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Students' Uses and Gratifications for Using Computer-Mediated Communication Media in Learning Contexts

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Students' Uses and Gratifications for Using Computer-Mediated Communication Media in Learning Contexts

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Abstract:

Despite a growing stream of research into the use of computer-mediated communication (CMC) media in higher education, there remains limited understanding about the students' motivations for using CMC alongside non-CMC media within a learning context. This article identifies seven dimensions of motivation from the perspective of uses and gratifications (U&G), including information seeking, convenience, connectivity, problem solving, content management, social presence, and social context cues. It was found that each CMC satisfied different motivations for its use, and that overall CMC best fulfilled information seeking, convenience, connectivity, and content management motivations. This study also identifies a number of similarities and differences between CMC and non-CMC media in terms of the motivations for their use. Finally, the study concludes with a discussion of the implications for Information Systems (IS) researchers, higher education, and organizations.

Keywords: Computer-Mediated Communication (CMC), motivations, Uses and Gratifications (U&G) perspective, e-learning, media choice, Repertory Grid Technique (RGT)

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I. INTRODUCTION

Given the widespread use of computer-mediated communication (CMC) media in higher education and the increasing focus on "student-centric" education, understanding why and how students use CMC media within learning contexts is crucial [Stottinger and Schlegelmilch, 2002]. However, there is a lack of research on the nature of student motivations for using one particular type of CMC over another for communication purposes [Papacharissi and Rubin, 2000; Stottinger and Schlegelmilch, 2002], although a handful of studies acknowledge the importance of understanding the motivations behind students' use of Internet technologies for communication [Alavi and Leidner, 2001; Bures et al., 2000; Metzger et al., 2003; Papacharissi and Rubin, 2000; Pena-Shafe et al., 2005; Shih et al., 2008; Watson-Manheim and Belanger, 2007]. A good number of studies provide insights into the nature of CMC and/or the motivations for using CMC [e.g., Baltes et al., 2002; DeSanctis and Poole, 1994; Dimmick et al., 1994; Dimmick et al., 2000; Dobos, 1992; Garramone and Anderson, 1986; Rice, 1987; Sproull and Kiesler, 1986; Stafford, 2005; Steinfield, 1992; Sun, 2008; Walther, 1997]. However, most studies are conducted within either organizational or general public contexts, rather than in a learning context and/or from a student's viewpoint. Existing research suggests that motivations for communication are related to a specific context, since the need for communication in different contexts may vary [McCreadiea and Rice, 1999; Perse and Courtright, 1993; Ruggiero, 2000; van de Wijngaert and Bouwman, 2009; Westmyer et al., 1998]. Therefore, it would be inappropriate to simply adopt motivations identified from existing studies into the learning context of students. According to the literature [McCreadiea and Rice, 1999], the students' motivations for using CMC for communication may also be different across different contexts, such as learning, personal life or professional contexts. Thus, if we want to take the full potential of CMC to improve student learning, it is important to know with whom they communicate, why they communicate, and how they communicate with a particular communication medium in their learning contexts [Graham et al., 1993], rather than in their personal or professional communication contexts. However, research examining the motivations of students for using CMC in a learning context has not kept pace [Kuehn, 1994; Metzger et al., 2003]. Kuehn's [1994] note that "indeed, it is somewhat ironic that many of the studies cited above examined computer communication variables using college students, often in classroom situations using computer-assisted instructions" (p. 172) still holds true today. Given the merit of CMC in higher education teaching and learning, finding ways of implementation and effective use is crucial [Breen et al., 2001]. However, without a better understanding of the motivations for using CMC within a learning context from the perspective of students, who are the customers of higher education [Stottinger and Schlegelmilch, 2002], little will happen to accomplish this goal. This study, therefore, attempts to address this gap.

As one of the dominant paradigms for explaining media use in the field of communication studies, the Uses and Gratifications (U&G) perspective has been employed increasingly to examine the motivations for public use of the Internet in general and various CMC media such as discussion forums, e-mail, the Web (WWW), and Instant Messaging (IM) in particular [e.g., Dimmick et al., 2000; Dobos, 1992; Flaherty et al., 1998; James et al., 1995; Jeffres and Atkin, 1996; Kaye and Johnson, 2002; Kaye and Johnson, 2003; Kim and Johnson, 2006; Ko et al., 2005; LaRose et al., 2001; LaRose and Eastin, 2004; Lin, 2001; Papacharissi and Rubin, 2000; Parker and Plank, 2000; Perse and Courtright, 1993; Stafford, 2005; Stafford and Stafford, 2001; Stafford et al., 2004; Vicent and Basil, 1997; Walther and Hancock, 2005]. The proponents of U&G view individuals as purposive and active, specifying that individuals select media to fulfill their various needs or motives [Flanagin and Metzger, 2001; Katz et al., 1974]. The U&G perspective shifts its focus of inquiry from what the media do for users, to assessing what users want from the media for communication by examining consumer motivations and consumption of media [Klapper, 1963; Rubin, 2002; Ruggiero, 2000]. This technique is considered to be a very useful "why and how" approach to understanding the motivations for media use, especially the use of Internet-based communication media, because of the Internet's media-like characteristics [Katz, 1959; Ruggiero, 2000; Stafford et al., 2004].

According to the U&G perspective, communication media are different, not only because of the objective characteristics, but also because of the needs that they are typically perceived to gratify [Lichtenstein and Rosenfeld, 1983; Lichtenstein and Rosenfeld, 1984]. Perse and Courtright [1993, p. 486] defined the "normative image" of a communication medium as "widely shared perceptions about a medium's typical usage." Prior research shows that there are normative images with various media, since some media are better than others for satisfying different communication needs [Flanagin and Metzger, 2001; Lichtenstein and Rosenfeld, 1983; Lichtenstein and Rosenfeld, 1984; Perse and Courtright, 1993]. At the same time, various media may provide "functional alternatives," since they may fulfill similar needs and have similar normative images [Elliott and Quattlebaum, 1979; Flaherty et al., 1998; Katz et al., 1973; Lichtenstein and Rosenfeld, 1983; Lichtenstein and Rosenfeld, 1984; Perse

and Courtright, 1993]. Furthermore, earlier studies demonstrate that normative images vary across cultures and time, resulting in changes in the helpfulness of different media for satisfying communication needs [Flanagin and Metzger, 2001; Katz et al., 1973; Lichtenstein and Rosenfeld, 1983; Lichtenstein and Rosenfeld, 1984; Perse and Courtright, 1993]. However, those studies were conducted almost a decade ago and did not include newly developed CMC media, such as IM, forums, and social networking sites (SNS). As Flanagin and Metzger note, “the normative images of relatively new, widely used, and rapidly changing technologies are evolving quickly, resulting in ambiguities surrounding the choices and use of new technologies” [Flanagin and Metzger, 2001, p. 159].

Thus, given the wide adoption of CMC media in learning contexts, coupled with the complex interdependence of communication media on each other and the accelerating functions of newer communication media, by employing the U&G approach, this study not only examines students’ motivations (i.e., uses and gratifications for, and needs satisfied from, using CMC media in a learning context),¹ but also reassesses the normative images of CMC media, along with traditional media in a contemporary media environment, and examines whether “the certain increase in use of the technology for communication will influence the functional images of this medium” [Perse and Courtright, 1993, p. 499]. Our focus is on the use of CMC for the purpose of communication in a learning context. Any reference to media use in this study relates to its use for communication in a learning context.

Since we hope to understand the unconstrained views for the reasons of using CMC by students within a learning context, a method that avoids the use of a *priori* adoption of a theoretical framework is warranted. Therefore, we employed Kuehn’s [1994] two-stage research approach for U&G profile development in a comprehensive examination of students’ motivations. The first stage involved the qualitative elicitation of student needs to be fulfilled by a variety of media through in-depth interviews of fifteen university students. This stage not only developed a set of unique constructs (motivations/needs) that students wished to fulfill when communicating, but also generated deep and less-biased views of student perceptions toward CMC. To that end, we identified nine commonly used media and thirty-one relevant unique motivation items for using these media for communication within student learning contexts. In the second stage, we placed all the unique motivation items identified in the first stage into a survey to empirically identify the dimensions of motivation to examine which communication media were being used for fulfilling similar needs, and to explore student perceptions and use of various CMC, as well as individual needs to be fulfilled by these CMC media. Some detailed comments recorded in first stage about the constructs and their underlying meanings were incorporated into our survey data analysis. To be more specific, we hoped to gain insights into the following research questions:

- RQ1: What are the student motivations for using media for communication in a learning context?
- RQ2: Which media are perceived by students as functional alternatives (share the same motivations) for the purpose of communication in a learning context?
- RQ3: Which media are rated most highly for satisfying various student motivations for communication in a learning context?
- RQ4: Which student motivations does each medium fulfill best in a learning context?

We believe that knowledge about what students want and how they benefit from using CMC in a learning context will be useful for university policy-makers regarding the implementation of CMC media for student learning. It would also assist our educators in finding ways to effectively accommodate various CMC media in their teaching to meet various student needs [Shroff et al., 2007]. Since today’s university students will be tomorrow’s business executives, they are expected to carry their perceptions of the media with them into the workplace. Thus, understanding their use of various CMC media in a learning context, as well as their needs to be fulfilled, is of importance for a rigorous examination of the development, use, and social effects of new information technologies [Flanagin and Metzger, 2001].

To accomplish this objective, in the following section, we first briefly describe CMC and its implications for the learning context. The next section focuses on media choice theories and the uses and gratifications approach applied in this study. Subsequent sections describe the methods and samples, the results, and a discussion of the implications of the findings in terms of the new media environment in the university context.

II. CMC MEDIA CHARACTERISTICS AND IMPLICATIONS IN A LEARNING CONTEXT

For the purpose of this study, CMC media refers to computer-based systems that enable individuals to communicate with others [Rice et al., 1990]. Common applications of CMC are e-mail, discussion forum, audio/video-conferencing,

¹ In this study, individual motives, motivations, and needs to be fulfilled for communication are used interchangeably.

whiteboard, news group, SNS, chat rooms, IM, groupware, the Web,² and other forms where communicating is the primary intent. This study focused on e-mail, IM, the Web, forum, and SNS. For the purpose of this study, non-CMC media used in a learning context include face-to-face (FtF), telephone, mobile, and Short Message Service (SMS). The definitions and reasons for examining these nine communication media in this study are explained in Table 3 and the Methodology section.

Prior studies present many ways to characterize CMC and non-CMC media. For instance, Rice [1987] charts media based on (1) constraints on users (physical character limits), (2) bandwidth (diversity of communication cues), (3) interactivity (exchangeability of sources and receivers), and (4) network factors (facilitation of information flow for groups). Clark and Brennan [1991] categorize media on the basis of eight constraints: (1) co-presence (share the same space), (2) visibility (communicators can see one another), (3) audibility (communicators can hear one another), (4) cotemporality (message can be received without delay), (5) simultaneity (message is produced and received at the same time); (6) sequentiality (communicator's turn cannot be taken); (7) reviewability (message can be reviewed later); and (8) revisability (message can be revised before sending out). Dennis and Valacich [1999] classify media on the basis of five characteristics: (1) immediacy of feedback (the extent to which a medium enables users to give rapid feedback on the communicators they receive), (2) symbol variety (the number of ways in which information can be communicated), (3) parallelism (the number of simultaneous conversations that can exist effectively), (4) rehearsability (the extent to which the media enable the sender to rehearse or fine tune the message before sending), and (5) reprocessability (the extent to which a message can be reexamined or processed again within the context of the communication event). Dennis and Kinney [1998] further explain that there are two types of feedback: concurrent and sequential, in which concurrency refers to simultaneity. Message granularity (the size of transmission) is another important but overlooked characteristic of communication media [Cherny, 1999]. Scott and Rockwell [1997] divide communication media into two-way interactive and one-way noninteractive, depending on the direction of communication. Other literature refers to two-way communication as mutual discourse [e.g., Rice and Love, 1987; Williams et al., 1988]. Lin [2003] names the multifunctional feature of CMC media as transmutability (the ability to transmute from one communication modality into another one). Jeong and Fishbein [2007] suggest that some media allow users to multitask, which refers to combining their media use with other activities. Carte and Chidambaram [2004] include the electronic trail (which helps record and retrieve relevant information) as one of the major additive capabilities of collaborative technologies. On the basis of Rice's [1987] chart, Table 1 presents some of the more salient characteristics for the media discussed in this study, as well as the extent to which each feature is present across all media examined. In several cases, media are listed as having a different degree of capability, since they are configurable (e.g., some IM applications allow you to have your personal space for storage, and some IM applications do not have this feature) [Dennis and Valacich, 1999; Rice, 1987].

The characteristics that distinguish CMC from non-CMC media, specifically the ability to enhance communication, participation and teamwork, have made it possible to use CMC as a technology to improve learning outcomes [Tolmie and Boyle, 2000]. There is no doubt that the implementation of CMC media has significantly changed the ways that educators teach students, as well as the ways that students learn. The use of CMC in teaching and learning has allowed more communication between and among students and instructors, leading to a more in-depth learning [Harasim et al., 1995; Hiltz and Goldman, 2005; Lee Price and Lapham, 2004]. In particular, the A³ features (anytime, anywhere, anybody) of CMC foster the active participation of students in the learning process and enable instructors to continuously improve their teaching process [Ebner and Walder, 2007; Hiltz and Goldman, 2005]. Due to a reduction in social context cues, students can clearly and openly express their opinions without fear and embarrassment [Kim, 2008; Kitsantas and Chow, 2007; Rau et al., 2008]. The asynchronous nature of CMC media gives students enough time to reflect and, hence, an opportunity to form a more cogent response or contribution to class activities [Hew and Cheung, 2008; Lee Price and Lapham, 2003; Thompson-Hayes et al., 2009]. By using CMC, students are also able to gather and modify learning knowledge in a way that satisfies their preferred learning style [Cook, 1998]. Harley et al. [2004] claim that the use of CMC in teaching allows students to repeat classes they have missed or provide an alternative for students with disability or illness, increasing their potential for course communication.

