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MEDIA SELECTION TO MEET COMMUNICATION CONTEXTS: COMPARING E-MAIL AND INSTANT MESSAGING IN AN UNDERGRADUATE POPULATION

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ABSTRACT

Media selection is a complex issue that may involve weighing factors such as media features (richness), user characteristics, and tasks. This study examines user perceptions about instant messengers (IM) compared to email (EM). It compares the relation of eight motivation variables with past experience (desktop and wireless) and future use intention (social interactions and work/coursework). Our results, based on a student survey, show that, for this population, frequency of use may predict the adoption of new technology, such as IM, but results in little or no effect on media that already enjoy widespread adoption. Years of media use did not affect IM or EM adoption. This study finds no evidence of a relationship between the availability of wireless access and user perceptions of IM and EM. IM adopters tend to use IM for both social reasons and work/coursework. These users expressed a strong intention for future use of IM. No significant difference was found in expected EM future use between the IM-adopters and non-adopters.

KEY WORDS: electronic mail (EM), instant messaging (IM), Internet service providers (ISP), media selection, media richness

I. INTRODUCTION

Technological advances bring down the cost of personal communication and irrevocably tie modern communication media to our lives. As a result, communicating with friends and colleagues over the Internet is now an integral part of our lives. E-mail communication and SPAM blocking are a major selling point for some Internet Service Providers (ISPs) as they attempt to

attract potential customers. Studies demonstrate that Internet-based communication maintains and even extends personal relationships with others [Parks and Floyd, 1996; 1998].

Similar to other communication channels which vary in response time, delivery formats, ability to transport attachments, detection of recipient's availability, and many other factors, so do communication tools used on the Internet. To illustrate, some online communication tools allow real time communication with rich communication cues, while others do not. The "presence awareness" feature available in most instant messaging (IM) software, for example, goes beyond the capabilities of traditional electronic mail (EM). The only limited presence awareness information available to e-mail is an e-mail receipt. However, this transaction occurs only if the sender requests it and the receiver grants it. Thus, this limited function is hampered if the receiver is unwilling to send such a receipt back.

IM and EM are both primarily text-based devices, but IM adds a richer set of features such as real time communication, presence detection, and graphic emotional icons. Applications for online, real-time communications range from receiving a quick answer to a question to simply saying hello. Some IM software even allows near-instant video capture of the parties involved in a communication session, providing capabilities similar to video conferencing (which largely involves investment in hardware and software), but at virtually no additional cost to most users. However, unlike EM where the communication protocols are now standard, IM software is still largely propriety.

ESTIMATES OF IM USE

Both IM and EM are popular communication tools on the Internet, with IM rapidly gaining popularity. A Gartner report [Grey, 2003] predicts that IM will exceed EM as the preferred communication method by 2006 for both business and consumer. IM is also making its way into the business environment. The AOL's Second Annual Instant Messaging Trends Survey [AOL Service, 2004] found that 27% of the users surveyed use IM in the work place. In addition, 43% of the employed users from the AOL survey say they use desktop IM software to communicate quickly in the work place. With 85 million workplace users, growing at a rate of 35% annually, IM is in the corporate world [Microsoft, 2003]. Studies such as D'Osterman [2003] indicate that IM will likely follow EM's pattern, where people adapt the use of computer-based communication tools to coexist with traditional communication tools like telephone and fax. This combined use of traditional and more recent technology is a good way to make the most effective use of all available communication media.

EMERGENT ISSUES

Two emergent issues about the use of EM and IM are:

1. how users perceive IM as compared to EM, and
2. how the perception changes as the user experience varies.

Research on EM abounds (e.g., [Walther, 1995; Markus, 1994; MaManus et al., 2002]). However, few studies focus on IM. IM offers a different set of capabilities than EM and therefore may result in new uses in different communication contexts. Furthermore, research on communication tools focuses on the organizational context (e.g., [Daft and Lengel, 1986; Kettinger and Grover, 1997; McManus et al., 2002]), neglecting much of use of communication tools for personal reasons. Although media richness theory claims that electronic media possess less richness or interactivity compared to face-to-face meetings it is still unclear in the current literature how different electronic media compare in meeting communication needs and fostering future use.

This paper studies user perceptions of EM and IM use. For these two communication means, the paper explores how previous media experience is related to different communication needs and how the perceived use contexts affect future use intentions. The study draws on existing theories,

such as media richness theory and the social presence theory, to examine the context of these constructs.

II. MEDIA SELECTION LITERATURE

MEDIA RICHNESS

Media richness theory claims that the mechanical characteristics of media (such as speed of communication, visual and audio cues present in the media, and degree of personalization) are likely to affect a user's perceptions of the usefulness of the media, and therefore affect the user's decision of selecting a certain medium for communication [Daft and Lengel, 1986]. Past media richness research (e.g., [Chidambaram and Jones, 1993; MaManus et al., 2002]) ranked communication media, including e-mail, teleconferencing, desktop video conferencing, and face-to-face meetings, on a continuum based on the ranges of communication cues supported in the media. E-mail is typically considered low in media richness, while face-to-face meetings are high in media richness. Sitting between these two extremes are audio conferencing, video conferencing, and EMS meetings in increasing order of media richness. Although IM is not placed on the media richness scale in existing studies, it nonetheless exhibits many interactive features that are closer to videoconferencing or even face-to-face meetings than EM. IM also exhibits features, such as text exchange, similar to leaner media on the media richness scale.

