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MOTIVATIONS FOR USING CMC AND NON-CMC MEDIA IN LEARNING CONTEXTS: A USES AND GRATIFICATIONS APPROACH

Motivations pour à utiliser des médias informatisés ou non, dans des contextes d'apprentissage : une approche par les usages et les gratifications

Completed Research Paper

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Abstract

As the use of computer-mediated communication (CMC) by students in the university learning contexts increases, there is a need to better understand students' motivations for using CMC and non-CMC media in their learning. By employing the uses and gratifications (U&G) perspective, this paper identified 7 motivation dimensions including information seeking, convenience, connectivity, problem solving, content management, social presence, and social context cues. Furthermore, this study found that overall CMC media were not functional alternatives to non-CMC media. However, this study revealed some specific similarities and differences between CMC and non-CMC media in terms of each specific motivation dimension. Finally, the paper concluded with a discussion of the implications for both IS researchers, higher education and organizations.

Keywords: Computer-Mediated Communication (CMC), motivations, Uses and gratifications (U&G) perspective, e-learning, functional alternative, media choice

Résumé

Ce papier identifie sept motivations pour l'utilisation de média informatisés ou non-informatisés par les étudiants : commodité de recherche d'information, connectivité, résolution de problème, gestion des contenus, présence sociale, et signaux du contexte social. Cette étude révèle des similarités et des différences entre les médias informatisés ou non, concernant chaque dimension spécifique de motivation, bien qu'en général les médias informatisés ne représentent pas des alternatives fonctionnelles aux médias non-informatisés.

Introduction

Given the increasingly widespread role of computer-mediated communication (CMC) media in higher education teaching and learning, finding ways of implementing and effectively using them are crucial (Breen et al. 2001). However, we know little about students' personal and social motivations for using various CMC as well as non-CMC media (Papacharissi et al. 2000).

Many researchers have examined why and how people use the Internet for communication; however, different communication components of the Internet are functionally different from each other. Each of these forms of media has its own usage conditions and, therefore, should be distinctly and comparatively analyzed (Baron 2004; LaRose et al. 2004). Although the uses and gratifications (U&G) perspective to the studies of media choice offers some insight into the reasons why people adopt a new medium when it becomes available, most have focused on only one new medium at a time (Flanagin et al. 2001). In addition, many of these studies were conducted from a general Internet users' perspective. Few researchers have systemically examined the use of Internet-based CMC in learning contexts from students' perspectives (Kuehn 1994), even though students may have different motivations for using CMC and non-CMC media (Parker et al. 2000). Therefore, this study examines university students' motivations (i.e. uses and gratifications for, and needs satisfied from) using CMC and non-CMC media.

To accomplish this, the following section first briefly describes CMC and then its implications for learning contexts. The next section briefly reviews some common theories about reasons for media choice and use, especially the uses and gratifications approach applied in this study, leading to four research questions. 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 contexts.

CMC Media Characteristics and Implications for Learning Contexts

CMC media are computer-based systems that enable individuals to communicate with others (Rice et al. 1990). Common applications of CMC are email, discussion forums, audio/video-conferencing, white board, news group, chat rooms, instant messaging (IM), listerve, groupware, wikis, blogs, world wide web (WWW), and other forms where communicating is the primary intent. CMC typically is characterized by interactivity and feedback, asynchronicity/synchronicity, electronic transmission and storage of information, structuring of communication, connectivity and integration, multimedia, and hypertextuality (Newhagen et al. 1996; Rice 1984). Through these characteristics CMC systems can reduce delays in information exchange, improve maintenance of records and information received, enhance coordination of geographic dispersed groups, and improve users' capabilities to process large amounts of information (Baltes et al. 2002; Kettinger et al. 1997; King et al. 1997). Thus, forms of communication through the Internet can possess both interactive/social and informational/task-oriented dimensions for users (Flanagin et al. 2001; Papacharissi et al. 2000).

For the purpose of this study, non-CMC media used in learning contexts include face-to-face, telephone, mobile, and Short Service Messaging (SMS). 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 et al. 2000). In particular, universities have incorporated the use of CMC in their teaching and are exploring the use of CMC-based or augmented learning (Bromham et al. 2006; Brown et al. 2004; Hiltz and Goldman, 2005; Tolmie et al. 2000).