² In this study, the *Internet* and *Web* are not being used interchangeably. *Internet* refers to the physical infrastructure of interconnected computers, cables, and other devices that serves as the infrastructure for global communication. In contrast, the *Web* is defined as a system of computers ("servers"), utilizing graphical user interfaces and is accessed via the Internet, providing access to documents, multimedia files, and websites, that are connected by hyperlinks to other documents, multimedia files, and websites [Metzger et al., 2003]. In this particular study, *Web* refers only to hypertext linked sites and their contents. *Web* is considered as part of Internet applications. Other applications of the Internet include e-mail, instant messaging, ftp, etc.

Table 1: Characteristics of CMC and Non-CMC Media

No.	Characteristics	FtF	Telephone	Mobile	SMS	E-mail	IM	Web	Forum	SNS
Constraints on users (physical character limits)										
1	Able to identify sender*	High	Medium–high	Medium–high	Medium	Low–high	Medium–high	Low	Low	Low–high
2	Have to know address*	High	High	High	High	Medium	Medium	Low	Low	Low–medium
3	Able to overcome receiver’s selectivity*	High	Low-high	Low–high	Low-high	Low	Low	Low	Low	Low
4	Synchrony (or Cotemporality)	High	High	High	Low	Low	Low–high	Low	Low	Low
5	Copresence	High	Low	Low	Low	Low	Low	Low	Low	Low
6	Storage	Low	Low	Low	High	High	Medium–high	High	High	High
7	Revisability (or Rehearsability)	Low	Low	Low	High	High	Low-high	High	High	High
8	Reviewability (or Reprocessability)	Low	Low–high	Low	High	High	Low–high	High	High	High
9	Granularity	Low–high	Medium–high	Medium–high	Low	Low–high	Low-high	High	High	Low–medium
10	Multitasking	Low	Low–medium	Low–medium	Low–medium	High	High	High	High	High
11	Accessibility to the sending system*	Low	Medium	High	High	Medium	Medium	Medium	Medium	Medium
12	Multifunctioning (or Transmutability)	High	Low	Low	Low	Low–medium	High	Low–medium	Low–medium	Medium-high
13	Electronic trail	Low	Low	Low	High	High	High	High	High	High
Bandwidth (diversity of communication cues)										
14	Intimacy	High	Medium	Medium	Low	Low	Low–medium	Low	Low	Low
15	Visibility	High	Low	Low	Low	Low	Low–high	Low	Low	Low
16	Audibility	High	High	High	Low	Low	Low–high	Low	Low	Low
Interactivity (exchangeability of sources and receivers)										
17	Simultaneity	High	High	High	Low	Low	Low–high	Low	Low	Low
18	Sequentiality	High	High	High	Low	Low	Low–high	Low	Low	Low
19	Ability to terminate*	Low	Medium–high	Medium-high	High	High	High	High	High	High
20	Information flow*	One to one, One to many, Many to many	One to one, Many to many	One to one	One to one, One to many	One to one, One to many	One to one, One to many, Many to many	One to many, Many to many	One to many, Many to many	One to many, Many to many
21	Direction of communication	Two-way	Two-way	Two-way	Two-way	Two-way	Two-way	One-way	Two-way	Two-way
* Please refer to Rice [1987] for the definition of these characteristics.										

Despite the usefulness of CMC in improving the effectiveness of teaching and learning, its use in learning does not alone consistently improve student academic performance [Fuller et al., 2006]. One of the major problems is that not all students use the CMC tools that are provided for them [Bures et al., 2000; Leidner and Jarvenpaa, 1993]. For example, a study at the University of North Texas in 2005 demonstrated that students commonly perceived the online components as optional compared to the traditional face-to-face classes [cf. Bromham and Oprandi, 2006]. This highlights a lack of engagement from students when CMC media are incorporated into learning. In their study of

examining the use of CMC media by students as supplements to their face-to-face class meetings, Sturgill et al. [1999] found that some students felt frustrated when required to use CMC media in their learning. Hew and Cheung [2008] also found that some students never participated in the online asynchronous discussion, an asynchronous CMC medium, or procrastinated in responding to other people's messages, while others contributed postings very sparingly. The authors' own observations indicate that some students are enthusiastic and use CMC media continually in their learning, while others are not interested in it at all or express very low enthusiasm and have minimal involvement.

Motivating students is always a difficult challenge in technology-mediated learning environments [Tao, 2008]. If we really want our students to take full advantage of CMC media to enhance their learning, it is important to understand why some students appear to be motivated to use various CMC media for learning purposes and others are not. In other words, understanding the motivations behind the use of various CMC media by students in a learning context is crucial. A motivation refers to a desire, need, or process that influences an individual's goal-directed behavior [Smith et al., 1982]. Hodges states, "without the proper motivation for students to engage in a learning experience, the otherwise best designed experiences will be unsuccessful" [Hodges, 2004, p. 1]. Similarly, some researchers also indicate that learners' motivations are important influences on learning through CMC [Frankola, 2001; Marett and Joshi, 2009].

III. REASONS FOR CHOOSING AND USING COMMUNICATION MEDIA

Several theories have been developed to explain media use, and related research has compared media on various aspects. This section begins with a brief review of three sets of primary theories derived from Information Systems research and communication research, leading to the explication of the U&G approach, the theoretical foundation for the present study.

Rational Criteria in Selecting Media

The social presence theory was initially proposed by Short et al. [1976] as a means to explain and predict the media selected by communicators, especially in organizations. Social presence is defined as the perceived quality of the medium to transmit the awareness of another person in an interaction; hence the feeling one has that other persons are involved in a communication exchange [Short et al., 1976]. According to the social presence theory, media are arranged along a continuum from low (numerical writing documents) to high social presence (face-to-face interaction), and people choose to use a medium based on the degree to which social presence is necessary for a particular communication task. Rice [1993] found that face-to-face was rated the highest and e-mail was ranked the lowest on the appropriateness for activities theoretically requiring different levels of social presence.

Similarly, the media richness theory, proposed by Daft and Lengel [1984], also suggests that media vary in their capacity to transmit rich information. Communication media are ranked along a richness hierarchy based on criteria such as speed of feedback, the form of language employed (body, natural, and/or numeric), language variety, and personal focus [Daft and Lengel, 1986; Daft et al., 1987]. The media richness theory proposes that individuals seek to match the richness of a communication medium with the complexity of the communication task at hand for better performance. Studies have found that face-to-face communication is described as the richest medium, and, therefore, is the most effective medium for reducing task equivocality, while e-mail and memos, described as leaner forms of media, are preferred for less equivocal tasks [Daft et al., 1987].

As communication media, CMC technologies were described as lacking nonverbal cues. The lack of social presence and information richness affected the nature of interpersonal interaction via the medium [Walther and Tidwell, 1995]. However, other researchers argued for the existence of computer-mediated interaction and lean media being used effectively for social interactions [Rice and Love, 1987; Sproull and Kiesler, 1986]. Also, research shows that much CMC conveys nonverbal cues in terms of chronemic cues. Flanagin and Metzger [2001] found that e-mail was used for social bonding, relationship maintenance, problem solving, and persuasion purposes, indicating that newer forms of media may transcend strict media richness predictions and be used for socioemotional or complex tasks [Fulk and Boyd, 1991; Walther and Burgoon, 1992].

Social Needs in Media Selection

The inconsistent results of rational media selection theories for newer media forms suggest that, although media attributes (social presence and media richness in this case) are important concerns, especially for managers and decision-makers, they should not be our only concern in making sense of communicating [Yates and Orlikowski, 1992]. The rational model of media selection has led to inadequate attention to the social and psychological differences of individuals in which media choice and usage decisions are made. As suggested by some researchers, other factors, such as assessment of need fulfillment, appropriateness, social norms, and peer evaluations of media

[Flanagin and Metzger, 2001], are equally important in the assessment and selection of media, especially for new media.

The social influence model of technology use recognizes that a socially constructed subjective assessment of media influences its usage [Schmitz and Fulk, 1991]. Decisions about media do not occur in a vacuum. Both decision-makers and media are socially embedded within organizational settings, thus, media perceptions and choices are subjective and socially constructed [Fulk et al., 1990]. This theory proposes that social influences such as work group norms, as well as co-worker and supervisor attitudes and behaviors, may positively or negatively influence individual attitudes toward the use of new media [Fulk, 1993; Rice and Aydin, 1991; Schmitz and Fulk, 1991].

Technology Adoption Models

In Information Systems research, a significant body of research has evolved over the last two decades in pursuit of various factors that influence an individual's acceptance and use of information technology and information systems within organizational contexts, resulting in the most influential framework known as the *Technology Acceptance Model* (TAM) [Davis, 1989], with its expansion to "TAM2" [Venkatesh and Davis, 2000], and the Unified Theory of Acceptance and Use of Technology (UTAUT) [Venkatesh et al., 2003].

TAM, one of the most cited and well-known theoretical frameworks [Hirschheim, 2007], is based on a view that perceived usefulness and ease of use of a technology are strongly associated with the acceptance of that technology by potential users, as indicated by their intention to use the technology. According to Davis et al. [1989], the model is an attempt to derive "the determinants of computer acceptance that is general, capable of explaining user behavior across a broad range of end-user computing technologies and user populations, while at the same time trying to be parsimonious and theoretically justified" (p. 985). Parsimony has been one of the key strengths of TAM [Bagozzi, 2007]: perception-intention-usage. Thus, from that beginning TAM focuses on the attitudinal explanations of intention to use a specific technology which, in turn, determines the usage of that particular technology [Schwarz and Chin, 2007]. Over the years, TAM has been augmented to include additional predictors such as computer self-efficacy, computer anxiety, computer playfulness, social influence, technology experience, demographic variables, personal innovativeness, information quality, top management commitment, and system quality for either perceived usefulness or intentions [Bagozzi, 2007; Benbasat and Barki, 2007; Chung and Tan, 2004; Venkatesh et al., 2003]. As a purely deterministic framework [Bagozzi, 2007], TAM and its expanded models have been adopted by many researchers to explain Information Technology (IT) acceptance intention and usage, with over 75 percent explained variance in intention and 50 percent in usage [Schwarz and Chin, 2007; Venkatesh et al., 2003].

Despite its popularity, TAM and its expanded models are not suitable for the present study for several reasons. First, the TAM/UTAUT model has been applied in organizational contexts by examining on-the-job usage choices [Nysveen et al., 2005; Stafford et al., 2004]. Both TAM and UTAUT are frameworks used in explaining whether and how employees will choose to use the communication media already implemented within organizations [Stafford et al., 2004]. Employees may adopt and use the media for communication because of their compliance with organizational goals, a form of normative social influence [Deutsch and Gerard, 1955; O'Reilly III and Caldwell, 1985]. In other words, employees are extrinsically motivated to use certain media for goal attainment and job performance [Guo et al., 2010; Stafford et al., 2004], in which extrinsic motivations refer to doing something because it leads to a separable outcome [Ryan and Deci, 2000]. The present study, however, examines student motivations for using various communication media within a learning context, in which social influence is operationalized in the form of consumer intrinsic motivations, which refer to doing something because it is inherently interesting and/or enjoyable [Ryan and Deci, 2000], for using media to interact with people [Stafford and Stafford, 2001]. Thus, both TAM and UTAUT are not useful in understanding consumers' technology use in consumer markets [Stafford et al., 2004] as different from organizational employees, students have a choice of using any media they want in order to meet their needs. Second, as a deterministic framework, TAM and its expanded models are very useful in predicting media usage [Bagozzi, 2007; Hirschheim, 2007]. However, the present study is not interested in predicting student media usage per se, but in the social and psychological motives that shape why they use the media and what motivates them to select certain media in order to gratify a set of psychological needs. Both TAM and its expanded models are not suitable for exploring this purpose, since TAM-based models treat perceived usefulness and ease of use as a black box by not showing why students perceive a system to be useful in a learning context [Baaren et al., 2009; Benbasat and Barki, 2007; van de Wijngaert and Bouwman, 2009]. Thus, TAM and its expanded models are not appropriate theoretical frameworks to apply for this study.

Uses and Gratifications Approach

Since TAM and its expanded models cannot provide help for us to understand student motivations for using various CMC and non-CMC media in a learning context, we must, therefore, turn to the U&G perspective, "one of the most

important influential theories in the field of communication research” [Lin, 1996, p. 574] but one that has somehow been largely overlooked in addressing the issues of newer and interactive communication technologies [Flanagin and Metzger, 2001; Rubin, 2002; Zhu and He, 2002]. Compared to TAM-based models, which usually have been applied in workplaces, the U&G approach has always been a model of consumer technology uses in consumer markets [Stafford et al., 2004]. In addition, the U&G approach has been widely applied to examine “why and how” consumers use certain media to satisfy their various social and psychological needs [Katz et al., 1974; Lin, 1996; Ruggiero, 2000], and “especially valuable as we seek to understand the newer, interactive media environment” [Rubin, 2002, p. 541].

