep

In Model 2 (see Table 2), gender was added to test whether or not it was significant in conjunction with the hypotheses. Gender had a significance level of .927, which the researcher found as non-significant and removed it.

Table 2
Model 2

Construct	S. Beta	T	Sig. (p = .05)	Keep/ Remove
Perceived Relative Advantage	.430	2.074	.43	Keep
Perceived Ease of Use	.423	2.106	.423	Keep
Gender	-.014	-.093	.927	Remove

The final model, Model 3 (see Table 3), used the two constructs perceived relative advantage and perceived ease of use which respectively showed significance at .43 and .423 when p = .05. With an adjusted R square at .584 (see Table 4), the researcher found Model 3 to be a good predictor for determining whether a participant would adopt IM or not.

Table 3
Model 3

Construct	S. Beta	T	Sig. (p = .05)
Perceived Relative Advantage	.430	2.074	.43
Perceived Ease of Use	.423	2.106	.423

Table 4
R squared for each Model

Model	Constructs	R Square	Adjusted R Square
1	Relative Advantage, Ease of Use, Visibility, Result Demonstrability	.63	.552
2	Relative Advantage, Result Demonstrability, Gender	.620	.564
3	Relative Advantage, Result Demonstrability	.620	.584

Model 3 determined constructs for adopting IM, perceived relative advantage and result demonstrability were the only good predictors. Thus, only hypothesis one and hypothesis four were tested. Through testing Model 2, it was determined that gender did not play a significant role. Table 5 shows the results of the four hypotheses.

Table 5
Hypotheses results

	Hypothesis	Accept/Reject
H1	*Perceptions of **relative advantage** will influence behavioral intent to use IM equally for men and women.*	Accept
H4	*Perceptions of **result demonstrability** will influence behavioral intent to use IM equally for men and women.*	Accept

A limitation that the researcher faced was a small sample size. The results cannot yield generalization statements about the whole student population since the sample audience did not represent the whole university. This study was also limited to a single university. The researcher feels that students enrolled in various schools and programs might give a clearer picture of adoption of higher education students. This research used a variety of constructs for technology adoption and encourages others to measure adoption using the various adoption theories.

The items used in determining adoption may not truly represent the tool in question. The items used were adopted and rewritten to match adoption for IM, but the original items were created for other computer-mediated communication mediums. Subjects may have also internalized the meaning of instant messengers and may have not included other IM tools found on different devices such as a cell phone or personal digital assistant (PDA).

To answer the research question, the researcher determined that gender does not play a significant role in adopting IM according to perceived relative advantage and result demonstrability. Adoption of this innovative technology does show that it is increasing in higher education but more research on it in higher education should be conducted. The researcher determined that only relative advantage and result demonstrability were good predictors for adoption of a new technology. The researcher suggests that the study be retested with a larger sample population to see if the model holds true. Gender did not play a significant role for this particular study, and it seems logical to reexamine whether other technology adoption once affected by gender is valid today.

References

Adams, D. A., Nelson, R. R., & Todd, P. A. (1992). Perceived usefulness, ease of use and usage of information technology: A replication. *MIS Quarterly, 16*(2), 227-247.

Agarwal, R., & Prasad, J. (1997). Role of innovation characteristics and perceived voluntariness in the acceptance of information technologies. *Decision Sciences, 25*(3), 557-582.

Chin, W., & Gopal, A. (1995). Adoption Intention in GSS: Relative Importance of Beliefs. *DATA BASE, 26*(2), 42-63.

Chin, W., & Todd, P. A. (1995). On the use, usefulness, and ease of use of Structural Equation Modeling in MIS research: A Note of Caution. *MIS Quarterly, 19*(2), 237-246.

Cunliffe, R. (2006). *Investigating the use and usefulness of instant messaging in an elementary statistics course.* Paper presented at the 7th International Conference on Teaching Statistics, Salvador, Bahia, Brazil.

Davis, F. (1989). Perceived usefulness, perceived ease of use and user acceptance of information technology. *MIS Quarterly, 13*(3), 319-340.

Gefen, D., & Straub, D. W. (1997). Gender differences in the perception and use of E-mail: an extension to the Technology Acceptance Model. *MIS Quarterly, 21*(4), 389-400.

Grinter, R. E., & Eldridge, M. (2001). *Y do tngrs luv 2 txt msg?* Paper presented at the Proceedings of Seventh European Conference on Computer-Supported Cooperative Work, Bonn, Germany.