Previous studies show that 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 et al. 2005; Lee Price et al. 2004). In particular, the A³ features (anytime, anywhere, anybody) of CMC foster students' active participation

in the learning process and enable instructors to continuously improve their teaching process (Ebner et al. 2007; Hiltz et al. 2005). The asynchronous nature of CMC media gives students enough time to reflect and the opportunities to form a more cogent response or contributions to class activities (Lee Price et al. 2003). 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.

While useful in improving the effectiveness of teaching, the use of CMC in learning does not by itself consistently improve students' academic performance (Fuller et al. 2006). One of the major problems is that students are not utilizing the CMC tools provided to them (Leidner et al. 1993). For example, a study in University of North Texas in 2005 demonstrated that students commonly perceived the online components as optional compared to the traditional face-to-face classes (Bromham et al. 2006). This highlights a lack of engagement from students when CMC media are incorporated into learning. Similarly, Frankola (2001) identifies that learners' motivations are important influences on learning through CMC. In general, then, it is important to understand students' motivations for using CMC media to improve the effectiveness of CMC in facilitating student learning.

Theories about Reasons for Choosing and Using Communication Media

Several theories have been developed to explain media use and the related research has compared media on various aspects. This section will briefly review two sets of primary theories and research results, leading up to an explication of the uses and gratifications approach.

Rational Criteria in Selecting Media

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 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 the particular communication task. Rice (1993) found that face-to-face was rated highest and email was ranked lowest on 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, which refers to the ability of information to change understanding within a time interval. 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 et al. 1986; Daft et al. 1987). 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 email and memos, described as leaner, are preferred for less equivocal tasks (Daft et al. 1987).

As communication media, due to less social presence and less information richness, CMC technologies were described as lacking nonverbal cues, which affected the nature of interpersonal interaction via the medium (Walther et al. 1995). Other researchers, however, have argued for the existence of computer-mediated interaction, lean media being used effectively for social interactions (Rice et al. 1987; Sproull et al. 1986). Also research shows that much CMC conveys nonverbal cues in terms of chronemic cues. Flanagin and Metzger (2001) found that email was used for social bonding, relationship maintenance, problem solving, and persuasion purposes, indicating the newer media may transcend strict media richness predictions and be used for socioemotional or complex tasks (Fulk et al. 1991; Walther et al. 1992).

Social Influences in Media Selection

These inconsistent results of rational media selection theories for the new media suggest that although media attribute (social presence and media richness in this case) is an important concern, especially for managers and decision-makers, it should not be our only concern in making sense of communicating (Yates et al. 1992). The rational model of media selection has led to inadequate attention to the individual social and psychological differences 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 et al. 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 et al. 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, and coworker and supervisor attitudes and behaviors can positively or negatively influence individuals' attitudes toward the use of new media (Fulk 1993; Rice et al. 1991; Schmitz et al. 1991).

Uses and Gratifications Motivations for and Satisfactions 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 people to select certain media 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.

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 et al. 2001). This approach proposes that users base their media selection on, initially, their expectations about how well a communication medium might 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 or another, and what they get from it (Ruggiero 2000). 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 users' motivations or reasons for using a particular new medium whenever it becomes available (Elliott et al. 1987). However, relatively little U&G research has addressed the issues of CMC use in the university contexts, so that is the primary focus of this study.

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 et al. 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 indicated that the needs for surveillance, personal identity and diversion were equally strong influences. Korgaonkar and Wolin (1999) established five motivations for web users: escapism, information control, interactive control, socialization, and economic. Papacharissi and Rubin (2000) also developed a scale of Internet usage motives that consisted of five primary dimensions: interpersonal utility, pass time, information seeking, convenience, and entertainment. Stafford and Stafford (2001) identified five key underlying dimensions of web use motivations: searching, cognition, new and unique, socialization, and entertainment. Stafford et al. (2004) identified 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 et al. 2001). Collectively, the U&G perspective has been very useful in understanding motivations and needs for using the Internet.