Consistent with the social influence model, the U&G approach primarily focuses on the needs of media users. It attempts to examine what people do with the media rather than what the media do to people [Flanagin and Metzger, 2001; O’Sullivan, 2000; Stafford et al., 2004]. This approach proposes that users initially base their media selection on their expectations about how well communication media may serve to fulfill their needs, and subsequently on how well those media actually met those needs [Palmgreen et al., 1985]. This approach has been considered a useful framework for exploring why people use one medium over another, and what they obtain [Ruggiero, 2000; Stafford et al., 2004]. Media studies that have taken a U&G approach have focused on a number of media, such as television, VCR, telephone, cable TV, and the Internet [Ruggiero, 2000]. Indeed, the U&G approach has been used to investigate user motivations or reasons for using a particular mediated communication medium whenever a new technology becomes available [Elliott and Orosenberg, 1987]. However, relatively less U&G research has addressed the issues of CMC use in a learning context. The primary focus of this study is, therefore, to fill this information gap.

Motivations for and Needs Fulfilled from Using Media

Derived from mass communication research, the U&G approach provides a user-centered perspective on the relation between users and media. The U&G perspective focuses on explaining the social and psychological motives influencing the selection of certain media by people in order to gratify a set of psychological needs [Katz et al., 1974; Rubin, 1994]. One basic assumption of this approach is that media users are goal-directed in their behavior, and the personal use of media is an active choice made to satisfy needs [Katz et al., 1974]. The second assumption of this approach is that media users are aware of their needs and select the appropriate media to gratify their needs.

The characteristics of active choice of media and user-centered nature make the U&G approach particularly useful for understanding motivations for using the Internet in general, and CMC in particular [Kuehn, 1994; Morris and Ogan, 1996; Ruggiero, 2000]. Numerous studies have applied the U&G approach to the Internet. For example, Garramone and Anderson’s pioneering work [1986] on electronic political bulletin boards indicates that the needs for surveillance, personal identity, and diversion are equally strong influences. Korgaonkar and Wolin [1999] establish five motivations for Web users: escapism, information control, interactive control, socialization, and economics. Papacharissi and Rubin [2000] also develop a scale of Internet usage motives with five primary dimensions: interpersonal utility, pass time, information seeking, convenience, and entertainment. Stafford and Stafford [2001] identify five key underlying dimensions of Web use motivations: searching, cognition, new and unique, socialization, and entertainment. Stafford et al. [2004] identify an important new Internet-specific social gratification, as well as process and content gratifications, as previously found in studies of television. Other new gratification dimensions have included: problem solving, persuading others, relationship maintenance, status seeking, and personal insight [Flanagin and Metzger, 2001]. Collectively, the U&G perspective has been very useful in understanding motivations and needs for using the Internet in general and CMC in particular.

As Internet technologies become more ubiquitous in university student interactions, some important questions are raised: How do students use Internet-based communication technologies in a learning context? Why do they use one technology over another for communicating? Studies focusing on student technology use find that students sometimes have different motivations for using available technologies, compared to the general public [Parker and Plank, 2000]. For example, Vicent and Basil [1997] contend that college students’ use of news media and surveillance needs increases with each year in college. They also assert that increasing surveillance needs results in increased use of all news media. By employing the U&G approach to explore the media habits of college students in the context of the new media, Parker and Plank [2000] argue that students do not abandon traditional forms of media for the Internet. They also find that the key predictors of college students’ online usage are relaxation and escape. Similarly, Ebersole [2000] suggests that high school students use the Internet for research and learning, communicating with other people, accessing to materials otherwise unavailable, entertainment, relieving boredom, for sports and games information, and for shopping and consumer information. Pena-Shafe et al. [2005] contend that the key reasons for students to participate in online discussions include course requirement and feedback from other students.

The studies discussed above, however, examine the motivations for using the Internet in general, although recognizing various functions of the Internet [Parker and Plank, 2000]. In addition, most of these studies examine

Internet motivations with previously defined mass media or interpersonal motive items, instead of identifying the motivations uniquely associated with Internet technologies used by students in learning contexts. People with different interests may have different motivations for using the Internet. For instance, Johnson and Kaye [2003] argue that politically interested users have different motives than the general public and students for going online. Therefore, knowledge of student motivations associated with CMC media use within learning contexts is an important first step in describing and explaining the use of CMC media in a learning context.

Functional Images of Communication Media

Prior research has demonstrated that various media serve similar needs, i.e., they are functional alternatives, since they have similar normative images [Rubin, 2002]. As Becker suggests, "people seeking a specific gratification from one medium seek that gratification from another medium as well" [1979, p. 72]. Following prior studies [such as, Katz et al., 1974; Lichtenstein and Rosenfeld, 1983; 1984; Perse and Courtright, 1993], Flanagin and Metzger [2001, p. 159] have proposed that the "functional images of media distinguish communication technologies according to their most salient features and uses (i.e., functions)." Both "functional alternatives" and "normative images" of media are the two key components for understanding the functional images of various media [Flanagin and Metzger, 2001]. Previous studies [e.g. Flanagin and Metzger, 2001; Perse and Courtright, 1993] demonstrate the importance of examining the functional images of communication media as such an understanding could "suggest important heuristics for thinking about new communication media as they evolve" [Flanagin and Metzger, 2001, p. 175].

The introduction of widely used and rapidly changing new technologies has no doubt changed the images and uses of new communication media [Perse and Courtright, 1993]. Previous studies suggest that with the change in media environment, the helpfulness of different media for satisfying communication needs may also change [Flanagin and Metzger, 2001; Guo et al., 2008; Perse and Courtright, 1993; Rice, 1993]. For example, Rice [1993] contends that new media are rated as more appropriate for fulfilling lean information exchange tasks than socio-emotional related tasks. Perse and Courtright [1993] argue that interpersonal media are overwhelmingly rated as the highest for motivations of showing affection, control, or inclusion. Flanagin and Metzger [2001] claim that mediated interpersonal communication media, such as e-mail, are more helpful than traditional face-to-face medium in fulfilling the need to stay in touch. They also maintain that e-mail and telephone are better than mass media, such as newspaper and television, in terms of social bonding (e.g., to feel less lonely), relationship maintenance (e.g., to stay in touch), problem solving, and persuasion purposes (e.g., to negotiate or bargain). Guo et al. [2008] determine that e-mail is a preferred medium in place of traditional face-to-face and telephone for nonreciprocal tasks such as responding/replying/scheduling tasks, while face-to-face is still the most favorable medium for tasks requiring more personal attention.

Some prior studies confirm that no other communication media are clustered with (i.e., functionally equivalent to, based on motivations or attributes) face-to-face communication, indicating the distinctive usage of the latter [Flanagin and Metzger, 2001; Perse and Courtright, 1993]. In a media appropriateness study of seven media across six organizational sites, Rice [1993] suggests that new media cluster with each other. Another Internet related study also establishes that e-mail is perceived to be functionally equivalent to the traditional medium of the telephone [Flanagin and Metzger, 2001]. These authors suggest that "newer media are transitioning toward the roles of more traditional ones due to their capability to improve or augment the capabilities of existing technologies" [Flanagin and Metzger, 2001, p. 171]. Similarly, in their study examining how IM is different from face-to-face, telephone, e-mail, and SMS in terms of needs to be fulfilled, Guo et al. [2008] contend that respondents integrate e-mail into their daily repertoire of communication tools and use it to fulfill various communication needs, just as they use other traditional media, such as face-to-face and telephone. However, their study also claims that IM and SMS cluster together (i.e. are functionally equivalent) and are largely separated from the other three media. Lin [2001] maintains that the Web is a unique medium, different from any other traditional and mass media, for fulfilling a distinct set of communication and information needs. Kaye and Johnson [2003] also argue that the Web, Bulletin Board Systems (BBS), and chat rooms gratify different needs. In a recent study, Kim et al. [2007] determine that IM, SMS, and mobile phone are distinctive media for students, and face-to-face appears to be a universal medium useful for anyone.

However, these studies were conducted in either organizational or general public contexts. Thus, the results derived from these studies may not be applicable to university contexts, due to the different needs to be fulfilled [McCreadiea and Rice, 1999]. In addition, as CMC media become more ubiquitous in university student interactions, coupled with the nature of the needs that people fulfill through media use evolving as a consequence of the changing functions of communication media [Flanagin and Metzger, 2001], an investigation of student perceptions and use of various functions of various media in a learning context is warranted.

IV. RESEARCH METHODOLOGY

Kuehn [1994] suggests a two-stage research design for uses and gratifications profile development. A qualitative study was first conducted through interviews to identify the different needs that university students aimed to satisfy when selecting and using CMC and non-CMC media in their learning contexts. The needs identified in the first step were then empirically analyzed in a large scale survey to categorize the motivation dimensions for using media for communication, and to assess the specific needs to be fulfilled by each medium. Each of these steps is explained fully in the following sections.

Stage One: Interview

There are two objectives in this stage: (1) to identify a set of motivations/needs (unique constructs) that students wish to fulfill during communication, and (2) to identify a set of CMC media (unique elements) that students commonly use, both in learning contexts. We first introduce the Repertory Grid Technique (RGT), the technique we adopted for interviews. Then we explain the interview procedure. Finally, we present the unique constructs and elements identified from our interviews.

Repertory Grid Interview Technique

George Kelly [1955] developed the repertory grid interviewing technique (RGT) to study personal construct systems. Kelly argues that individuals use their own personal constructs to understand and interpret events that occur around them and that these constructs are influenced by each individual's background, personal experiences, beliefs, and value systems [Napier et al., 2009]. The RGT involves the generation of a list of concepts (elements) about things and/or events to be studied and the forming of attributes (constructs) based on the list of concepts [Zhang and Chignell, 2001]. It is a structured interview process with procedures for uncovering the cognitive constructs of individuals [Tan and Hunter, 2002], and has been widely used in organizational and Information Systems (IS) research [Curtis et al., 2008; Napier et al., 2009]. In IS research, this technique has been used in developing expert systems [Phythian and King, 1992], eliciting qualities of excellent system analysts [Hunter, 1997], exploring the cognitive thinking of business and IS executives [Tan and Gallupe, 2006], and, more recently, examining the skills of successful IT project managers [Napier et al., 2009] and website usability [Tung et al., 2009].

The first reason for choosing RGT in this study is that RGT is a method that avoids the use of *a priori* adoption of a theoretical framework and, hence, is a less biased approach to research [Stewart and Stewart, 1981]. Second, this technique allows participants to express their views in their own words and yet, due to its systematic nature, allows researchers to probe deeper into the responses to derive richer information. This facilitates a better understanding of participant perceptions and aids in the analysis of data. Finally, the data obtained from RGT is rich enough to enable a thorough examination of content, elicited by each individual's construct system [Hunter and Beck, 2000].

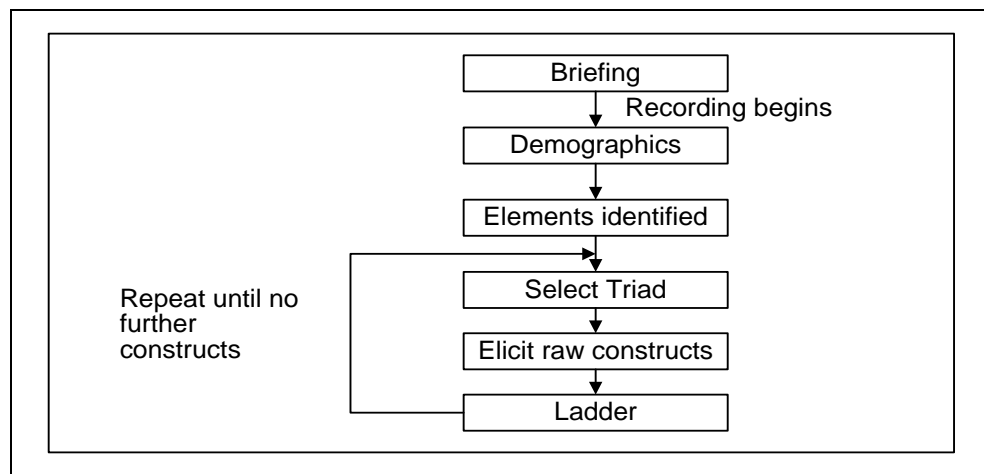


Figure 1. Interview Procedure

Interview Procedure

Given the intensive nature of the RGT, a relatively small sample size of about fifteen to twenty-five participants are capable of eliciting a comprehensive list of constructs [Tan and Hunter, 2002]. A total of fifteen university students, nine men and six women, participated in this study. All of the participants had an average of four years university experience and at least five years experience with Internet use. Overall, each interview lasted approximately fifty to sixty minutes, and all participants agreed to the interview being recorded. An overview of the steps conducted during the interview is provided in Figure 1. The major steps involved in the interview are outlined below.

Element Selection: Elements are objects within the domain of the investigation. The relevant elements for this study are the CMC and non-CMC media used by students. The definition and examples of CMC and non-CMC media were provided to the participants. A minimum of six elements are required to permit construct elicitation [Tan and Hunter, 2002]. Each participant was initially encouraged to identify at least five commonly used and functionally unique CMC media for their university learning related communication behavior. For the purpose of this study, *university learning communication behavior* is defined as any interaction with instructors or peers, which may include discussion, research, consultation, individual and group work, or relationship building. Four additional non-CMC media were supplied by the researcher as additional elements: face-to-face, telephone, mobile, and SMS. These four non-CMC media represent researcher-supplied elements to measure and compare the differences between CMC and non-CMC media [Tan and Hunter, 2002]. The names of each of the nine media were then written on individual index cards.