Grinter, R. E., & Palen, L. (2003). *Instant messaging in teen life.* Paper presented at the Proceedings of the 2002 ACM conference on Computer supported cooperative work, New Orleans, Louisiana.

Ilie, V., Van Slyke, C., Green, G., & Lou, H. (2005). Gender differences and perceptions and use of communication technologies: a diffusion of innovation approach. *Information Resources Management Journal, 18(3)*, 13-32.

Imhof, M., Vollmeyer, R., & Beierlein, C. (2007). Computer use and the gender gap: The issue of access, use, motivation, and performance. *Computers in Human Behavior, 23*(6), 2823-2837.

Ito, M. (2001). *Mobile phones, Japanese youth, and the replacement of social contact.* Paper presented at the Proceedings of the Annual Meeting for the Society for the Social Studies of Science., Cambridge, MA.

Jahnke, A. (2003). Ready for Instant Messaging?; IM isn't just for teenagers anymore. But are the downsides too much for corporate America? *CIO, 16*(11).

Kasesniemi, E. L., & Rautiainen, P. (2002). Mobile culture of children and teenagers in Finland. In J. E. Katz & M. Aakhus (Eds.), *Perpetual Contact: Mobile communication, private talk, public performance* (pp. 170-192). Cambridge, UK: Cambridge University Press.

Lenhart, A., Rainie, L., & Lewis, O. (2001). Teenage life online: the rise of the instant message generation and the internet's impact on friendships and family relationships., *Pew Internet and American Life Project*.

Meelissen, M., & Drent, M. (2008). Gender differences in computer attitudes: Does the school matter? *Computers in Human Behavior, 24*(3), 969-985.

Moore, G. C., & Benbasat, I. (1991). Development of an instrument to measure the perceptions of adopting an information technology innovation. *Information Systems Research, 2*(3), 192-222.

Ong, C.-S., & Lai, J.-Y. (2006). Gender differences in perceptions and relationships among dominants of e-learning acceptance. *Computers in Human Behavior,22*(5), 816-829.

Nardi, B. A., Whittaker, S., & Bradner, E. (2000). *Interaction and outeraction: instant messaging in action.* Paper presented at the Proceedings of ACM Conference on Computer Supported Cooperative Work, Philadelphia, PA.

Pew Internet and American Life Project. (2004). How Americans use instant messaging. http://www.pewinternet.org/pdfs/PIP_Instantmessage_Report.pdf.

Plouffe, C. R., Hulland, J. S., & Vandenbosch, M. (2001). Research report: richness versus parsimony in modeling technology adoption decisions. *Information Systems Research, 12*(2), 208-222.

Prescott, M., & Conger, S. (1995). Diffusion of Innovation Theory: Borrowing, Extensions and Modifications from IT Researchers. *DATA BASE for Advances in Information Systems, 26*(2 & 3), 20-41.

Rautiainen, P., & Kasesniemi, E. L. (2000). *Mobile communication of children and teenagers: Case Finland 1997 - 2000.* Paper presented at the Proceedings from a Seminar about Society, Mobile Telephony and Children, Oslo, Norway.

Rogers, E. M. (1995). *Diffusion of Innovations* (5 ed.). New York, NY: The Free Press.

Rosen, L. D., & Maguire, P. D. (1990). Myths and realities in computerphobia: a meta-analysis. *Anxiety Research, 3*, 175-191.

Schiano, D. J., Chen, C. P., & Ginsberg, J. (2002). *Teen use of messaging media.* Paper presented at the Proceedings of ACM Conference on Human Factors in Computing Systems, Minneapolis, MN.

Schumacher, P., & Morahan-Martin, J. (2001). Gender, Internet and computer attitudes and behavior. *Computers in Human Behavior, 32*(1), 18-37.

Taylor, A., & Harper, R. (2002). *Age-old practices in the "New World:" A study of gift-giving between teenage mobile phone users.* Paper presented at the Proceedings of Conference on Human Factors in Computing Systems, Minneapolis, MN.

Van-Slyke, C., Comunale, C. L., & Belanger, F. (2002). Gender differences in perceptions of web-based shopping. *Communications of the ACM, 45*(8), 82-86.

Van-Slyke, C., Lou, H., & Day, J. (2003). Intentions to use groupware: the influence of users' perceptions. In M. Khosrow-Pour (Ed.), *Advanced topics in information resources management* Hershey, PA: IGI Publishing.

Venkatesh, V., & Morris, M. G. (2000). Why don't men ever stop to ask for directions? Gender, social influence and their role in technology acceptance and user behavior. *MIS Quarterly, 24*(1), 115-139.