SOCIAL PRESENCE

Social presence refers to the subjective perception of a communication medium's characteristics to foster the social psychological concepts of intimacy and immediacy [Short, Williams, and Christie 1976]. Social presence can be considered a function of a medium's capability to deliver both verbal and non-verbal cues (e.g., gestures, emotional feelings, posture, and responsiveness). According to this theory, communication media (such as face-to-face communication) that present more of these verbal and nonverbal cues will provide higher social presence than those presenting fewer sets of these cues.

Rice studied [1993] seven types of media (face-to-face, telephone, meetings, desktop video and video conferencing, voice mail, text, and electronic mail) and found that EM and voice mail were both ranked low in their social presence compared to other highly interactive forms of communication, such as face-to-face meetings. EM was judged to provide even less social presence than voice mail when it comes to exchanging timely and/or confidential information.

In an educational setting to compare strictly text-based EM and EM with PureVoice attachments, Keil and Johnson [2002] found that the social presence of EM with the attached audio files was perceived to be higher than social presence with text-only EM. In terms of the quality of feedback and usefulness, both types of communication media were considered about the same. Text-only EM, however, was perceived as easier to use than EM with audio attachments.

In terms of perceived service assurance of help desk personnel, Lee, Kim and Lee [2001] found that perceived service assurance is related to face-to-face interactions. Phone calls, although considered to be of more social presence and media richness than e-mail support, were not related to perceived service assurance. Lee et al.'s study concludes that the use of media may very likely depend on the task at hand and can vary from one person to another.

CONVERGENCE OF THEORIES

Both media richness theory and social presence theory imply that media selection is a decision responding to the need of interactivity or acknowledgement of "self" relating to "others" during the course of communication. However, studies showing counter evidence to these theories are also available in the literature. For example, managers of a company were found to use e-mail (low in media richness and little to support social presence) as a rich medium [Markus, 1994]. Leaner media were found to support rich social information among individual communications over time

[Lee, 1994; Walther, 1995]. E-mail's text quality and e-mail software's capabilities allow the users to process and filter more information than PureVoice, a medium considered richer in features than e-mail [Keil and Johnson, 2002].

Studies on the relative richness of a medium are inconclusive. For example, video technology is considered as rich as face-to-face communication in some studies (e.g., [Valacich et al., 1994]), while no significant effect is found in others [Meadar, 1995].

Carlson and Davis [1998] stated that the contradicting results in the literature may be due to:

1. incorrect placement of electronic media on the media richness/social presence scale when compared with traditional communication media (such as face-to-face and phone calls),
2. differences in the importance of some criteria in different situations (for example, low equivocality tasks allow users to choose from low equivocality media as well as from high equivocality media),
3. perceptions and experience with certain communication media changes over time, and
4. differences in research methods.

From a pragmatic view, a certain communication medium is chosen for many reasons, such as cost, availability, the amount of time available to perform the task, or the complexity involved in the communication needs [MaManus et al., 2002]. In addition, King and Xia [1997] found that the user's past experience with a medium also played an important role in the user's future intention of using such media. We anticipate that both supporting and contradicting findings of media richness and social presence will still be uncovered for the years to come. The literature seems to agree on the concept that media selection depends not only on the media features (such as richness and interactivity), but also on the user characteristics and on the types of communication needs. One promising line of research (e.g., [Wilson, 2003]) is studying how media support different aspects of communication needs.

III. CONCEPTUAL MODEL

Media richness and social presence theories indicate that different media may require different levels or types of user interaction, which affects the communication quality and shape user experience with a particular medium. The selection of media for future use may also depend on a user's perception of the uses of the media. Individual users may find a different communication medium most suitable for a given communication need at a given time. Therefore, richness of a medium does not solely determine future media selection. Instead, a given medium can be used on a broad range of occasions and for many possible reasons. Table 1 lists several possible motivations for media use suggested in the literature.

Table 1. Media Selection Motivations Suggested in the Literature

Media Selection Motivation	Literature
Enjoyment	[Stafford and Stafford, 1996; Hoffman and Novak, 1996]
Personal	[Daft and Lengel, 986]
Social interactions	[Sproull and Kiesler, 1986; Sproull and Kiesler, 1991; Kettinger and Grover, 1997]
Ability to carry out large volume of info.	[Sarbaugh-Thompson and Feldman, 1998]
Speed of information exchange (immediacy)	[Short et al., 1976; Zmud et al., 1990; Kydd and Ferry, 1994]
Ease of use	[Davis, 1989; Keil and Johnson, 2002]
Clarification of ambiguous issues	[Daft and Lengel, 1986; Rice, 1987; Rice and Shook, 1988]
Resolution of disagreements	[Daft and Lengel, 1986; Rice, 1987; Rice and Shook, 1988]