Construct Elicitation: Constructs are the qualities that people attribute to the elements. Constructs are bipolar in nature. They describe how some elements are alike and yet different from others [Tan and Hunter, 2002]. Each participant was asked to randomly select three index cards (triad) from the stack. Based on the three elements on the cards, the participant was asked: How are two media similar and yet different from the third in terms of your motivations for using these in your learning? Participants were encouraged to verbalize and discuss their thoughts with the researcher to deduce their underlying motivations. To complete the processing of each triad, the participant was encouraged to provide a brief label that best described the motivation and its contrast. The labels for similarity and difference that were identified formed a bipolar construct, e.g., quick access to the medium—slow access to the medium. Based on the construct identified, the researcher probed the participants with a series of “how” and “why” questions to clarify the meaning and uncover the underlying meanings (laddering process). For example, where participants identified “quick access” as the construct, they were asked “How is ‘quick access’ good?” and “Why is it important to have ‘quick access’?” The participant then placed the three cards back in the stack, shuffled the deck of index cards, selected another three cards, and the exercise was repeated. The construct elicitation process was then repeated to identify more constructs until either no new constructs can be elicited from a triad or the participant became noticeably tired [Tan and Hunter, 2002].

Theoretical Saturation

Participant interviews were conducted until the point of theoretical saturation, i.e. until further interviews no longer provided new constructs. After completing each block of five interviews, the raw motivations elicited from the interviews were examined to determine if any new constructs had emerged. The theoretical saturation can be said to have occurred when subsequent interviews failed to produce new constructs (see Figure 2). In this study, theoretical saturation occurred after fifteen interviews. This sample number was not only consistent with Tan and Hunter’s [2002] recommended range of fifteen to twenty-five interviews, but also similar to Napier et al.’s [2009] sample size of nineteen.

Determining Unique Constructs and Elements

By design, the repertory grid interview process adopted in this study allows participants to freely voice their opinions to achieve the greatest construct elicitation effect. As a result, the fifteen interviewees produced a total of 298 raw comments. For the purpose of data analysis, we first consolidated the raw comments for each individual participant by combining comments that were expressions of the same underlying idea (e.g., “free of charge” and “cheap” were considered as aspects of the same construct, i.e., cost), resulting in 232 unique statements. Based on their semantic similarities, the 232 statements derived from all interviewees were further consolidated into thirty-one unique constructs or motivations/needs (e.g., “can only access at one place,” “can be carried around,” and “is not with me all the time” were mentioned by three interviewees and considered as aspects of the same construct, i.e., mobility). Table 2 shows the thirty-one identified unique motivation/need items that were identified for inclusion in stage-two of the survey. We introduce stage two in the following section

A frequency count was applied to the data from the interviews to identify the most commonly used communication media (unique elements) in student learning contexts. This process involved counting the number of times a medium was mentioned by the students. As a result, fifteen raw elements were elicited. To identify the most common media that were used by university students, further data reduction was required. Functionally similar media (e.g., MySpace and Facebook, Skype and Instant Messaging) were combined, while media that were identified by a minority of students were removed (i.e., Google Groups). This resulted in nine unique communication media as shown in Table 3, which also provides a brief definition for each medium. The nine communication media were: e-mail, IM, the Web, forum, SNS, face-to-face, telephone, mobile and SMS, which were put into the questionnaire development in the next stage of the study.

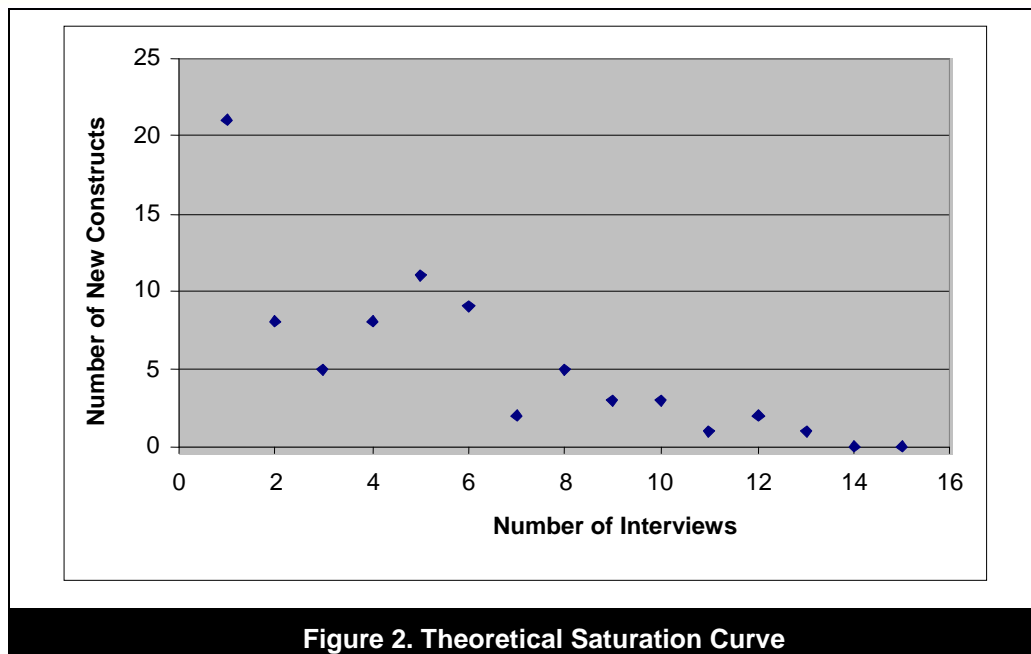


Figure 2. Theoretical Saturation Curve

Table 2: Unique Motivation Constructs Identified During the Interview Stage				
No.	Unique Construct Identified	Number of Participants Mentioning this Construct (N = 15)	Description of the Construct	Motivation Dimensions**
1	Synchronicity	12	The medium allows you to have a real-time communication (or not).	Dim6
2	Feedback	12	The medium provides quick (or slow) feedback.	Dim6
3	Familiarity of communicators	12	The medium allows you to know who you are talking with (or not).	Dim6
4	Accessibility	10	It is easy (or difficult) to access to the medium.	Dim2
5	Cost*	10	It is cheap (or expensive) to communicate with the medium.	—
6	Details of information	10	The medium allows you to obtain detailed information (or not).	Dim1
7	Verbal communication	10	The medium allows you to use text or voice (or text and voice).	Dim7
8	Information sharing	9	The medium allows you to share information with others (or not).	Dim3
9	Mobility*	9	You can carry the medium with you (or not).	—
10	Clarification of issues	9	Communication through the medium allows you to clarify the issues easily (or not).	Dim4
11	One to many communication	9	The medium allows you to communicate with multiple people simultaneously (or only one at a time).	Dim3
12	Formality of interaction	8	Communication through the medium is more formal (or informal).	Dim6
13	Ease of use	8	The medium is easy (or difficult) to use.	Dim2



Table 2: Unique Motivation Constructs Identified During the Interview Stage

No.	Unique Construct Identified	Number of Participants Mentioning this Construct (N = 15)	Description of the Construct	Motivation Dimensions**
14	Large quantity of information	8	The medium allows you to transfer or obtain a large (or small) quantity of information.	Dim5
15	Multifunctioning	8	The medium allows you to use multiple tools (or a single tool) for communication, e.g., chat, talk, text, attach file etc.	Dim5
16	Personalness of interaction	7	Communication through the medium provides a more personal (or impersonal) touch.	Dim6
17	Sources of information	7	The medium allows you to obtain information from different sources (or a single source).	Dim1
18	Range of information	7	The medium allows you to obtain information from a broad (or narrow) range.	Dim1
19	Socializing	6	The medium allows you to maintain social relationships with others (or not).	Dim3
20	Speed	6	The medium allows quick (or slow) communication with others.	Dim2
21	Reliability of information	6	The information provided by the medium is reliable (or unreliable).	Dim1
22	File management	6	The medium allows you to store and manage files (or not).	Dim5
23	Communication history	6	The medium allows you to keep communication record history (or not).	Dim5
24	Nonverbal cues	6	The medium allows you to see other body languages (or not).	Dim7
25	Geographic distance	6	The medium allows you to communicate with others no matter where they are (or not).	Dim3
26	Communication length	5	The medium allows you to have a longer conversation with others easily (or not).	Dim3
27	Guaranteed delivery*	5	The medium allows you to know whether the message is delivered safely (or not).	—
28	Complexity of issues	5	The medium is good (or poor) at solving complex issues.	Dim4
29	Intrusiveness*	4	Communication through the medium will be less (or more) intrusive for the receiver.	—
30	Social influence	4	Everyone else uses the medium for communication (or not).	Dim3
31	Criticality of issues	2	The medium is good (or poor) at solving critical issues.	Dim4

* These items were removed after factor analysis, with twenty-seven items remaining for the final analysis.

** The motivation dimensions presented here correspond to Table 5. Dim1 = "Information Seeking," Dim2 = "Convenience," Dim3 = "Connectivity," Dim4 = "Problem Solving," Dim5 = "Content Management," Dim6 = "Social Presence," Dim7 = "Social Context Cues."

Table 3: A List of Commonly Used Media by the Interviewees

No.	Medium	No. of Participants Mentioning this Medium	Definition
1	E-mail	15	Text-based and asynchronous computer messaging system which allows written messages to be composed and edited on a computer screen and then sent either individually or to a predefined list of recipients [Rice and Webster, 2002, p. 195].
2	Face-to-face (FtF)	14	The exchange of information, ideas, and feelings among people who are in the same physical location. It can be one-to-one, one-to-many, or many-to-many communication.
3	IM	14	IM represents Instant Messaging. It refers to a form of Internet-based, near-synchronous chat, with one-to-one, or small-group communication among users on the same system [Guo et al., 2008]. It includes various communication modalities, such as text, audio, video, graphic, etc. Examples include MSN, Yahoo Messaging, and Skype.
4	The Web	12	The Web is defined as a system of computers ("servers"), utilizing graphical user interfaces and accessed via the Internet, that provides access to documents, multimedia files, and websites, that are connected by hyperlinks to other documents, multimedia files, and websites [Metzger et al., 2003]
5	Mobile	12	An electronic device used for mobile telephony over a cellular network of specialized base stations known as cell sites. It excludes SMS.
6	SMS	11	Short Message Service: It allows text messages to be sent or received via the network operator's message center to a mobile phone [Tung, 2004, p. 353].
7	Forum	10	Online forums are virtual communication spaces structured by discussion threads [da Cunha et al, 2008]. Some commonly used examples include "Web forums," "message boards," "electronic bulletin boards," "online discussion groups," or "newsgroups."
8	Telephone (Tel)	8	A telecommunication device that transmits and receives sound. It only represents landline telephone.
9	Social Networking Site (SNS)	5	Social Networking Site refers to a Web-based service that allows individuals to construct a profile, articulate a set of other people on the service with whom they share a connection, and view their list of connections and the lists made by others. Social network sites usually contain many Web-based applications that allow users to interact and share resources in different ways [Boyd and Ellison, 2007, p. 2]. Facebook and Myspace are two such examples.

Stage Two: Survey

In stage two, we used a quantitative survey methodology to collect data to answer our four research questions. We first introduce the instrument used in our survey. Then we describe participants and data collection procedure.

Instrument

This stage was the extension of stage one, which focused on the qualitative investigation of student motivations for using CMC and non-CMC in learning contexts. This phase takes the findings from the previously completed qualitative investigation into a quantitative exploratory assessment of motivations to uncover a student-specific motivational scale for technology use in their learning contexts. The results of the first stage included a set of thirty-one unique motivation/need items that students wished to fulfill when using various media in learning contexts, as well as a set of nine commonly used media within their learning contexts. Therefore, this second phase assesses the student perceived helpfulness of each of the nine media types for satisfying each of the thirty-one unique motivation/need items. Respondents were asked to rate their level of agreement with the motivations for using each of the nine media in learning contexts on a scale of 1–9 (where 1 = "Strongly Disagree," 5 = "Neutral," and 9 = "Strongly Agree"). Respondents were given the option to select 10 (where 10 = "Not Applicable") for a particular medium, if they had never used it before in their learning contexts.

The first part of the instrument included the consent form and general instructions for completing the survey. Participants were then asked to provide demographic information, including gender, age, study major, and the usual

Internet access venues. Participants were also asked to report their levels of expertise and accessibility, and their frequency of access and weekly usage of the media. For further clarity in the questionnaire, a definition for each medium was provided. For example, mobile was limited to its audio capability only for the purpose of this study. The full instrument used for the study is provided in an Appendix.

Participants and Procedure

A total of 266 undergraduate students who had enrolled in an introductory Management Information Systems course, were invited over a two-week period to complete the questionnaire designed for this study. We first invited 227 students from ten out of twelve tutorial classes of this course for participation. A paper-based survey was distributed during their respective tutorial classes to obtain responses quickly, and to increase the ease for the researcher to monitor the completion of the survey. In total, 142 usable surveys were collected, representing a 63 percent response rate (142/227). We also sent an e-mail to invite each of another thirty-nine students from the other two tutorial classes of this course to participate, and a link was provided to the survey. These students were given a week to respond. In all, twenty-one completed surveys were returned, representing a 54 percent response rate.