These studies, however, examined motivations for using the Internet in a very general way, although recognizing various functions of the Internet (Parker et al. 2000). In addition, most of them examined Internet motivations with previously defined mass media gratifications items instead of identifying the gratification uniquely associated with various Internet components used in specific contexts (such as student learning). Knowledge of students'

motivations associated with CMC and non-CMC media for learning, therefore, is an important step in describing and explaining the use of the CMC and non-CMC media in the university context. Thus:

RQ1: What motivations influence students to use CMC and non-CMC media?

RQ2: Which groups of students' motivations do CMC and non-CMC media fulfill best?

According to the U&G perspective, media can be differentiated by the needs that they are typically perceived to meet (Lichtenstein et al. 1983). Perse and Courtright (1993, p. 486) define the "normative image" of a communication medium as "widely shared perceptions about a medium's typical usage." The normative images of communication media thus vary since some media are better than others for satisfying different communication needs (Flanagin et al. 2001; Perse et al. 1993). Further, various media may be "functional alternatives" media that fulfill similar needs and have similar normative images (Flanagin et al. 2001; Perse et al. 1993). The introduction of widely used and rapidly changing new technologies has no doubt changed the images and uses of new communication media (Flanagin et al. 2001; Williams et al. 1983). Previous studies suggest that as the media environment changes, the usefulness of different media for satisfying communication needs also changes (Flanagin et al. 2001; Perse et al. 1993). For example, Rice (1993) found that new media were rated as more appropriate for fulfilling lean information exchange tasks than prior studies had indicated. Flanagin and Metzger (2001) found that newer media may be used for both relatively rich and lean tasks. Perse and Courtright (1993) found that interpersonal media were overwhelmingly rated highest for motivations of show affection, control, or inclusion. Some prior studies found no other communication media were clustered, based on motivations or attributes, with face-to-face communication, indicating its distinctive usage (Flanagin et al. 2001; Perse et al. 1993). Rice (1993) suggested that new media clustered with each other. A recent study found that email was perceived to be functionally equivalent with the traditional medium of the telephone (Flanagin et al. 2001). Given the wide adoption of new communication media, coupled with the complex interdependence of communication media on each other (Flanagin et al. 2001), the re-evaluation of the normative images of new media is crucial for better understanding how people in general select different media for fulfilling their different needs, and in particular students. Thus:

RQ3: Which CMC and non-CMC media are perceived by students as functionally similar (share the same motivations) in learning contexts?

RQ4: Which groups of CMC and non-CMC media are rated most highly for satisfying students' various motivations for using media in learning contexts?

Research Design

Kuehn (1994) suggested a two-stage research design for uses and gratifications profile development. Identifying student motivations for using CMC and non-CMC media in learning contexts is the first step of this study. A pilot study was first conducted through an interview and sorting process to identify the different needs university students aimed to satisfy when selecting and using the five CMC and four non-CMC media in their learning contexts. Then, these need statements identified in the first step were measured and analyzed in a large scale survey in order to assess the student's motivations across these nine communication media.

Student Motivations for Using CMC and non-CMC Media: A Pilot Study

A set of structured interviews was performed in this stage to achieve two goals: to produce a comprehensive list (elements) of current CMC media utilized by students, and to yield a set of motivation statements (constructs) unique to students in the university context. We adopted the Repertory Grid Technique (RGT) (Tan et al. 2002) to collect raw statements of reasons for using communication media in learning. A total of 15 university students, 9 males and 6 females, were interviewed. All of the participants had an average of 4 years university experience and the experience of Internet usage was at least 5 years.

First, the five commonly used CMC media in learning contexts were identified: website, forum, IM, email, and social networking site. Literature suggests that experience with using various new media has a great impact on how those media are used (King et al., 1997). Thus, some new communication media, such as wikis and blogs, were not included in our analysis since most of interviewees had no experience using them as of the time of the study. We also provided four non-CMC communication media, face-to-face, telephone, mobile, and SMS, representing researcher-supplied elements to measure and compare the differences between CMC and non-CMC media.

By design, the repertory grid interview process adopted in this study allowed participants to freely voice their opinions to achieve the greatest construct elicitation effect. As a result, the 15 interviewees produced a total of 298 raw comments. For the purpose of data analysis, we first consolidated 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, cost), resulting in 232 unique statements. Then, these 232 statements were content analyzed by following the generic content analysis procedure for RGT (Jankowicz 2004). Based upon their semantic similarities, 232 statements were consolidated into 31 unique constructs or motivations (e.g., "can only access at one place", "can be carried around", and "is not with me all the time", were considered as aspects of the same construct, mobility). Table 1 shows the 31 unique constructs.