Figure 1. Conceptual Model

IV. HYPOTHESES

Rice [1993] found that the appropriateness of a new medium was weakly associated with use. The social influence model of technology use theorizes that an individual's perceptions on a medium's appropriateness are influenced by both the social context and the user's experience with the medium [Fulk et al., 1990]. The main premise derived from these studies is that prior experience influences the user's perception on media usefulness and their appropriateness in performing certain tasks [King and Xia, 1997]. However, research findings on Internet media use and the user's preexisting experience with the media are mixed. Stafford and Stafford [2001] found that frequency of computer use and frequency of web use were not related to social motivations of web use, but frequency of web use was related to entertainment motivations. Boneva et al. [2001] suggested that frequency of e-mail use has an effect on improved social interactions. Cowles and Crosby [1990] verified factors that affect the extent to which the interpersonal relationships are developed through the use of technology and may include the media characteristics (interactivity), and user experience with the technology, but the results were mixed for both videotext and teletext.

As users develop their impression of certain media through use, it is likely that this use becomes part of their experience with these media. Experience is the basis for forming judgments to compare and select media for future use. This experience can be achieved through frequent use or through years of use. To summarize, we develop the following hypotheses regarding the effect of experience on the motivations to use IM and EM.

Hypothesis 1: Previous media experience is associated with the motivations to use IM and EM.

Hypothesis 1a: Years of experience is associated with the motivations to use IM and EM.

Hypothesis 1b: Frequency of use is associated with the motivations to use IM and EM.

Users accumulate direct experience with a medium through use, but the process of obtaining use of certain media could come with extra cost. For example, desktop IM and EM are relatively low cost to the end-users, because of the availability of low or no cost IM and EM clients on the market. However, most wireless devices (e.g., cell phones and PDAs) require a separate subscription to the Internet services in order to use IM and EM. Even with the availability of IM and EM on wireless devices, the user interfaces of the software are not comparable to their desktop counterparts. Limited screen size, graphic capabilities, and confined data entry

capabilities are all constraints that may not result in a pleasant communication experience. Furthermore, the novelty of these Internet services on wireless devices could also affect the user perception of IM and EM. Therefore, the following hypothesis is developed to assess attitudes of wireless users (and non-users) toward the motivations to use IM and EM.

Hypothesis 2: Experience with wireless IM or EM is not associated with the motivations to use IM and EM.

The effectiveness of communication can be enhanced if the capabilities of the media can match the nature of work or task at hand [Tushman, 1977]. Matching media richness with information communication needs is found to improve perceived effectiveness of the media and future media use [Daft, Lengel and Trevino, 1987; Rice, 1992]. In predicting e-mail use in an interorganizational context, Kettinger and Grover [1997] found that perceptions of e-mail as low social presence (e.g., cold, not sociable, and impersonal) inhibited future use of e-mail for social reasons.

Evidence in the more recent literature shows that communication media are not only used for work related tasks, but also used for social reasons. For example, Boneva, Kraut, and Frohlich's [2001] found that e-mail is often used for building or extending personal relationships. Based on the above discussions, perceived benefits may be associated with future use intention. In Hypotheses 3 and 4, we posit that the motivations to use IM and EM are associated with future use intention in different use contexts (social interactions and work/coursework).

Hypothesis 3: Use motivations will be associated with future use intention in general.

Hypothesis 3a: Users considering IM to be a better communication tool will continue to use IM rather than EM in general.

Hypothesis 3b: Users perceiving IM to be of lesser importance than EM will continue to use EM rather than IM in general.

Hypothesis 4: Users perceiving more reasons to use a communication medium will continue their future use of the medium even in different communication contexts.

Hypothesis 4a: Users perceiving IM (EM) to be of greater benefits will continue their use of such medium for social interactions.

Hypothesis 4b: Users perceiving IM (EM) to be of greater benefits will continue their use of such medium for work/coursework.

V. RESEARCH METHOD

To test the hypotheses, data were collected from undergraduate Internet users who used both IM applications and e-mail. The instrument, shown in Figure 2, was a custom-designed questionnaire containing mostly Likert-scale questions. Four hundred seventy-six undergraduates from a large Midwest university voluntarily participated in the study. Participants were students enrolled in a MIS course. No monetary incentives or bonus credits were provided as inducements to participate. The survey was conducted within a one-week period in January, 2003. Each of the survey's administrators received detailed instructions regarding the procedure. Before the survey, a standardized announcement was made to the subjects, and written instructions were also given to each participant. A total of 476 responses were received.