Table 4: Demographics and Media Related Experience

Gender^a		Age^a	
Male	60.7%	≤18	5.5%
Female	38.7%	19–25	92%
		26–30	1.8%
Degree^a		Study Major^a	
Bachelor	93.9%	Commerce/Economics	58.9%
Honors	4.3%	Engineering	16.6%
Master and above coursework	1.2%	Science	13.5%
		Arts & Social Science	4.9%
		Law	3.7%
		Medicine	1.8%
Usual Online Venue (can be more than one)^a		Average Internet Usage (hours)^a	
Home	98.2%	<1	12.3%
University	56.4%	≥1 but <3	41.1%
Work	17.2%	≥3 but <5	20.9%
Net Café	3.7%	≥5 but <10	21.5%
		≥10	3.7%
Years of Experience in Internet Use^b		Computer / Internet Experience	
≥1 but <3	0.6%	How easy is it for you to access a computer? ^c	4.58 (.70)
≥3 but <5	8.6%	How easy is it for you to access the Internet? ^c	4.51 (.76)
≥5 but <10	64.4%	What is your computer literacy level? ^d	4.11 (.80)
≥10	24.5%		
^a : N=162 ^b : N=161 ^c : Scale 1–5 from “Extremely Difficult” to “Extremely Easy” ^d : Scale 1–5 from “Not at all Literate” to “Complete Literate”			

Although the overall response rate of this study was 61 percent, this was acceptable for research of this nature [Compeau and Higgins, 1995], however the non-response bias has always been a concern for survey-based research [Armstrong and Overton, 1977; Kanuk and Berenson, 1975]. In order to address this issue, Armstrong and Overton [1977] claim that we may estimate non-response bias by comparing early respondents to late respondents. The assumption behind such effort is that subjects who respond late are likely to be similar to non-respondents, since late respondents require an increased stimulus to respond, and, therefore, are considered less eager [Armstrong and Overton, 1977; Kanuk and Berenson, 1975]. If late respondents do not differ significantly from early respondents, it is less likely that non-respondents will differ in significant ways from respondents [Kanuk and Berenson, 1975]. For data collected in this study, we compared early respondents (N = 13, in the first four days) and late respondents (N = 8, in the final three days) with our online survey data, only because our paper-based surveys were collected during tutorials resulting in no time difference in terms of submission. Statistical analysis showed no

significant differences in any variables of interest (Wilks' Lambda $F = 15.14$, $p = 0.20$). Thus, it was reasonable to assume that there was no non-respondent bias, at least for our online survey data. Furthermore, since there were also no significant differences between the two different types of survey groups in any variables of interest (Wilks' Lambda $F = 0.87$, $p = 0.67$), it was justifiable to combine both paper-based and online survey data into one group of data [Scott and Timmerman, 2005]. As a result, a total of 163 usable questionnaires, 142 from the paper version and twenty-one from the online survey, were used for subsequent data analyses. Table 4 above provides the demographic and media use information derived from these surveys.

V. RESULTS

In this section, we provide data analysis results from the data collected in stage two. Four research questions are examined and analyzed individually.

Research Question 1

To answer Research Question 1 (identifying student motivation dimensions for using communication media in their learning contexts), we used a principal component factor analysis with varimax rotation to extract and interpret potential motivation dimensions (factors) [Papacharissi and Rubin, 2000]. Factors with eigenvalues greater than 1.0 and at least two items were retained. Items were retained as representing a factor if they had a loading of at least 0.5 on that factor [Hair et al., 1998]. The validity of the factors was confirmed through a Cronbach's alpha reliability analysis.

As presented in Table 5, seven factors (dimensions), containing twenty-seven motivation items, emerged with eigenvalues greater than 1.0, and explaining 64.49 percent of the variance. Four motivation items, *guaranteed delivery*, *mobility*, *cost*, and *intrusiveness*, did not meet the loading criteria, and were removed from subsequent analyses. As a guide, Nunnally [1967] advises that a modest reliability in the range of 0.5 to 0.6 will suffice. Thus the Cronbach alpha for each mean scale was acceptable.

The first motivation dimension, "Information Seeking," consisted of four motivation items reflecting the range and quality of information that could be obtained through the use of the media. It contained items such as the width, depth, accuracy, and the source of the obtained information. The second motivation dimension, "Convenience," contained items that illustrated the ease of approaching a medium, such as speed of use, ease of access, and ease of use. The third motivation dimension, "Connectivity," consisted of six items describing the ways people communicated with one another across time and space, such as communicating with people at different locations, one to many communication, information sharing, long time conversation, etc. The fourth motivation dimension, "Problem Solving," included items such as solving complicated and critical issues. The fifth motivation dimension, "Content Management," included four items that described the ability of a medium to manage and communicate a large quantity of information, such as saving a record of the communication, file storage and management, and the use of multiple communication methods. "Social Presence" was the sixth motivation dimension, containing five items describing the characteristics of the interaction during a communication, such as synchronicity, formal or informal communication, personal or impersonal communication, and whether communicating with a known or unknown person. The last motivation dimension, "Social Context Cues," consisted of two items that described the different nature of communication, such as a verbal or text communication, or whether body language could be delivered.

Research Question 2

As one of the key components for understanding functional images of communication media [Flanagin and Metzger, 2001], the functional alternatives of communication media were assessed through answering research Question 2. In line with prior studies [e.g., Flanagin and Metzger, 2001; Guo et al., 2008; Perse and Courtright, 1993], we first conducted a hierarchical cluster analysis of the communication media according to their motivation scale means. Because the aim of this research question was to identify homogeneous groups of media along functional dimensions (in this case, motivation dimensions for fulfilling the needs), and not to identify a smaller number of underlying dimensions in the data, hierarchical cluster analysis was the preferred analytic strategy [Flanagin and Metzger, 2001; Perse and Courtright, 1993]. Similar to Flanagin and Metzger [2001], we also used three criteria to determine the appropriate number of clusters. First, by applying a method similar to a scree test commonly used in factor analysis to determine the number of factors, we plotted the number of clusters against the distance coefficients. The point at which the curve flattened out was an indication of where to stop combining clusters, since the new cluster yielded little new information. Second, we calculated dissimilarity ratios between the distance coefficients at contiguous stages and compared their magnitude. Large ratios indicate great separation between clusters, suggesting the optimal number of cluster solutions. Finally, after the number of clusters was identified by applying the above criteria, each of the clusters was examined to determine its theoretical relevance. In addition to

Table 5: Factor Loadings of the Seven Motivation Dimensions

	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
Factor (Dimension) 1: Information Seeking							
Range of information	0.84						
Sources of information	0.80						
Details of information	0.79						
Reliability of information	0.76						
Factor (Dimension) 2: Convenience							
Accessibility		0.85					
Speed		0.85					
Ease of use		0.80					
Factor (Dimension) 3: Connectivity							
One to many communication			0.79				
Geographic distance			0.68				
Social influence			0.67				
Communication length			0.63				
Socializing			0.54				
Information sharing			0.52				
Factor (Dimension) 4: Problem Solving							
Complexity of issues				0.72			
Clarification of issues				0.67			
Criticality of issues				0.65			
Factor (Dimension) 5: Content Management							
Communication history					0.73		
Large quantity of information					0.67		
Multifunctioning					0.61		
File management					0.59		
Factor (Dimension) 6: Social Presence							
Personalness of interaction						0.75	
Synchronicity						0.59	
Feedback						0.57	
Familiarity of communicators						0.56	
Formality of interaction						0.52	
Factor (Dimension) 7: Social Context Cues							
Verbal communication							0.77
Nonverbal cues							0.76
Eigenvalue:	9.12	3.03	1.99	1.9	1.44	1.29	1.22
Percentage of Variances Explained:	29.42	9.79	6.41	6.12	4.64	4.17	3.94
Cronbach's Alpha:	0.88	0.89	0.83	0.76	0.77	0.76	0.67

the cluster analysis technique, we also used another interdependence technique, multidimensional scaling (MDS) technique, to confirm our media cluster analysis results, as recommended by previous studies [e.g., D'Ambra et al., 1998; Flanagan and Metzger, 2001; Rice, 1993]. MDS technique has been considered as a valuable technique to identify media similarities, since this technique visually plots distances between variables in a multi-dimensional space in terms of their dissimilarities while keeping the relations among the data objects as similar as possible [D'Ambra et al., 1998].

First, the similarities of media were assessed by the hierarchical cluster (using Squared Euclidean Distance) analysis of the communication media, according to the similarity in their ratings in satisfying the seven motivation dimensions. The scree plot and the dissimilarity ratio were evaluated to determine the optimal number of cluster solutions. The dissimilarity ratio results from the analysis are illustrated in Table 6. The results from the scree plot were inconclusive, as there was no clear flattening of the dissimilarity ratio curve. The greatest dissimilarity ratio occurred between cluster 7 and cluster 8 (ratio = 1.84), and the second highest dissimilarity ratio happened between cluster 6 and cluster 7 (ratio = 1.58). After further observations of the theoretical relevance of each medium, we believed that a 7-cluster solution could best describe the data of this study, since the 8-cluster solutions failed to

Table 6: Agglomeration Schedule for Cluster Analysis of Nine Media				
Stage	Cluster #	Media Combination	Distance Coefficient	Dissimilarity Ratio*
1	8	Tel and Mobile	45.75	1.84
2	7	IM and E-mail	84.12	1.58
3	6	FtF and Tel	133.08	1.09
4	5	FtF and IM	145.78	1.04
5	4	SMS and Web	157.27	1.02
6	3	SMS and Forum	160.44	1.40
7	2	SMS and SNS	224.98	1.27
8	1	FtF and SMS	286.61	-

* Note: Dissimilarity Ratio = (Previous stage distance coefficient) / (Current stage distance coefficient), thus the cluster 1 dissimilarity ratio is not applicable.

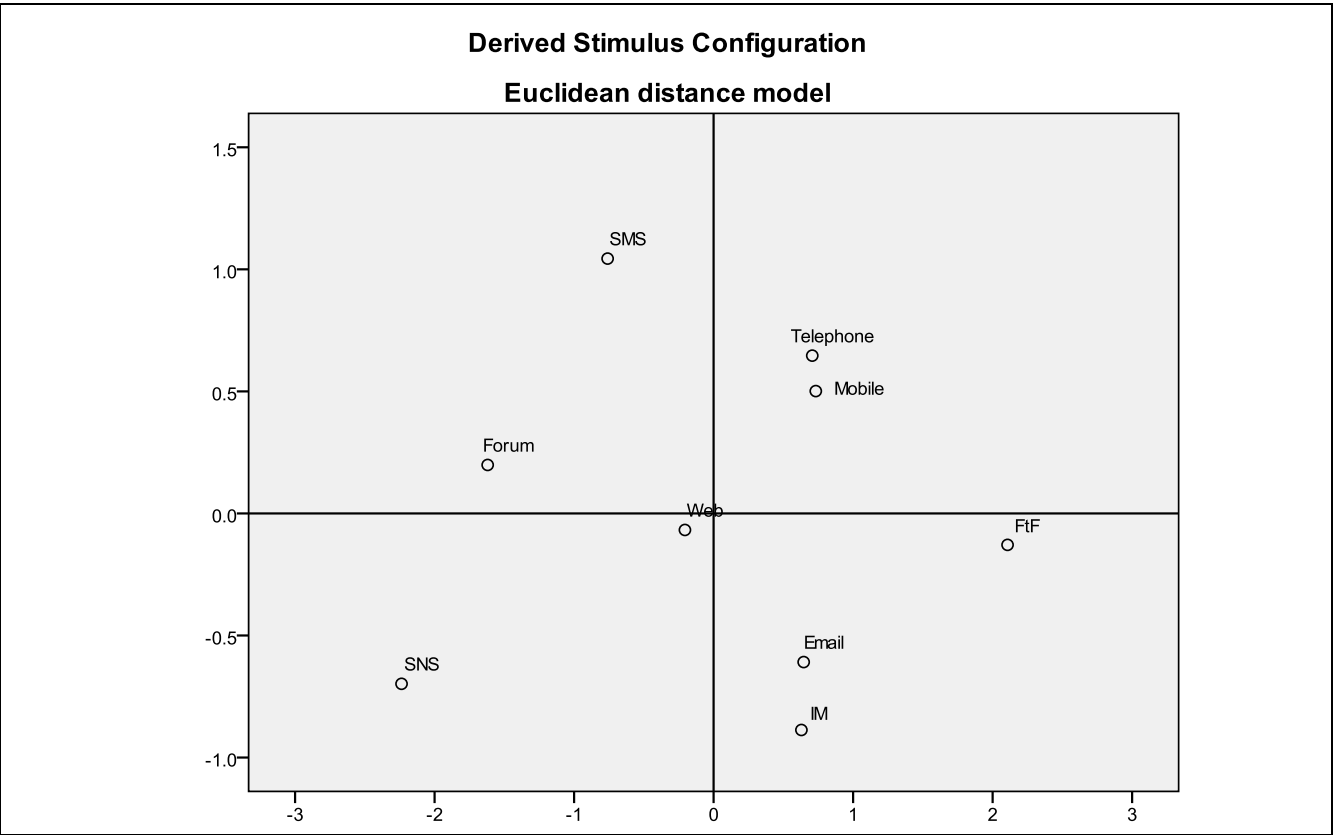


Figure 3. Multidimensional Scaling Plot of Media Similarity Based on a Mean Motivation Rating (Stress = 0.057, RSQ = 0.982)

discriminate between certain media, such as e-mail and IM. This decision was also supported by the MDS results (Figure 3). It was clear that telephone and mobile were tightly clustered in the MDS, as were e-mail and IM, indicating similarities between telephone and mobile, and e-mail and IM. However, both Table 6 and Figure 3 indicate that the other five media were less tightly clustered, thus were not considered as functional alternatives.

In addition, Table 7 shows the mean ratings and rankings for how well each of the nine communication media satisfies each of the seven motivation dimensions, as well as the average rating score and average ranking of each medium over the seven motivation dimensions. The highest mean score for each motivation dimension indicated that students considered that specific medium to be most helpful in satisfying a specific motivation dimension, thus receiving the rank of "1."

This table further supports our media cluster solution. First, face-to-face was considered to best serve the majority of student communication needs, except to manage content (Dim 5). Telephone and mobile served a very similar purpose, receiving better ranking for four out of the seven motivation dimensions. Both media have very similar technical features, except that a mobile phone can be carried anywhere and has easier access than a telephone.