Interestingly, two common Internet motives such as entertainment and escapism (Kang et al. 1999; Papacharissi et al. 2000) were not identified by the students as their motives for learning. These results do not mean that these two dimensions are not important. It is probably because we asked students to identify motivations for learning purpose only and students do not feel that using media in learning is fun or help them escape from the reality at all.

Table 1: Unique Constructs Identified during Pilot Study

No.	Unique Construct Identified	Number of Participants Mentioning this Construct (N=15)	Description of the Construct
1	Synchronicity	12	The medium allows you to have a real-time communication (or not).
2	Feedback	12	The medium allows you to get quick feedback (or not).
3	Familiarity of communicators	12	The medium allows you to know who you are talking with (or not).
4	Accessibility	10	It is easy to access to the medium (or not).
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).
7	Verbal communication	10	The medium allows you to use text or voice, (or text and voice).
8	Information sharing	9	The medium allows you to share information with others (or not).
9	Mobility	9	You can carry the medium with you (or not).
10	Clarification of issues	9	Communication through the medium allows you easier to clarify the issues (or not).
11	One to many communication	9	The medium allows you to communicate with multiple people simultaneously (or not).
12	Formality of interaction	8	Communication through the medium is more formal (or informal).
13	Easy of use	8	The medium is easy to use (or not).
14	Large quantity of information	8	The medium allows you to transfer or obtain large quantity of information (or not).
15	Multimedia	8	The medium allows you to use multiple tools for communication, e.g., chat, talk, attach file etc. (or not).
16	Personalness of interaction	7	Communication through the medium makes you feel more personal touch (or not).
17	Sources of information	7	The medium allows you to obtain information from different sources (or not).

18	Range of information	7	The medium allows you to obtain information from a broad range (or not).
19	Socializing	6	The medium allows you to maintain social relationships with others (or not).
20	Speed	6	The medium allows you to quickly communicate with others (or not).
21	Reliability of information	6	Information provided by the medium is reliable (or not).
22	File management	6	The medium allows you to store and manage files (or not).
23	Communication history	6	The medium allows you to keep communication record history (or not).
24	Nonverbal cues	6	The medium allows you to see other body languages (or not).
25	Geographic distance	6	The medium allows you to communicate with others no matter where they are (or not).
26	Communication length	5	The medium allows you to easily have a longer conversation with others (or not).
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 at solving complex issues (or not).
29	Intrusiveness	4	Communication through the medium will be less intrusive for receiver (or not).
30	Social influence	4	Everyone else uses the medium for communication (or not).
31	Criticality	2	The medium is good at solving critical issues (or not).

Formal Survey

Participants and Procedures

266 university students were approached within their respective laboratory classes and asked to complete a questionnaire designed to assess their usage of 9 communication media (the five CMC and four non-CMC media) for satisfying the 31 motivations identified in the pilot study. For each of these 9 communication media, participants were also asked to report their levels of expertise and accessibility, and their frequency of access and weekly usage of the media. 163 usable questionnaires (other questionnaires were incomplete) were used for subsequent data analysis. Table 2 below provides demographic and media use information.

Measures

Communication Media: All CMC and non-CMC media used in our pilot study were included in this study: website, forum, IM, email, social networking site, face-to-face, telephone, mobile, and SMS. 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.

Motivations for Using Media: The 31 final unique motivations derived from the pilot interview study were transformed into short and easily understandable sentences. Respondents were asked to rate their level of agreement with the motivations for using each of the 9 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 skip sections that dealt with a particular medium if they had never used it before.