Items for the Comparison of IM and EM	
I enjoy instant messaging more than e-mail.	5(SA)---4(A)---3(N)---2(D)---1(SD)
Instant messaging is more personal than e-mail.	5(SA)---4(A)---3(N)---2(D)---1(SD)
Instant messaging is better than e-mail for social interaction.	5(SA)---4(A)---3(N)---2(D)---1(SD)
Instant messaging allows me to communicate more information than e-mail.	5(SA)---4(A)---3(N)---2(D)---1(SD)
I feel that instant messaging conveys a large amount of information faster	5(SA)---4(A)---3(N)---2(D)---1(SD)
Instant messaging is easier to use than e-mail.	5(SA)---4(A)---3(N)---2(D)---1(SD)
Instant messaging is better than e-mail for clarifying ambiguous (hard to understand) issues	5(SA)---4(A)---3(N)---2(D)---1(SD)
Instant messaging is better than e-mail for resolving disagreements	5(SA)---4(A)---3(N)---2(D)---1(SD)
Experience and Purpose of Use	
I use e-mail frequently	5(SA)---4(A)---3(N)---2(D)---1(SD)
I use instant messaging frequently	5(SA)---4(A)---3(N)---2(D)---1(SD)
Years of e-mail experience	
Years of instant messaging experience	
Have you used wireless instant messaging?	Yes No
Have you used wireless e-mail?	Yes No
I use e-mail mainly for	Work (study); Personal Use; Both
I use instant messaging for	Work (study); Personal Use; Both
For social interactions, I prefer to use	E-mail; Instant Messaging
For work or coursework related interactions, I prefer to use	E-mail; Instant Messaging
Future Use	
In the future, I will use instant messaging more than e-mail.	5(SA)---4(A)---3(N)---2(D)---1(SD)
In the future, I will use e-mail more than instant messaging	5(SA)---4(A)---3(N)---2(D)---1(SD)
Other Data	
Gender	
Do you have your own computer?	Yes No
How many hours do you use computer per day?	
How many days do you use computer per week?	
Major field (concentration)	
Minor field	
Status	Freshman, Sophomore, Junior, Senior

Figure 2. Questionnaire

Based on the conceptual model outlined in Figure 1, variables are operationalized for three groups: (1) media experience, (2) motivations to use media, and (3) future use intention. The media experience group includes questions to measure user media experience of IM and EM in the following areas: (1) years of experience, (2) frequency of use, and (3) use experience in the wireless environment. The motivations group contains eight questions (the first eight questions in Figure 2) comparing preferences of using IM and EM for the eight media selection motivations in Table 1. The future use intention group includes two items measuring future intention to use EM more than IM (and IM more than EM.)

MISSING VALUES

An analysis of missing values indicates that the missing values for the experience variables of both EM and IM did not appear at random (Little's MCAR test, $\chi^2 = 154.22$, $df=102$, $p = .001$). In addition, the high regression correlations ($p = .60$) and EM correlations ($p = .62$) from the SPSS missing value procedure both indicate that the processes of missing values in years of IM and EM experience affect one another. Therefore, it is likely that the missing values were due to respondents' lack of IM and EM experience. Since this study concerns the IM and EM past experience and current usage patterns, seventeen questionnaires with heavy missing data on the experience variables were discarded. The resulting valid cases were 459.

THE SAMPLE

The final data set is approximately balanced by gender, with two hundred and thirty nine (239) males and two hundred and nineteen (219) females. One respondent declined to reveal his or her gender. The respondents' e-mail experience, measured as the number of years that they used e-mail, ranged from one to 16.5 years, with a mean of 5.8 and a standard deviation of 1.8 years. Their IM experience was also measured as the number of years of claimed IM use. The results ranged from less than one year to, in one case 10 years with a mean of 4.2 and a standard deviation of 1.85 years. The respondents are primarily in their early twenties, as 293 are sophomores 72 are juniors and 76 are seniors. The rest of 18 respondents did not report their academic status. Most students are full-time undergraduate college students without practical experience, while some (15) are part-time students with some working experiences.

VI. ANALYSIS AND RESULTS

MEASUREMENT OF PERCEPTIONS

As previous sections suggest, selection of a certain medium depends on the use contexts and motivations to use. The first eight questions in Figure 2 were designed to assess user preferences of using IM (or EM) for the following eight motivations¹.

- enjoyable experience
- personal flavor,
- social interaction
- amount of information exchange,
- speed of information exchange,
- ease of use,
- issues clarification,
- resolution of disagreements

The reliability index for the eight-item measure for the perceptions of IM/EM for the eight motivations, as measured in Cronbach's alpha, was 0.79. These eight items were factor analyzed and the result showed a single factor structure.

EXPERIENCE VARIABLES

The data were analyzed using canonical correlation analysis to test the relationships between the four experience variables

- years of EM experience,
- years of IM experience,
- frequent EM user, and
- frequent IM user

¹ Table 1 lists the studies that recommend using these items.

and the eight motivation variables given in the previous subsection. The results in Table 2 show two canonical functions with moderate-to-high canonical coefficients (.61 and .30). Although a canonical coefficient is a estimate of the strength of the linear relationship between the two sets of variables (canonical variates), it does not show the amount of variance shared by the two sets of variables. The large canonical coefficients could be an indication of an artifact of the analytical procedure and not an indication of a strong association between the two sets of variables [Lambert and Durand, 1975]. Therefore, the redundant index was also calculated for the two canonical variates of each canonical function. Even though both canonical functions are statistically significant, the second canonical function shows very low redundancy indices for its two canonical variates (.08 for the experience variables and .04 for the perception variables). The low redundancy indices imply little shared variance among the two canonical variates, and the second canonical function can be of little practical significance [Hair et al., 1998]. For this reason, the second canonical function is, dropped from further discussions.