Table 7: Mean Ratings and Rankings for Nine Media by Seven Motivation Dimensions

Motivation Dimension		FtF	Tel	Mobile	SMS	E-mail	IM	Web	Forum	SNS
Dim1	Information Seeking	7.07 (2)	5.53 (6)	5.31 (7)	4.43 (9)	5.93 (4)	5.62 (5)	7.55 (1)	6.38 (3)	5.23 (8)
Dim2	Convenience	7.58 (2)	7.57 (3)	7.89 (1)	7.29 (7)	7.467 (5)	7.46 (6)	7.468 (4)	5.90 (9)	6.23 (8)
Dim3	Connectivity	6.46 (3)	6.20 (6)	6.29 (5)	5.92 (9)	6.92 (2)	7.37 (1)	5.96 (8)	6.17 (7)	6.34 (4)
Dim4	Problem Solving	8.10 (1)	7.10 (2)	6.98 (3)	5.61 (6)	6.35 (4)	5.98 (5)	4.66 (8)	4.30 (9)	4.69 (7)
Dim5	Content Management	4.46 (7)	3.68 (9)	3.91 (8)	4.71 (6)	7.34 (1)	6.53 (3)	6.88 (2)	6.30 (4)	5.86 (5)
Dim6	Social Presence	8.09 (1)	7.36 (2)	7.26 (3)	5.96 (6)	6.19 (5)	6.35 (4)	4.46 (8)	4.35 (9)	4.92 (7)
Dim7	Social Context Cues	8.47 (1)	5.10 (3)	5.13 (2)	2.24 (8)	2.19 (9)	3.53 (4)	2.26 (7)	2.33 (6)	2.52 (5)
Average rating		7.17	6.08	6.11	5.17	6.06	6.12	5.60	5.11	5.11
Average ranking		2.43	4.43	4.14	7.14	4.00	4.00	5.71	6.86	6.29
N		160	159	158	154	161	152	162	139	112

SMS, forum and SNS seemed to be dissimilar in the ways they were used. The Web served best for information seeking (Dim 1), which was different from all other CMC media. Finally, e-mail and IM were very similar in terms of fulfilling a variety of needs. E-mail and IM were the most popular media for students to be connected with each other (Dim 3), by providing the easiest means of keeping in touch and exchange ideas. Consequently, face-to-face was the most “general” medium (average rank of 2.43 and average rating of 7.17), since students applied it to a wide range of functions, such as problem solving (Dim 4), seeking information (Dim 1), receiving quick and real time feedback (Dim 6), delivering verbal and visual cues (Dim 7), etc. In contrast, SMS was the most “specific” medium (average rank of 7.14 and average rating of 5.17), since it was used for a rather homogeneous set of convenient functions, such as easy to access, quick to use, carry everywhere, across time and space [Elliott and Quattlebaum, 1979; Katz et al., 1973]. E-mail and IM shared a similar image by receiving the exactly same average rank of “4.” Telephone and mobile were also functionally similar as their average ranks were also very close.

Thus, all the analyses conducted above supported our 7-cluster solution, with cluster one: telephone and mobile; cluster two: e-mail and IM; cluster three: face-to-face; cluster four: SMS; cluster five: the Web; cluster six: forum; and cluster seven: SNS.

Research Questions 3 and 4

Both research Questions 3 and 4 can help us understand the normative images of media, the second key component for understanding the functional images of various media [Flanagin and Metzger, 2001].

Needs Fulfillment by Communication Media

Research Question 3 assessed the relative contribution of each communication medium in satisfying a variety of student motivation dimensions for using media. Apart from results presented in Table 7, which described the utility of the nine media in fulfilling each of seven communication motivation dimensions, a Multivariate Analysis of Variance (MANOVA) analysis, using nine communication media as independent variables and the mean motivation ratings as dependent variables, was conducted to statistically assess which medium was most helpful in fulfilling various needs [Flanagin and Metzger, 2001; Perse and Courtright, 1993]. The omnibus F was significant, ($F_{(56, 7232)} = 59.85, p < 0.001$). With these significant results, a series of one-way ANOVA tests were used as a follow-up, to determine how the nine communication media were different in terms of fulfilling each of the seven motivation dimensions. A summary of ANOVA analysis results is presented in Table 8. In this table, media are rank ordered from the highest (strongly agree) to the lowest (strongly disagree).

Table 8: Significant Differences among the Nine Media across Seven Communication Motivation Dimensions*

Dim1: Information Seeking	Web	FtF	Forum	E-mail	IM	Tel	Mobile	SNS	SMS
Dim2: Convenience	Mobile	FtF	Tel	E-mail	Web	IM	SMS	SNS	Forum
Dim3: Connectivity	IM	E-mail	FtF	SNS	Mobile	Tel	Forum	Web	SMS
Dim4: Problem Solving	FtF	Tel	Mobile	E-mail	IM	SMS	SNS	Web	Forum
Dim5: Content Management	E-mail	Web	IM	Forum	SNS	SMS	FtF	Mobile	Tel
Dim6: Social Presence	FtF	Tel	Mobile	IM	E-mail	SMS	SNS	Web	Forum
Dim7: Social Context Cues	FtF	Mobile	Tel	IM	Forum	Web	SNS	SMS	E-mail

* Media were rank ordered from the highest to the lowest on each dimension, in which media that share a common underlining are not significantly different from each other. For instance, for dimension 1 of Information seeking, Web and FtF were significantly different from all other media. Forum was significantly different from all other media, except e-mail. E-mail was significantly different from Web, FtF, and SMS. IM, Tel, Mobile, and SNS were significantly different from Web, FtF, Forum, and SMS. SMS was significantly different from all media.

Both the Web and face-to-face were used more heavily than the other media for fulfilling the motivation of “Information Seeking,” while SMS was the least appropriate medium for information seeking. “Convenience” was well satisfied by most communication media. In particular, four non-CMC media, coupled with the Web, e-mail and IM, performed similarly in this dimension, whereas SNS and forum demonstrated less capability to meet this motivational need. It is interesting to see that IM and e-mail replaced FtF to become the most helpful media for connecting people around the world. It was not surprising to see that face-to-face has become dominant for “Problem Solving.” Telephone, mobile, and e-mail were also popular for fulfilling this motivation. The “Content Management” dimension was best satisfied by e-mail and the Web. This dimension was also moderately satisfied by other CMC media, while the non-CMC media were relatively unsatisfactory.

The sixth dimension of “Social Presence” was very well satisfied by almost all synchronous communication media. IM, e-mail, and SMS, as near-synchronous or asynchronous media, also demonstrated a capability of meeting this motivation. In contrast, other asynchronous CMC media were relatively weak in fulfilling this motivation. It was not surprising to find that the need of “Social Context Cues” was fulfilled best by face-to-face, mobile, and telephone.

Motivations for Using Communication Media in Learning Contexts

Research Question 4 asked which student motivations were best fulfilled by each medium. To answer this question, we first provided a descriptive analysis in Table 9, describing the mean ratings and rankings of how well each of the seven motivation dimensions was served by each of the nine communication media. Table 9 also shows the average rating score and average rank of each dimension over the nine media, in addition to the average rank of each dimension over the five CMC media only. The highest mean score for each medium indicated that students considered this medium to be the most helpful in fulfilling that specific motivation dimension, thus receiving the rank of “1.”



Table 9: Mean Ratings and Rankings for Seven Motivation Dimensions by Nine Media

	Dim1*	Dim2	Dim3	Dim4	Dim5	Dim6	Dim7
FtF	7.18 (5)	7.58 (4)	6.68 (6)	8.07 (3)	4.71 (7)	8.12 (2)	8.30 (1)
Tel	5.94 (5)	7.66 (1)	6.36 (4)	7.24 (3)	3.93 (7)	7.50 (2)	5.12 (6)
Mobile	5.76 (5)	7.96 (1)	6.42 (4)	7.17 (3)	4.18 (7)	7.34 (2)	5.14 (6)
SMS	4.80 (6)	7.39 (1)	6.09 (2)	5.89 (4)	4.92 (5)	6.07 (3)	2.39 (7)
E-mail	6.29 (6)	7.57 (1)	7.13 (3)	6.50 (4)	7.36 (2)	6.47 (5)	2.44 (7)
IM	5.92 (6)	7.58 (1)	7.50 (2)	6.24 (5)	6.70 (3)	6.53 (4)	3.74 (7)
Web	7.49 (2)	7.52 (1)	6.35 (4)	4.82 (5)	6.96 (3)	4.65 (6)	2.53 (7)
Forum	6.44 (1)	5.99 (4)	6.34 (3)	4.47 (5)	6.37 (2)	4.45 (6)	2.41 (7)
SNS	5.23 (4)	6.21 (2)	6.37 (1)	4.67 (6)	5.90 (3)	4.87 (5)	2.53 (7)
Average rating	6.116	7.27	6.58	6.118	5.67	6.22	3.84
Average ranking	4.44	1.78	3.22	4.22	4.33	3.89	6.11
Average ranking for CMC media	3.8	1.8	2.6	5	2.6	5.2	7
N	107	106	110	107	107	109	106
* Dim1 = "Information Seeking," Dim2 = "Convenience," Dim3 = "Connectivity," Dim4 = "Problem Solving," Dim5 = "Content Management," Dim6 = "Social Presence," Dim7 = "Social Context Cues."							

Overall, "Convenience" was the most general function served by these media (average rank of 1.78 and average rating of 7.27), while "Social Context Cues" was the least popular function provided by these media (average rank of 6.11 and average rating of 3.84). The second most popular function that these media served was "Connectivity." "Social Presence" was the third most popular function served by these media.

The most interesting findings derived from Table 9 come from comparing the average ranks over the five CMC media with the average ranks over the nine media. Although "Convenience" and "Social Context Cues" were still the most and least popular functions of these five media, "Connectivity" and "Content Management" became equally useful functions served by these CMC media. "Information Seeking" was the third key function served by these media. It is not surprising to see that CMC media were not considered to be very helpful in "Problem Solving," "Social Presence," and "Social Context Cues," since synchronous media (most of which in this case were non-CMC media) would be the most appropriate for serving these functions [Rice, 1993].

In order to statistically assess this question, we conducted a MANOVA test with the seven mean motivation dimensions serving as the independent variables and the mean motivation ratings by media served as the dependent measures. The omnibus F was significant, ($F_{(54, 3763)} = 32.41; p < 0.001$). Thus a series of one-way ANOVA tests were used as a follow-up, to determine how the seven motivation dimensions were best fulfilled by each of the media. The results are presented in Table 10, in which the motivation dimensions are rank ordered from the highest (strongly agree) to the lowest (strongly disagree)

It was not surprising to observe that FtF served best for "Social Context Cues," "Social Presence," and "Problem Solving." Both telephone and mobile were better options for fulfilling the motivations of "Convenience," "Social Presence," and "Problem Solving." In fact, both telephone and mobile had similar patterns in fulfilling each motivation dimension. Furthermore, all three synchronous media (i.e. FtF, telephone, and mobile) were not good at

Table 10: Significant Differences among the Seven Communication Motivation Dimensions across the Nine Media*

Table 10: Significant Differences among the Seven Communication Motivation Dimensions across the Nine Media*							
FtF	<u>Dim7**</u>	<u>Dim6</u>	<u>Dim4</u>	<u>Dim2</u>	Dim1	Dim3	Dim5
Tel	<u>Dim2</u>	<u>Dim6</u>	<u>Dim4</u>	<u>Dim3</u>	<u>Dim1</u>	Dim7	Dim5
Mobile	<u>Dim2</u>	<u>Dim6</u>	<u>Dim4</u>	<u>Dim3</u>	<u>Dim1</u>	Dim7	Dim5
SMS	Dim2	<u>Dim3</u>	<u>Dim6</u>	<u>Dim4</u>	<u>Dim5</u>	<u>Dim1</u>	Dim7
E-mail	<u>Dim2</u>	<u>Dim5</u>	<u>Dim3</u>	<u>Dim4</u>	<u>Dim6</u>	<u>Dim1</u>	Dim7
IM	<u>Dim2</u>	<u>Dim3</u>	<u>Dim5</u>	<u>Dim6</u>	<u>Dim4</u>	<u>Dim1</u>	Dim7
Web	<u>Dim2</u>	<u>Dim1</u>	<u>Dim5</u>	<u>Dim3</u>	<u>Dim4</u>	<u>Dim6</u>	Dim7
Forum	<u>Dim1</u>	<u>Dim5</u>	<u>Dim3</u>	<u>Dim2</u>	<u>Dim4</u>	<u>Dim6</u>	Dim7
SNS	<u>Dim3</u>	<u>Dim2</u>	<u>Dim5</u>	<u>Dim1</u>	<u>Dim6</u>	<u>Dim4</u>	Dim7
<p>* Dimensions are rank ordered from the highest to the lowest for each medium, in which dimensions that share a common underlining are not significantly different from each other. For instance, for face-to-face, the social context cues were significantly different from convenience, information seeking, connectivity, and content management. Social presence and problem solving were significantly different from information seeking, connectivity, and content management. Convenience was significantly different from content management and social context cues. Information seeking was statistically similar to convenience and connectivity. Content management was significantly different from all other dimensions.</p> <p>** Dim1 = "Information Seeking," Dim2 = "Convenience," Dim3 = "Connectivity," Dim4 = "Problem Solving," Dim5 = "Content Management," Dim6 = "Social Presence," Dim7 = "Social Context Cues."</p>							

managing contents (Dim 5). SMS was adopted mainly because of "Convenience." It was perceived not to be good at satisfying motivations of "Content Management," "Information Seeking," and especially delivering "Social Context Cues." E-mail was popular in terms of "Convenience" and "Content Management." It was also good at "Connectivity" and "Problem Solving." IM had very similar patterns to e-mail, in terms of functions fulfilled, except that IM was considered better in "Connectivity" than "Content Management." The Web was considered to be significantly better at fulfilling the motivations of "Convenience," "Information Seeking," and "Content Management," while not good at satisfying motivations of "Problem Solving," "Social Presence," and especially "Social Context Cues." Forum was considered as a relatively good medium for satisfying "Information Seeking," "Content Management," "Connectivity," and "Convenience," while not very suitable for "Social Context Cues." SNS performed relatively better in terms of fulfilling the motivations of "Connectivity," "Convenience," and "Content Management." It was not considered good at "Social Context Cues" either.