Table 2: Demographics and Media Related Experience

Gender*		Age*	
Male	60.7%	<=18	5.5%
Female	38.7&	19-25	92%
		26-30	1.8%
Degree*		Study Major*	
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)*		Average Internet Usage (hours)*	
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**		Computer / Internet Experience	Mean (S.D.)
>=1 but <3	0.6%	How easy is it for you to access a computer? ***	4.58 (.70)
>=3 but <5	8.6%	How easy is it for you to access the Internet? ***	4.51 (.76)
>=5 but <10	64.4%	What is your computer literacy level? ****	4.11 (.80)
>=10	24.5%		

* N=162; **N=161;*** Scale 1-5 from 'Extremely Difficult' to 'Extremely Easy'; **** Scale 1-5 from 'Not at all literate' to 'Complete Literate'

Data Analysis Techniques

For Research Question 1, identifying students' motivation dimensions for using communication media, we used a principal component factor analysis with varimax rotation to extract and interpret potential motivation dimensions (factors) (Papacharissi et al. 2000). Factors with eigenvalues greater than one and at least two items were retained, and items were retained as representing a factor if they had a loading of at least 0.5 on that factor and no more than 0.4 on any other factor (Hair et al. 1998). The validity of the factors was confirmed through a Cronbach's alpha reliability analysis. Responses to the retained items were averaged to form the scales representing each motivation dimension, and their means were compared.

To answer Research Question 3, we 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, motivations 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 et al. 2001; Perse et al. 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.

Table 3: Factor Loadings of the Seven Motivation Dimensions

Motivation Items	Informa-tion Seeking	Conveni-ence	Connect-ivity	Problem Solving	Content Manage-ment	Social Presence	Social Context Cues
Range of information	0.84						
Sources of information	0.80						
Details of information	0.79						
Reliability of information	0.76						
Accessibility		0.85					
Speed		0.85					
Easy of use		0.80					
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				
Complexity of issues				0.72			
Clarification of issues				0.67			
Criticality of issues				0.65			
Communication history					0.73		
Large quantity of information					0.67		
Multimedia					0.61		
File management					0.59		
Personalness of interaction						0.75	
Synchronicity						0.59	
Feedback						0.57	
Familiarity of communicators						0.56	
Formality of interaction						0.52	
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 Variance Explained:	29.4	9.8	6.4	6.1	4.6	4.2	3.9
Cronbach's Alpha:	0.88	0.89	0.83	0.76	0.77	0.76	0.67

The point at which the curve flattens 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.

Research Questions 2 and 4 were assessed by using Multivariate Analysis of Variance (MANOVA) (Hair et al. 1998) with the motivation dimensions and media clusters derived from research questions 1 and 3, respectively, as the independent variables and the mean motivation ratings as the dependent variables.

Findings

Motivations for Using Communication Media

Concerning Research Question 1, Table 3 shows the results of the factor loadings and the reliability analyses. Seven factors, containing 27 needs, emerged with eigenvalues greater than 1.0, explaining 64.49% of the variance. Four items, guarantee delivery, mobility, cost, and less intrusive for the receiver, did not meet the loading criteria and were removed from the subsequent analysis. The Cronbach alpha for each mean scale was acceptable, except for a slightly low reliability of the last factor.

The first factor "Information Seeking" consisted of four items reflecting the range and quality of information that could be obtained through the use of the media. The second factor "Convenience" contained items that illustrated the ease of using a medium. The third factor "Connectivity" consisted of six items describing the ways people communicated with one another across time and space. "Problem Solving" included motivations such as solving complicated and critical issues. The fifth factor "Content Management" included four items that described the ability of a medium to manage and communicate a large quantity of information. "Social Presence" was the sixth factor containing the five items describing the characteristics of the interaction during a communication. The last factor "Social Context Cues" consisted of two items that described the different nature of communication.

Table 4: Agglomeration Schedule for Cluster Analysis of Nine Media

Stage	Cluster #	Media Combination	Distance Coefficient	Dissimilarity Ratio*
1	8	Telephone and Mobile	45.75	1.84
2	7	IM and Email	84.12	1.58
3	6	Face-to-face and Telephone	133.08	1.09
4	5	Face-to-face and IM	145.78	1.04
5	4	SMS and Website	157.27	1.02
6	3	SMS and Forums	160.44	1.40
7	2	SMS and Social Networking Site	224.98	1.27
8	1	Face-to-face and SMS	286.61	-

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

Functional Alternatives

Research Question 3 concerned functional similarity of media. Similarities were assessed by a hierarchical cluster (using Squared Euclidean Distance) analysis of the communication media according to how similarly they were rated in satisfying the 27 motivations. The scree plot and the dissimilarity ratio were evaluated to determine the optimal number of cluster solutions. The results from the analysis are illustrated in Tables 4. The results from the scree plot were inconclusive, as there was no clear flattening of the dissimilarity ratio curve. However, according to the Agglomeration Schedule, the dissimilarity ratios were the greatest between cluster 7 and cluster 8 (ratio = 1.84). This suggested that 8 clusters of communication media were the optimal of cluster solution.