Table 1: Canonical Correlation Analysis - The Effects of Experience Variables on Motivation Variables

	Canonical Loadings		Cross Loadings	
	Func. 1	Func. 2	Func. 1	Func. 2
Experience variables				
Years of EM experience	-.15	-.52	-.09	-.15
Years of IM experience	-.01	-.01	-.01	-.00
Frequent EM user	-.03	-.83	-.02	-.25
Frequent IM user	-.96	-.07	-.59	-.02
Redundancy coefficient	.16	.08		
Motivation variables				
IM is more enjoyable than EM	-.95	.06	-.58	.02
IM is more personal than EM	-.38	-.22	-.23	-.06
IM is better than EM for social interaction	-.68	-.53	-.42	-.16
IM allows more information to be communicated than EM	-.32	.36	-.20	.11
IM allows faster information exchange than EM	-.43	.37	-.20	.11
IM is easier than EM to use	-.48	.24	-.30	.07
IM is better than EM for clarifying ambiguous issues	-.17	-.26	-.10	-.08
IM is better than EM for resolving disagreements	-.31	-.32	-.20	-.10
Redundancy coefficient	.19	.04		
Canonical correlation coefficient	.61	.30		
χ^2	253.46	49.25		
d.f.	32	21		
P(χ^2)	.00	.00		

Func. = function

A cross-loading value reflects a variable's correlation with the canonical variate for the other set of variables. Lambert and Durand suggested a minimum acceptable cross-loading value of .30 to justify the significance of variables in canonical functions. Using cross-loading values greater than .30 as the minimum, the first canonical function shows that "Frequent IM user" was significantly related to three motivations: "IM is more enjoyable than EM," "IM is better than EM for social interaction," and "IM is easier than EM to use". Years of experience (in IM or EM) did not appear to play a significant role in affecting a user's perception of IM versus EM for the eight motivations.

HYPOTHESIS 1

The first hypothesis posits that previous experience (in the forms of years of experience and frequency of use) is associated with user preferences in using IM or EM for the eight motivation variables. The canonical correlation analysis presented in Table 2 shows one canonical function, which confirms the relationship between frequent IM user and three use motivations (enjoyment, social interaction, and ease of use). Specifically, hypothesis 1a, which posits an association

between years of experience and use motivations, was rejected because such an association was not confirmed in the canonical function. However, hypothesis 1b, which posits an association between frequency of use and use motivations, was supported. Therefore, hypothesis 1 is partly supported.

HYPOTHESIS 2

The second hypothesis posits that the experience with wireless IM and EM will not impact the motives of using IM over EM. The respondents were classified into four groups, (1) users of wireless IM, (2) non-users of wireless IM, (3) users of wireless EM, and (4) non-users of wireless EM. As Table 3 shows, 335 (73.10%) respondents never either wireless IM or wireless EM, 35 (7.60%) used wireless previously, IM, 23 (5.00%) used wireless EM previously, and 65 (14.20%) had used both.

Table 2: Cross-Tabulation of Wireless IM and EM Use

			Used Wireless EM Previously		Total
Used Wireless IM Previously	No	Count	No	Yes	
			335	35	370
		% within Wireless IM	90.5%	9.5%	100.0%
		% within Wireless EM	93.6%	35.0%	80.8%
	Yes	% of Total	73.1%	7.6%	80.8%
		Count	23	65	88
		% within Wireless IM	26.1%	73.9%	100.0%
		% within Wireless EM	6.4%	65.0%	19.2%
		% of Total	5.0%	14.2%	19.2%
Total		Count	358	100	458
		% within Wireless IM	78.2%	21.8%	100.0%
		% within Wireless EM	100.0%	100.0%	100.0%
		% of Total	78.2%	21.8%	100.0%

MANOVA (Table) was conducted to analyze the wireless users and non-users vs. the first eight motivation variables in Figure 2. The dependent variables include the eight variables that measure the motivations of using IM versus EM. Two dichotomous variables, use of wireless EM and use of wireless IM were used as independent variables, thereby creating the four use categories stated in the previous paragraph. All four multivariate tests of significance (Pillais, Hotellings, Wilks, and Roy) indicate that the interaction effect is not significant, which indicates that the differences between types of wireless IM users and types of wireless EM users are roughly equal across the eight motivation variables. An examination of the main effects from the two independent variables (Table 4) shows that they are also not significant. Therefore, the second hypothesis cannot be rejected.

Table 4. MANOVA Table for Wireless Use of IM and EM

Effect	F-Value	P-Value
Use of wireless EM	.98	.45
Use of wireless IM	.82	.58
Interaction effect (use of wireless EM * use of wireless IM)	.76	.64

HYPOTHESIS 3

To examine Hypothesis 3, the respondents were divided into the following two groups using the eight motivation variables (see the first eight Likert-like variables in the questionnaire) as the classification variables for the clustering procedure.