In addition, both Tables 9 and 10 further confirmed our media 7-cluster solution, since telephone and mobile had exactly same rank order of motivation dimensions fulfillment, and the relative order of e-mail and IM was also very similar.

VI. DISCUSSION

Student-Specific Motivations for Using CMC and non-CMC for Communication in Learning Contexts

Seven student-specific dimensions of motivation for using CMC and non-CMC media in their learning contexts, labeled information seeking, convenience, connectivity, problem solving, content management, social presence, and social context cues, were identified in this study. In general, this study found that students were motivated to use communication media in their learning contexts, mainly for instrumental reasons, such as information seeking, convenience, connectivity, problem solving, and content management. Others may also use communication media for social motives such as social presence and/or social context cues.

The importance of each dimension in a learning context reflects student preferences in using CMC for different purposes. First, the most important reason for students to use CMC media for communication is how convenient they are, i.e. easy to learn and use and/or quick to access the media and contents [McCreadiea and Rice, 1999]. If the media being designed or implemented are not easy and quick to use, students are unlikely to adopt or use them. Second, our study supports the idea that CMC has vastly expanded connectivity, which allows people to link globally, thus creating a virtual community [Fulk and DeSanctis, 1995; Simons and De Ridder, 2004]. Our study found that participants used CMC to work with other people, no matter where they were. Anytime and anywhere features of CMC have become the driving force for students to use CMC in their learning, especially for group collaboration [Hiltz and Turoff, 2005]. The asynchronous nature of communication technologies is seen to benefit students by providing sufficient time to reflect on their work, and hence form more cogent responses or contributions to group tasks [Lee Price and Lapham, 2003], consequently promoting high levels of cognitive engagement and critical thinking [Althaus, 1997; Solimeno et al., 2008; Wu and Hiltz, 2004].

An instrumental motivation dimension identified in this study, "Content Management," was not identified in any other CMC studies as one of the fundamental motives, although Pena-Shafe et al. [2005] indicated that asynchronous online discussion forums can be used as an archival database for learning materials. From the constructs of the history of communication, file storage and management, the ability to transfer a large quantity of files, and performing multiple functions, this study indicates that students do not only evaluate a medium by its ability to communicate with others, but rather its ability to store and retrieve information. This is a particularly useful functionality for university students, as they are constantly traveling and working between home and university. CMC media, such as e-mail and forum, offer a universal storage platform that can be accessed anywhere. Furthermore, in instances of university group work, where physical meetings are not always possible, the use of CMC media provides a central repository for students with the capability to share and store documents in real-time. One interviewee's comments supported this point:

"... yes, with the forums you can have long discussion with people like group members and you've always got a record of everything that everyone's said so you can go back and it can trace things and stuff as well. ... whether you are floating around ideas or trying to get a grasp of one of the readings or something like that we use the forums because then multiple people can communicate within the same topic and everything is always available for you to read again, again, and again."

This study identified information seeking as one of the important factors for students when making a choice on CMC usage. Similarly, Kaye and Johnson [2004] also identified information seeking, which is an activity of purposefully searching for information, as a motive for using the Internet. Constructs such as "reliability" and "detail" of information indicated that students selected a medium based on the quality of information it can provide, although Metzger and Flanagin [2003] found that students favored the Internet's capacity to increase information quantity, rather than the quality. Another noticeable difference that we found was that students used only the Web or forum as the key means for seeking information, although prior studies found that e-mail, face-to-face, books, magazines, newspapers, and the Web were all highly useful for acquiring information [Flanagin and Metzger, 2001]. This indicated the change of media images over time [Lichtenstein and Rosenfeld, 1984; Perse and Courtright, 1993].

Finally, our study also found that the participants used not only non-CMC, but also CMC, such as e-mail or IM, to clarify issues and solve critical or complex issues. However, our participants did mention that not all CMC could meet their needs in terms of problem solving. They preferred to have real-time conversations for certain important or complex issues. Short messages were always avoided for complex issues to minimize misunderstanding. This finding is consistent with media richness theory which suggests that people would like to choose synchronous media for complex problems [Daft and Lengel, 1986].

Functional Alternatives of Communication Media

Supporting the results of prior studies [e.g., Flanagin and Metzger, 2001; Perse and Courtright, 1993; Rice, 1993], this study also found that face-to-face was distinct in its usage by the fact that it was not clustered with any other media. It was not surprising to find that the telephone and mobile served as functional alternatives. Actually, almost every student had access to a mobile phone, and some international students had access only to a mobile phone, rather than a landline telephone, due to the connection cost for landline telephones. Hence, it is expected that mobile phones will become substitutes for telephones. Even though there are many similarities between e-mail and IM (see Table 1), it is still interesting to find that students view e-mail to be similar to IM in most needs fulfilled, especially for connecting people, seeking information, convenience, solving problems, and social presence. In other words, the functional images of IM have become more similar to e-mail. Kim et al. [2007] found that IM was actually also more closely related to e-mail and SMS, compared to face-to-face and the mobile phone, in terms of the functions that they fulfilled. However, this result was different from the findings of Guo et al. [2009], in which e-mail was clustered together with face-to-face and the telephone, yet located largely apart from IM and SMS. In their study, Guo et al. [2009] attributed the separation of IM from e-mail to the newness and unfamiliarity of IM. They called for further study to observe “whether the almost certain increase in use of IM for communication will influence people’s preference for communication over time” [Guo et al., 2009, p. 13]. The findings of this study confirmed that over time, people have changed their perceptions of IM for communication. Compared to e-mail and IM, forum and SNS are still relatively new to most students, thus still not functional alternatives to other CMC media. Differences among these media, as well as with other media, can be explained by the maturity of the communication media. Since the familiarity and experience of new technology is more important in determining how people use it at its early adoption stage [Guo et al., 2009; King and Xia, 1997; Rice, 1993], we may expect to obtain different images of forum and SNS over time, as in the case for e-mail and IM now. However, since the clustering results were based on all the dimensions of motivation, the distinctions among the motivation dimensions may be obscured.

Normative Images of Communication Media

Indeed, comparing the separate motivation dimensions across all media showed a range of overlapping similarities of the media. We found some interesting relationships between CMC and non-CMC media from the means of the motivation dimensions. The first dimension, “Information Seeking,” was best satisfied by the Web and face-to-face. These two media are thus functional alternatives for this dimension, while other media also function well in this dimension, with SMS being the exception. This result supports Kaye and Johnson’s [2002] suggestion that users are placing more trust on the credibility of websites, and as a result are increasingly seeking information over the Internet. For the second dimension of “Convenience,” almost all media were perceived to be convenient. The high satisfaction achieved across all media supports Papacharissi and Rubin’s [2000] claim that convenience is an important gratification served by all online components.

Although face-to-face was still one of the primary means used to keep people in touch, IM and e-mail have become the most preferred media to connect people. Of course, CMC media allow people to perform tasks or keep in touch without physically meeting, which is a predominant benefit of CMC media. The dimension of “Content Management” was best satisfied by e-mail and the Web. This represents a change from the traditional perspective that e-mail is primarily used for communication [Lightfoot, 2006] or information seeking [Dimmick et al., 2000], indicating the commonality of e-mail among students and the increasing storage capacity available on e-mail. This suggests that a functional difference exists between some CMC and non-CMC media for “Content Management.”

Non-CMC media were still more preferred to CMC media, in terms of “Social Presence.” Among CMC media, IM was as good as e-mail in terms of satisfying this motivation. This demonstrates the change of IM use over time. Nardi et al. [2000] found that IM was used for four major functions: quick question and clarification, coordinating impromptu work-related or phone meetings, coordinating impromptu social meetings, and keeping in touch. Hameed et al. [2006] found that more than half of their respondents preferred talking face-to-face to using IM for developing inter-personal relationships. Furthermore, Guo et al. [2008] found that IM was not the first preferred medium for any communication tasks students performed.

As expected, “Social Context Cues” was well satisfied by face-to-face, telephone, and mobile, but very poorly satisfied by other forms of media, with the exception of IM. We suggest that the reason IM performed better than other types in this respect, was due to its ability to use video and audio features. In comparison, the Web, SMS, e-mail, forum and SNS are primarily text-based communication media, which provide fewer social cues. As the interviewees commented:

“... the other thing about the forum is there is no body language so there’s no tone in somebody’s voice. So when you read it you read it with your own internal dialogue and you read what’s on the board and you

go blah blah blah ... when somebody's speaking to you, you can hear their voice so you can actually emphasize certain points. It's really easy to communicate with voice."

"... you get a lot more out of people's voice like their emotions and things like that. If you try to explain things to people as well, it's really hard to do that over text sometimes."

"Skype (IM) is very similar to the forums. You can have the long discussion with them, except you gain a lot more from talking to people than you do just typing. ... you get a lot more out of people's voice like their emotions and things like that. It is easier to communicate exactly what you're thinking. It is easier to interpret what other people are thinking or trying to say."

As suggested by various researchers, the appropriateness of face-to-face as a communication medium does not change [Flanagin and Metzger, 2001; King and Xia, 1997; Rice, 1993]. This was supported by the results of this study, where face-to-face was ranked highly across most of the motivations. Our interview results also supported this point. For instance, our interviewees commented that:

"... face-to-face I think links people. It links people close. Knowing someone face-to-face, you'll develop a better relationship which means more communication in the future will be ... all the nuances, all the subtleties that come along with face-to-face communication through voice and expressions"

"... face-to-face communicates more than just text or voice because it gives you a reaction. Reactions are very important; they tell you a lot. If a person isn't happy with something, obviously they're going to show it in their facial expressions. So you can say that more information is communicated face-to-face."

The results from this study indicate a noticeable difference in usage of forum and e-mail between students and the general public. A study showed that general bulletin boards (forums) were used to satisfy social contact and entertainment needs [James et al., 1995]. In terms of its information seeking capabilities, a more recent study suggested that forums lacked credibility, since anyone could post messages [Kaye and Johnson, 2004]. However, this seemed to have little impact on the use of forums by university students for information seeking, content management, and connecting tool, at least not in this study. Students considered the forum especially useful for the discussion of specific topics. For instance, one interviewee commented that:

"... if I sent them an e-mail I'd get everything back. If I use a discussion board the same thing. But if we're talking we may stumble upon an idea that I hadn't considered and it may just happen because I display a bit of uncertainty in my expressions. It's almost like serendipity. You accidentally fall onto another topic or by accident, just because of how dynamic conversation is, you might lead to one thing whereas you didn't mean to before. Whereas the use of discussion boards is very narrow. ... [face-to-face] you have to send different messages for each topic whereas this it can just float from one thing to another. You're not likely to get that with a discussion board. They're very strict which is good for specific discussion."

VII. IMPLICATIONS AND CONCLUSION

Implications to Research

This study makes a number of significant contributions to research about media use by students within a learning context. First, in this study we translated the experiences of student media use into the set of gratifications they considered when choosing media for communication in the context of learning. The application of the RGT yielded rich and relevant qualitative data from the interviews. The findings of this study represent a comprehensive list of important student-specific motivations for technology use that meet their communication needs within a learning context. Rather than using prior gratification items, derived from mass communication research or derived from other contexts, future studies that examine the use of technology by students in the context of learning can apply this student-specific technology use scale in order to enhance their study's validity.

Although the seven motivation dimensions identified in this study are not exclusive from those identified in Internet and CMC studies, we have not found a single study that has identified all the dimensions found in this study. This finding not only supports the findings of prior studies in showing that motivations vary across contexts, but also indicates the importance of conducting this research to better understand the motivations of university students for using CMC in such a specific learning context. For example, two common Internet motives, such as entertainment and escape, were not identified in this study [Kang and Atkin, 1999; Papacharissi and Rubin, 2000]. In contrast, some motives were shared because users had similar needs, such as information seeking, social presence, and convenience [Kaye and Johnson, 2004]. Furthermore, this study has contributed to the literature on using CMC in a university learning context. This study emphasizes the importance of satisfying student needs relating to information

seeking, convenience, connectivity, problem solving, content management, social presence, and social context cues. These observations suggest the validity of a user-centered perspective, and encourages further research [Tung et al., 2009] to focus on the needs of the user rather than media characteristics.

Implications to Practice

This study also has practical implications for university policy-makers, educators and technology organizations, with the aim to improve their understanding of student communication needs in a learning context. This research has identified seven motivations for the use of CMC media by university students in their learning contexts. Such an understanding may provide university policy makers and educators with a comprehensive insight into student perceptions for better CMC-mediated learning decisions, as well as strategic decisions to invest in broader technologies in the learning environment. For instance, being part of the so-called “Net” generation, our students have expectations that any technology they use has to be “Convenient”; that means easy to use, quick to learn, and user friendly. When university policy makers and educators decide to implement a new information system into the student learning environment, they must ensure that the selected system meets this essential requirement. Otherwise, they may find that students may not be willing to use it or not use it at all. This finding also implies that organizations that design any new technology in the future must take convenience as a very important feature. Otherwise, they may not be able to attract one of the biggest consumer markets: the students.