Further observation of the theoretical relevance of each cluster demonstrated that the use of telephone and mobile by university students were very similar. This suggests that they were functional alternatives of each other, i.e.,

satisfying the same motivations for using them. Thus, the 8 clusters of media are website, forum, IM, email, social networking site, face-to-face, telephone/mobile, and SMS.

Relationships between Motivations & Communication Media

Research Question 2 asked which groups of students' motivations were best fulfilled by different communication media. To answer this question, a MANOVA test was conducted with the 7 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 (48, 3704) = 36.97; p<.001). Thus a series of one-way ANOVA tests was used as a follow-up to determine how the 7 motivation dimensions were best fulfilled by each of the media clusters. Table 5 presents the results.

Table 5: Mean Motivation Ratings by Motivation Dimensions

	Information Seeking*	Convenience	Connectivity	Problem Solving	Content Management	Social Presence	Social Context Cues
Website	7.47_{a}	7.53_{a}	6.39_{b}	4.85_{c}	6.96_{ab}	4.66_{c}	2.54
Forum	6.42_{a}	6.01_{a}	6.36_{a}	4.52_{b}	6.39_{a}	4.45_{b}	2.42
IM	5.89_{ac}	7.56_{b}	7.51_{b}	6.26_{ac}	6.68_{c}	6.54_{ac}	3.74
Email	6.27_{a}	7.57_{bc}	7.12_{bc}	6.51_{ac}	7.36_{bc}	6.45_{a}	2.45
Social Networking	5.20_{acd}	6.20_{bd}	6.37_{bd}	4.67_{ac}	5.90_{abd}	4.84_{ac}	2.54
Face-to-face	7.18_{abc}	7.59_{abd}	6.64_{ac}	8.06_{bde}	4.69	8.11_{bde}	8.31_{de}
Tele/Mobile	5.81_{a}	7.80_{bd}	6.38_{a}	7.19_{cd}	4.02	7.42_{bcd}	5.13
SMS	4.77_{a}	7.38	6.09_{b}	5.90_{b}	4.90_{a}	6.08_{b}	2.40
N**	109	108	112	109	109	111	108

*: each motivation item was measured from 1= "strongly disagree" to 9 = "strongly agree".
**: participants who never used the medium were not included in the analysis.
$_{a}$: means with the same letter in the subscript within the same row were not significantly different from one another.

Website was considered to be significantly better at fulfilling the motivations of "Convenience", "Information Seeking", and "Content Management", while not good at satisfying motivations of delivering "Social Context Cues", "Problem Solving", and "Social Presence". 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". IM was also used heavily to fulfill motivations of "Convenience" and "Connectivity". Email was better than IM in satisfying motivation of "Content Management". Social networking site performed relatively better in terms of fulfilling the motivations of "Connectivity", "Convenience", and "Content Management". It was not good at "Social Context Cues". Face-to-face was significantly better at fulfilling all motivations except "Content Management". Telephone and mobile were better options for fulfilling motivations of "Convenience", "Problem Solving", and "Social Presence". They were not good at "Content Management", as well as delivering "Social Context Cues". SMS was adopted mainly because of "Convenience". It was perceived not to be good at satisfying motivations of "Information Seeking", "Content Management", and especially delivering "Social Context Cues".

Research Question 4 asked which communication media were most useful for satisfying students' motivations for using media. To assess this research question, a MANOVA test was conducted with the media clusters as the independent variables and the 7 mean motivation ratings as the dependent variables. The omnibus F was significant, (F (49, 6030) = 62.68, p<.001). With these significant results, a series of one-way ANOVA test was used as a follow-up to determine how the 8 communication media were different in terms of fulfilling each of the 7 motivation dimensions. A summary of the ANOVA analysis results is presented in Table 6.