1. Those that responded less favorably to IM compared to EM on all eight motivation variables and
2. Those that responded favorably to IM.

Table 5 shows the final cluster centers (means of the standardized variables for each cluster) for the two resulting clusters. Considering the group memberships shown in Table 4, the first cluster consisted of 209 respondents who were neutral or less favorable towards IM for all eight classification variables. Therefore, the cluster was named the "IM non-adopters". Two hundred and thirty nine (239) respondents were grouped into the second cluster, due to their high ratings on IM for the eight classification variables. The second cluster is labeled "IM adopters". Some respondents were not classified into the two groups due to missing data in classification variables. As Table 5 shows, all eight classification variables were significantly different between the two groups ($p < .01$ for all classification variables). Members in the IM non-adopters group were assigned a group membership value of 1, whereas IM adopters were assigned 2 as their group membership value for further analyses.

Table 5. Cluster Analysis of Comparative Perceptions on IM vs. EM

	IM Non-adopters	IM Adopters	F	Sig.
IM is more enjoyable than EM	3.08	4.32	179.87	.00
IM is more personal than EM	3.14	4.13	132.75	.00
IM is better than EM for social interaction	3.60	4.38	135.63	.00
IM allows more information to be communicated than EM	2.63	3.89	219.29	.00
IM allows faster information exchange than EM	2.81	3.94	167.00	.00
IM is easier than EM to use	3.07	3.79	73.06	.00
IM is better than EM for clarifying ambiguous issues	2.77	4.05	214.33	.00
IM is better than EM for resolving disagreements	2.92	3.97	140.24	.00

Profiling Analysis

To understand the differences between the two groups of respondents further, a profile analysis was performed. The goal of this analysis is to examine the characteristics of the two respondent groups to explain how they differ on dimensions relevant to this study. Hair et al. [1998] recommended that the profiling variables are not previously included in the cluster procedure and these variables typically are demographic characteristics, psychographic profiles, and consumption patterns. We included gender and future use intentions to profile the two groups.

Future use intention was measured in two categories:

1. future use intention in general, and
2. context of use.

For the general future use intention, we provided the respondents two statements:

1. I will use IM more than EM in the future, and
2. I will use EM more than IM in the future.

The two statements measure the user's preference on each of the media. Context of use was split into: (1) social interactions and (2) work/coursework. The goal of these four variables is to assess future use intention with (and without) preset conditions of use. 6 shows the means and standard deviations of the five profiling variables.

Table 6. Means and Standard Deviations of Profiling Variables

	Type of users	N	Mean	Std. Deviation
Gender	IM non-adopters	209	1.52	.50
	IM adopters	238	1.44	.50
IM (or EM) use for social interactions**	IM non-adopters	207	1.75	.43
	IM adopters	238	1.95	.21
IM (or EM) use for work***	IM non-adopters	208	1.03	.17
	IM adopters	236	1.16	.36
Future use of IM more than EM ⁺	IM non-adopters	208	2.62	1.00
	IM adopters	239	3.64	1.09
Future use of EM more than IM+	IM non-adopters	208	3.58	.98
	IM adopters	239	2.87	1.07

* Gender is encoded as males being 1 and females being 2. Thus, 1.5 would indicate equality of the genders

** A categorical variable with 1's being "preference of using EM for social interactions," and 2's being "preference of using IM for social interactions."

*** A categorical variable with 1's being "preference of using EM for work/coursework," and 2's being "preference of using IM for work/coursework."

+ A 5-point Likert-type variable with 5 being "strongly agreed" and 1 being "strongly disagreed".

Logistic Regression Analysis

Table 7 shows the result of analyzing the data as a logistic regression. The dependent variable was the two user groups: IM non-adopters and IM adopters. The independent variables include (1) the gender variable and the (2) four variables measuring future use intention. The overall classification accuracy was 70%, indicating an acceptable classification. The Cox and Snell R^2 was .24. Even though this type of R^2 is comparable to the R^2 measure in multiple regressions, it, however, does not reach the maximum value of 1. Nagelkerke's R^2 modifies the Cox and Snell R^2 to have the range of 0 to 1. Nagelkerke R^2 in this current study was .32. In addition, the nonsignificant Hosmer and Lemeshow test ($\chi^2 = 2.81$, $df=8$, $p=.95$) shows that there was no statistically significant difference between the observed and predicted classifications. Furthermore, the Chi-square test for the reduction in the $-2LL^2$ value from the base model was statistically significant at the .00 level ($\chi^2 = 118.44$, $df=5$, $p<.00$).

As Table 7 shows, the two user groups were consistent in the composition of the two genders. The two groups differ in all future use variables except one: future use intention of EM more than IM. Combining the data in Table 6 and Table 7, the IM adopters group appeared more likely than the IM non-adopters to use IM not just for social interactions, but also for work/coursework. They tended to continue this use pattern to the future.