As educators, it is vital that we understand what our students want from the technologies they use for communicating. We can serve our customers better only if we know their goals and needs. Then we can select or customize one or more media that best satisfy these needs, and incorporate them into our teaching strategies. For instance, this study identified that students use CMC mainly as a means to communicate with people. Prior studies have found that students felt less threatened or embarrassed to express their opinions, or to seek help from others, in computer-mediated environments [Kitsantas and Chow, 2007; Rau et al., 2008]. Educators can then make themselves available to the students through these preferred computer-mediated channels, such as e-mails, IM, or even discussion forum, or introduce these media into student learning tasks. Through establishing a less stressful environment, the educator may help students transform learning from a traditional passive experience to one of discovery, exploration, and excitement, leading to increased engagement, confidence, and responsibility [Young, 2003]. If students do not feel comfortable to talk to us face-to-face, then let us chat online. Students who are motivated to use the media may then invest more time and effort into their learning and, as a result, improve their academic performance [Frankola, 2001], as well as obtain various educational goals, such as access, engagement, and participation [Rice et al., 2005]. Of course, not everything can be done online. This study found that students would seek synchronous communication media, preferably face-to-face, when they had critical issues to resolve. Educators need to be aware that students still consider traditional communication channels as significant vehicles in problem solving and interpersonal interactions.

Limitations and Future Directions

However, our study was limited in a number of ways. First, this study was limited to participants who were studying at one university, with the majority of them majoring in business. Student majors and university media-use culture may affect their experience with, and hence motivations for, use. Thus, demographics must be considered when drawing conclusions from the results of this study. For an exploratory study, a large sample size exceeding the 163 collected in this study is required to further validate the motivation dimension measures developed in this study. Hence, a further confirmatory study with a large sample size could be conducted in order to create a student-specific motivational scale for technology use. In addition, considering the small sample size of our online survey, a future study with a large sample size may be required in order to assess the non-response bias issue more rigorously.

In addition, this study was limited by the lack of specificity of media being used by the students. Since the purpose of this study was to examine the motivations for using CMC and non-CMC media in a learning context, we included only commonly used media by students. To minimize the number of elements (CMC and non-CMC media in this case) in the interviews, we grouped media with similar features into the same group, such as Facebook and MySpace being considered as SNS group, and deleted some media which were being mentioned by fewer than two students, such as audio-conferencing. We did not include new forms of Web 2.0 communication technologies, such as wikis and blogs, in our study since most of our participants had little or no experience of their use at the time of this study. As Web 2.0 and all its applications are transforming the traditional e-learning world [O'Reilly, 2006], a study examining how and why these new technologies, coupled with existing technologies, are being used for communication in learning contexts would be useful.

One of the limitations of the U&G perspective is its inability to consider the content of the communication through the media, as this may directly affect a student's media selection. For example, a student may use a different medium to transfer video and text (due to differences in file size), may be more or less satisfied with e-mail (depending on the

content of the message), or may copy work published on a website without acknowledgement. Therefore, future studies should be carried out with the consideration of the communication content for a comparative analysis. This user-centered approach has also been criticized as being too individualistic by providing little explanation on the formation of social and psychological needs, or ignoring the social implications of media use [Elliott, 1974; Ruggiero, 2000; Zhu, 2004]. Thus, a study investigating the psychological and social factors that affect student motivations for using media, and the consequences of media-related behaviors is important. For instance, communication apprehension, which is a person's level of fear or anxiety about either real or anticipated communication with other people, has been shown to have a great impact on technology use [Brown et al., 2004; Scott and Rockwell, 1997; Scott and Timmerman, 2005]. People with high communication apprehension are less likely to engage in communication with others than their low communication apprehension counterparts [Scott and Timmerman, 2005]. Because CMC technologies are primarily for communication purpose, a user's anxiety about communicating would probably influence the likelihood of using new CMC technologies [Scott and Timmerman, 2005]. Thus, a future study examining the influence of communication apprehension on student motivations for using CMC in learning contexts may be warranted.

A better understanding of the factors motivating student media use would be useful for university policy-makers regarding the implementation of Information and Communication Technology (ICT) for student use in a university setting. It would also assist our educators in developing ways of effectively using communications media to enhance students learning. Finally, in view of the growing multicultural nature of our classrooms, it is also important to examine the cross-cultural differences in media-use motivations. A better understanding of the cultural impact on media use would assist educators in exploring the applicability of western models of media use in the classroom to students from different cultures. Enhancing our knowledge on this issue would enable institutions to be more successful in educating our future multicultural business executives.

Conclusion

This study is a preliminary effort at providing insightful analyses for university policy makers and educators regarding student motivations for using CMC in learning contexts. We observed that some students enjoyed and extensively used CMC media, while others resisted or never used them at all. Additional studies are needed to develop a discernible typology of different students based on their motivations toward CMC media. Such investigation would help us understand the perceptions of our students specifically toward CMC, and assist educators toward finding a better way to convert those less technology enthusiastic students to appreciate and use CMC media more effectively and efficiently. Further research to examine factors that influence the motivations and outcomes from media related behaviors should also be explored. As suggested by Rubin [1994], psychological characteristics, social contexts, and attitudes influence people's motivations and behaviors.

There has been high institutional investment in technology infrastructure to support more flexible models of teaching and learning within higher education [Kirkup and Kirkwood, 2005]. Without an understanding of the social contexts of CMC use in the universities from the student perspective, the smooth implementation of technologies and flexible teaching and learning models could easily be impeded or disrupted by the anxieties and insecurities of students, caused by rapid change in the learning environment [Breen et al., 2001]. When educators understand the motivations that guide student interactions through various media in their learning contexts, they will be able to accommodate those needs more responsively in their teaching strategies. The use of various CMC media has become pervasive in the lives of this young generation, and a natural extension of themselves [Hoffman et al., 2004]. Hence, it is also important for organizations to understand the motivations and media use of their future executives.

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Editor's Note: The following reference list contains hyperlinks to World Wide Web pages. Readers who have the ability to access the Web directly from their word processor or are reading the paper on the Web, can gain direct access to these linked references. Readers are warned, however, that:

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APPENDIX: QUESTIONNAIRE

Part A: Personal Information

Please complete the following demographic information: (tick the appropriate response)

1. Gender: Male Female
2. Age Group: < 18 19–25 26–30 31–35 >35
3. How many **years** of professional work experience have you had?
 < 1 ≥ 1 but <2 ≥ 2 but < 4 ≥ 4 but < 6 > 6
4. University: UNSW USYD UMACQ UTS
 Other Please Specify _____
5. Study Status: Full time Part time
6. What is the type of degree you are currently studying?
 Bachelor Honors Master by coursework
 Mphil or PHD Other Please specify _____
7. Faculty: Commerce/Economics/Business Science Arts and Social Science
 Engineering Law Medicine Other Please specify _____

Part B: Computer/Internet Experience

The following questions relate to your use of computer/Internet: (circle the appropriate response)

- | | | | | | | |
|--|--------------------------------|---|---|---|---|------------------------------|
| | Extremely
difficult | | | | | Extremely
easy |
| 8. How easy is it for you to access a computer? | 1 | 2 | 3 | 4 | 5 | |
| 9. How easy is it for you to access the Internet? | 1 | 2 | 3 | 4 | 5 | |
| | Not at all
literate | | | | | Complete
literate |
| 10. What is your computer literacy level? | 1 | 2 | 3 | 4 | 5 | |
| 11. How many years have you been accessing the Internet?
< 1 ≥ 1 but < 3 ≥ 3 but < 5 ≥ 5 but < 10 >10 | | | | | | |
| 12. How many hours do you use the Internet for your study during an average day ? (Includes Web searches, e-mails, instant messaging, download lecture notes, etc.)
< 1 ≥ 1 but < 3 ≥ 3 but < 5 ≥ 5 but < 10 >10 | | | | | | |
| 13. Where do you usually go online? Select multiple responses where applicable.
Home Work University Internet Café
Other Please specify _____ | | | | | | |

Part C: Technology Experience

The following questions relate to your usage of communication media.

Terms: Telephone represents landline telephone

Mobile excludes SMS.

Web represents downloading/searching/browse/uploading from Vista or other websites

Forum includes Discussion Forum, electronic bulletin board systems (BBS), and Newsgroup

IM represents Instant Messaging (MSN, Yahoo Messaging, Skype etc), includes both text, video and audio interaction

Social Networking Sites refer to sites such as Facebook and Myspace for social networking

14. What is your ability in using these media? Select "n/a" if you have never used the media

	Not at all expert				Complete expert		
Face to face	1	2	3	4	5	n/a	
Telephone	1	2	3	4	5	n/a	
Mobile	1	2	3	4	5	n/a	
SMS	1	2	3	4	5	n/a	
Web	1	2	3	4	5	n/a	
Forum	1	2	3	4	5	n/a	
IM	1	2	3	4	5	n/a	
E-mail	1	2	3	4	5	n/a	
Social Networking Sites	1	2	3	4	5	n/a	

15. What is your accessibility to each of the media?

	Extremely easy to access				Extremely difficult to access		
Face to face	1	2	3	4	5	n/a	
Telephone	1	2	3	4	5	n/a	
Mobile	1	2	3	4	5	n/a	
SMS	1	2	3	4	5	n/a	
Web	1	2	3	4	5	n/a	
Forum	1	2	3	4	5	n/a	
IM	1	2	3	4	5	n/a	
E-mail	1	2	3	4	5	n/a	
Social Networking Sites	1	2	3	4	5	n/a	

16. How long have you been using each of the media?

	Never	< 1 yr	1- 5 yrs	5 - 10 yrs	> 10 yrs
Face to face	1	2	3	4	5
Telephone	1	2	3	4	5
Mobile	1	2	3	4	5
SMS	1	2	3	4	5
Web	1	2	3	4	5
Forum	1	2	3	4	5
IM	1	2	3	4	5
E-mail	1	2	3	4	5
Social Networking Sites	1	2	3	4	5

17. How often do you use each of the media for your study during a week?

	Not at	Less than once a	About Once a	2 or 3 times a	Several times a	About once	Several times

	all	week	week	week	week	a day	each day
Face to face	1	2	3	4	5	6	7
Telephone	1	2	3	4	5	6	7
Mobile	1	2	3	4	5	6	7
SMS	1	2	3	4	5	6	7
Web	1	2	3	4	5	6	7
Forum	1	2	3	4	5	6	7
IM	1	2	3	4	5	6	7
E-mail	1	2	3	4	5	6	7
Social Networking Sites	1	2	3	4	5	6	7

18. How many **hours per week** do you communicate with your peers/lecturers for **learning purposes** via each medium listed below?

	Never	< 1 hr	1-3 hrs	3-5 hrs	5-10 hrs	10-15 hrs	>15 hrs
Face to face	1	2	3	4	5	6	7
Telephone	1	2	3	4	5	6	7
Mobile	1	2	3	4	5	6	7
SMS	1	2	3	4	5	6	7
Web	1	2	3	4	5	6	7
Forum	1	2	3	4	5	6	7
IM	1	2	3	4	5	6	7
E-mail	1	2	3	4	5	6	7
Social Networking Sites	1	2	3	4	5	6	7

Part D: Communication Attitudes and Behavior

The following question assesses your perceived helpfulness of each of the nine media for satisfying your motivations for using them for communication in your learning contexts.

19. Considering your **learning** environment, please indicate your level of agreement with the motivations for using each of the nine media in learning contexts on a scale of 1–9 (where 1 = “Strongly Disagree,” 5 = “Neutral,” and 9 = “Strongly Agree”).

If you have never used a specific medium in learning contexts, please select “10” for that medium.

Motivation for using the medium	No.**	Face to face	Telephone	Mobile	SMS	Web	Forum	IM	E-mail	Networking Sites
It is easy to access to the medium.	4									
The medium allows quick communication with others.	20									
The medium is easy to use.	13									
The medium allows you to maintain social relationships with others.	19									
Everyone else uses the medium for communication.	30									
The medium allows you to store and manage files.	22									
The medium allows you to keep communication record history.	23									
The medium allows you to use multiple tools for communication, e.g. chat, talk, text, attach file, etc.	15									
Communication through the medium is more formal.	12									
The medium allows you to obtain information from different sources.	17									

Motivation for using the medium	No.**	Face to face	Telephone	Mobile	SMS	Web	Forum	IM	E-mail	Networking Sites
The medium allows you to obtain information from a broad range.	18									
The medium allows you to obtain detailed information.	6									
Information provided by the medium is reliable.	21									
The medium allows you to have a real-time communication.	1									
The medium provides quick feedback.	2									
The medium allows you to communicate with multiple people simultaneously.	11									
The medium allows you to communicate with others no matter where they are.	25									
The medium allows you to know who you are talking with.	3									
The medium allows you to easily have a longer conversation with others.	26									
Communication through the medium will be less intrusive for receiver.*	29									
Communication through the medium provides a more personal touch.	16									
The medium is good at solving critical issues.	31									
You can carry the medium with you.*	9									
The medium allows you to know whether the message is delivered safely.*	27									
The medium allows you to transfer or obtain large quantity of information.	14									
The medium allows you to share information with others.	8									
The medium is good at solving complex issues.	28									
The medium allows you to see other body languages.	24									
It is cheap to communicate with the medium.*	5									
Communication through the medium allows you to clarify the issues easily.	10									
The medium allows you to use text or voice.	7									
Note: * These items were removed after factor analysis, remained twenty-seven items for the final analysis. ** The number presented here is corresponding to the No. column presented in Table 2.										

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