Both Website (7.55) and face-to-face (7.07) were used more heavily than the other media to fulfill the motivation of "Information Seeking", while SMS was the least appropriate medium for information seeking. "Convenience" was well satisfied by most communication media. Four non-CMC media, coupled with two popular CMC media, email

and IM, performed similarly in this dimension, whereas forum and social networking site demonstrated less capability to meet this motivation.

A surprising result was found for the third dimension "Connectivity", which represented a group of people communicating with one another. Two popular CMC media, IM and email were found to be as good as the traditional meeting format, face-to-face, in fulfilling this motivation. Other CMC media also performed relatively well in this dimension. For "Problem Solving" dimension, face-to-face became dominant. Other media were also popular for fulfilling this motivation except website, social networking site, and forum. The "Content Management" dimension was best satisfied by email (7.34) and website (6.88). It was moderately satisfied by other CMC media, while the non-CMC media were relatively unsatisfactory for "Content Management".

The sixth dimension of "Social Presence" was very well satisfied by almost all synchronous communication media. Email, as an asynchronous medium, also demonstrated the capability of meeting this motivation. In contrast, other asynchronous 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.

Table 6: Mean Motivation Ratings by Media Clusters

	Website	Forum	IM	Email	Social Networking	Face-to-face	Tele/ Mobile	SMS
Information Seeking	7.55_{a}	6.38_{ce}	5.62_{bdef}	5.93_{bcde}	5.23_{bdf}	7.07_{a}	5.40_{def}	4.43
Convenience	7.47_{a}	5.90_{b}	7.46_{a}	7.47_{a}	6.23_{b}	7.58_{a}	7.73_{a}	7.29_{a}
Connectivity	5.96_{abc}	6.17_{abc}	7.37_{d}	6.92_{ad}	6.34_{abc}	6.46_{abd}	6.24_{abc}	5.92_{bc}
Problem Solving	4.66_{b}	4.30_{b}	5.98_{acd}	6.35_{cd}	4.69_{b}	8.10	7.03	5.61_{ac}
Content Management	6.88_{bcde}	6.30_{bcdf}	6.53_{bcd}	7.34_{be}	5.86_{cf}	4.46_{a}	3.77	4.71_{a}
Social Presence	4.46_{bcd}	4.35_{bc}	6.35_{a}	6.19_{a}	4.92_{bd}	8.09	7.30	5.96_{a}
Social Context Cues	2.26_{a}	2.33_{a}	3.53	2.19_{a}	2.52_{a}	8.47	5.10	2.24_{a}
N*	162	139	152	161	112	160	161	154

*: participants who never used the media were not included in the analysis.
$_{a}$: means with the same letter in the subscript within the same row were not significantly different from one another.

Discussion

Seven student-specific motivation dimensions for using communication media in learning contexts -- information seeking, convenience, connectivity, problem solving, content management, social presence, and social context cues -- were identified in this study.

In general, students were motivated to use CMC in university mainly by instrumental reasons, which has been defined as an active and purposive orientation (Rubin 1994). This study identified information seeking as one of the most important factors for students when making a choice among CMC and non-CMC media. Similarly, Kaye and Johnson (2004) also identified information seeking, an activity of purposely searching for information, as a motive for using the Internet. Constructs such as "range" and "detail" of information indicated that students selected a medium based on the quality of information it can provide.

No prior study identified all the dimensions found in this study, and one of the 7 motivation dimensions appeared to be unique. "Content Management" was not identified in any prior Internet studies as an instrumental motivation. From the constructs of history of the communication, file storage and management, ability to transfer large quantity of files, and performing multiple tasks, this study indicates that students do not only evaluate a medium by its ability to communicate with others, but also by its ability to handle information. This is a particularly useful functionality for university students as they are constantly traveling and working between home and university. As discussed

earlier, students did not indicate that entertaining and escape, which are two common motives for using Internet-based CMC in the general public, were their motivations for using media in learning contexts. In contrast, some motives are shared across many studies, as users have similar needs such as information seeking, social presence and convenience (Kaye et al. 2004). Others may use CMC for connectivity, social presence and social context cues.