² -2LL stands for -2 log likelihood and is calculated as -2 times the log of the likelihood value. It is the overall measure of goodness-of-fit in the logistic regression model.

Table 7. Logistic Regression for the Two User Groups

	B*	S.E.	Wald**	df	Significance
Gender	-.25	.22	1.26	1	.26
EM (or IM) use for social interactions	1.34	.38	12.32	1	.00
EM (or IM) use for work	1.35	.49	7.51	1	.00
Future use of IM more than EM	.70	.13	28.20	1	.00
Future use of EM more than IM	-.12	.14	.82	1	.37
Constant	-5.25	1.19	19.41	1	.00
-2LL (-2 Log Likelihood)	491.00				
Goodness of fit	426.92				
Cox & Snell – R ²	.24				
Nagelkerke – R ²	.32				
Overall classification accuracy	70.00%				

* Logistic coefficients are the weighting factors for independent variables for their discriminatory power. These are similar to regression weights.

** Wald statistic in logistic regression is a test used to represent the significance of the logistic coefficients.

Hypothesis 3 posits that use motivations will be associated with general future use intention, but Table clearly indicates that IM adopters tend to continue their future use of IM. A difference between the two groups of users was not observed for future EM use. Therefore, the third hypothesis is partially supported.

HYPOTHESIS 4

Hypotheses 4 posits that users perceiving more reasons to use a communication medium will continue their future use of such a medium even in different communication contexts. In this study, we considered two types of communication contexts: social interactions and work/coursework. Therefore, two sub-hypotheses were posited for the two communication contexts. The two logistic coefficients in Table indicate that IM adopters tended to use IM for both social interactions and for work/coursework, while IM non-adopters tended to use less IM (but more EM) in the two communication contexts. Therefore, the fourth hypothesis and its associated hypotheses (4a and 4b) are supported. A brief summary of hypothesis testing results is presented in Table 8.

Table 8. Summary of Hypothesis Testing

Hypothesis	Result
H1: Previous media experience is associated with the motivations to use IM and EM	Partially supported
H1a: Years of experience is associated with the motivations to use IM & EM.	Rejected
H1b: Frequency of use is associated with the motivations to use IM & EM.	Supported
H2: Experience with wireless IM or EM is not associated with the motivations to use IM and EM.	Supported
H3: Use motivations will be associated with future use intention in general.	Partially supported
H3a: Users considering IM to be a better communication tool will continue to use IM than EM in general.	Supported
H3b: Users perceiving IM to be of lesser importance than EM will continue to use EM than IM in general.	Rejected
H4: Users perceiving more reasons to use a communication medium will continue their future use of the medium even in different communication contexts.	Supported
H4a: Users perceiving IM (EM) to be of greater benefits will continue their use of such medium for social reasons.	Supported
H4b: Users perceiving IM (EM) to be of greater benefits will continue their use of such medium for work/coursework.	Supported

VII. DISCUSSION

This study found limited support for the association of individuals' past experience and perceived benefits between the two media: IM and EM. Frequent IM use appeared to be the only experience measure that affected the perception of IM over EM in three areas: social interaction, enjoyment, and ease of use.

Frequent IM users in this study considered IM as a tool for social interactions. Most IM clients operate on a permission basis (where an individual is only added to someone's contact list of IM when the request is granted by the recipients). Therefore, the social interaction aspect of IM use may very likely be to promote or maintain friendship. The enjoyment aspect of IM compared with EM could result from IM's capabilities of displaying smiley, avatars, icons, and even the interactive features, such as Yahoo Messenger's capability of shaking the recipient's window with a push of a short-cut key. The added interactive features of IM allow individuals to build experiences closer to face-to-face meetings, and therefore foster the feel of being connected to people on one's contact list [Ha and James, 1998; Chen and Yen, 2004]. Note, however, that these results are based on a student population in the Midwest U.S. and may not be true for the population as a whole.

This study also shows that IM is considered easier and more enjoyable to use than EM for frequent IM users. One reason that frequent IM users found IM easier to use may be that IM simplifies the communication process and offers a graphical interactions. However, user experience with IM is not consistent due to the sheer number of incompatible IM implementations and disparity in IM protocols. EM's protocols are more standardized than those of IM. Most EM clients operate on a standard set of protocols and users typically do not expect surprises in the form of incompatible e-mail protocols. Compatibility is not yet the case for different IM systems. For example, Yahoo's messenger does not really allow a direct chat connection from MSN messenger. IM protocols are mostly proprietary and not portable across vendors. However, standardization of IM protocols is under way with The Internet Engineering Task Force (IETF) overseeing the standardization process. The "Session Initiation Protocol (SIP)" working group of IETF is charged to continue developing and refining SIP, a text-based protocol for initiating interactive communication sessions for users [Willis and Mahy, 2004]. The "SIP for Instant Messaging and Presence Leveraging Extensions (SIMPLE)" working group focuses on the extension of the SIP protocol for IM interoperability [Sparks and Khartabil, 2004]. The "Extensible Messaging and Presence Protocol (XMPP)" working group develops an XML-based protocol for near real-time messaging and presence [Resnick and Dusseault, 2004]. All these standardization efforts will improve IM technologies to promote compatibility and interoperability for future IM implementations.

The findings in this study indicate that past experiences with media did not play a role in affecting an individual's perception on issues that often appear in organizations: issue clarification, resolution of disagreements, and the volume of communication messages. By assessing differences between EM and IM, the findings disagree with the media richness studies. Instead, the results show that richer media (i.e., IM) is not considered any more useful than the leaner ones (i.e., EM) for issues that require a complex process of involvement. King and Xia [1997] found that individuals tend to consider traditional media (face-to-face meetings, phone calls, and fax) useful, even when new media are introduced. Based on King and Xia's findings, it is likely that when users from our study compared IM and EM on business issues or issues involving much effort to resolve, they subconsciously compare these electronic media with their traditional counterparts and habitually opted for traditional means of resolving complex business issues.

IM adopters responded favorably on their intention to continue IM use in general and in specific environments, such as work/coursework and social interactions. No significant difference was found between the two groups for their future intention to use more EM than IM. Since there was no significant demographic difference between the two groups, it is possible that the IM adopters' interest in IM is sustainable and will continue to grow as the IM technology evolves. One interesting aspect of this finding is that IM adopters will continue their IM use even in the

organizational context. Since the sample includes mostly college students who may work temporarily or in a part-time setting, their IM use at the job implies that IM is making its way into businesses with or without a set policy on the use of IM in the workplace.

To many companies, IM is considered as a nuisance or a security risk, but the bigger problem may lie in federal rules on record keeping [Cunningham, 2003]. The National Association of Security Dealers (NASD) requires that IM records must be maintained for three years [Cunningham, 2003]. The rationale of this ruling is based on Securities and Exchange Commission's (SEC) rule 17-a, which makes record keeping mandatory for certain exchange members, brokers, and dealers, for business related messages transmitted by their employees. However, IM messages, as shown in this study, can be private and for social interactions only. They can also have a mixture of private, social interactions, and even business contents in one series of communications. This type of IM communications poses difficulties in determining whether messages are business related and are subject to the archival requirement set forth by SEC. The same issue also exists in businesses not under NASD and/or SEC supervision. Therefore, a clear policy of IM use is highly recommended to provide guidance for the appropriate and ethical use of company resources.

VIII. LIMITATIONS

As with many studies, this one is also subject to limitations.

1. A given medium can be used on many occasions and for many different purposes. In this study, we examined eight out of many other possible motivations of IM and EM (Table 1). The many possibilities of media use pose a limitation on this study, but at the same time open opportunities for future research. For example, even though the capability of delivering presence information is a unique feature of IM, EM is also increasingly used to offer the similar (but limited) feature. Examples include vacation or out of office notice and email receipts to notify the sender when the message is opened. Presence information available in both media certainly appeals to different audiences, but its adoption and use pattern have not received a full attention in the information systems literature. Many IM and EM clients are now bundled with extra services, such as calendar with instant alerts of an event, contact list, personal notes, and file transfers. With low-cost IM and EM clients, these add-on features may likely drive further adoption. This adoption brings about business values to IM and EM software developers, but imposes additional security concerns to other organizations.
2. This study did not collect data on how IM compares with other communication media, such as phone calls, video conferencing, and face-to-face meetings. Due to the short history of IM and the limited research on the motivations to adopt IM from the standpoint of media selection, future research may also look to further examine these issues empirically.
3. The phrasing of the questions appeared in the questionnaire may possibly present a bias toward IM. To avoid this aforementioned bias and obtain impartial result, the authors did put a disclaimer at the beginning of the questionnaire which indicates that the authors have no intention to imply that IM is a better tool and/or technique than EM, or vice versa.

IX. SUMMARY

Past experience is consistently cited as a predictor of future use intention. This article shows that it takes frequent media use for users to appreciate the benefits of new media, such as IM. For existing media that already enjoy a widespread adoption such as EM, experience does not seem to affect their use. This may be partially due to the use of certain media is required for reasons such as (1) availability of the media, (2) widespread adoption of the media, and (3) standardization of the access methods. In this study, EM falls into this latter group with IM standardization soon to be a reality.

New uses of technology are constantly improved with new communication devices being introduced to the market. Wireless access to EM and IM are now available to cell phones and PDAs. Experience with such new uses of existing technology was not found in this study to affect the perceptions of the benefits of IM relative to EM. As indicated in this article, wireless access to EM and IM may bring the convenience of making the technology available. However, we speculate that the limited capabilities of most wireless devices (such as small display screen and cumbersome data entry capabilities) may hinder widespread adoption.

To attempt to decipher the current use pattern and future use intention of IM and EM, this study groups users into "IM adopters" and "IM non-adopters". IM adopters, (i.e., undergraduates who responded favorably to the eight motivation variables (section IV)) , tend to use IM for social reasons and plan to use it for work more than the non-adopters. "IM adopters" also intend to continue their use of IM in the future. However, there was no significant difference in terms of future use intention of EM between the two groups.

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