The nine communication media examined in this study were not functional alternatives, except telephone and mobile. In terms of the motivations satisfied by these media, this study found that the five CMC media showed little similarity with each other and with the four non-CMC media. One possible explanation for this finding was the choice of media assessed in the study. Although these media shared common features, they were elicited based on their unique functional features in a learning context. These unique features were used by students to satisfy different motivations; hence no media other than the telephone and mobile were used to replace others and thus clustered together. Another explanation of the results was related to the maturity of the communication media. With the exception of social networking sites, all the other media have been available to students for an extended period of time. Thus, in the perspective of students, they may not consider these computer-mediated systems as new technologies, and hence the new media did not cluster together on the basis of "newness" (Rice 1993). Finally, the clustering results were based on all the motivation dimensions, thus obscuring the distinctions among the motivations.

Indeed, comparing the separate motivations across the media shows a range of overlapping similarities. We found some interesting relationships between CMC and non-CMC media based on the means of the motivation dimensions. The first dimension "Information Seeking" was best satisfied by website and face-to-face. These two media are thus functional alternatives over this dimension, while telephone/mobile, forum, IM, email and social networking site were also similar in their level of rated motivation. The results support Kaye and Johnson's (2002) suggestion that users have become more trusting of the credibility of websites and 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.

In general, CMC media outperformed non-CMC media in terms of "Connectivity". CMC allows people to perform tasks or keep in touch without physically meeting, as face-to-face. CMC media are also far cheaper than telephone or mobile for communicating. The dimension of "Content Management" was best satisfied by email and website. This represents a change from the traditional perspective that email is primarily (or solely) used for communication (Lightfoot 2006) or information seeking (Dimmick et al. 2000), indicating the commonality of email among students and the increasing storage capacity available on email. This suggests that a functional difference exists between some CMC and non-CMC media for "Content Management".

The non-CMC media were still more satisfying than CMC media in terms of "Social Presence". Among CMC media, IM was as good as email 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.

As expected, "Social Context Cues" was well satisfied by face-to-face and telephone/mobile, but very poorly satisfied by others, with the exception of IM. The reason IM performed better than others in this respect, we suggest, is due to its ability to use video and audio features. In comparison, website, SMS, email, forums and social networking sites are primarily text-based communication media which provide fewer social cues.

As suggested by various researchers, the appropriateness of face-to-face as a communication medium does not change (Flanagin et al. 2001; King et al. 1997; Rice 1993). This was supported by the results of this study, where face-to-face ranked highly across most of the motivations.

The results from this study indicate a noticeable difference in usage of forums and email 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 et al. 2004). However, this seems to have little impact on university students' use of forums for information seeking, connecting and content management tool, at least not in this study.

Limitations and Future Directions

Like other social science research, this study suffers from some limitations. First, this study was limited to participants who were currently studying at one university with the majority of them majoring in business. Students' majors and university media use culture may affect their experience with and motivations for using them. Thus, generalizability of the results and conclusions drawn from this study must consider the demographics. For an exploratory study, a large sample size more than the 163 collected in this study is required to further validate the results. Then 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, 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 motivations for using CMC and non-CMC in learning, we only included commonly used media by students. To minimize the number of elements (CMC and non-CMC media in this case) in the interviews, we had grouped media with similar features into the same group, such as FaceBook and MySpace, and deleted some media which were being mentioned by fewer than two students, such as audio-conferencing. As Web 2.0 and all its applications, such as wikis and blogs, are transforming the traditional e-learning world (Duffy et al. 2006; Elgort et al. 2008; 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 U&G perspective is its inability to consider the content of the communication through 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 email depending on the content of the message, or may copy someone's work published on the websites without acknowledgement. Future studies, thus, can 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 students' motivations for using media and the consequences of media-related behaviors is important. A better understanding of factors motivating students' media use would be useful for university policy-makers regarding the implementation of information and communication technology (ICT) for student uses in a university setting. It would also assist our educators in finding ways of effectively using media in their teaching. 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 cultural impact on media use will assist educators to explore the applicability of western models of media use in the classroom to students from different cultures. Enhancing our knowledge on this issue will enable institutions to be more successful in educating our future multicultural business executives.

Implications and Conclusion

One of the key contributions of this study to existing literature is the identification of student-specific motivation dimensions. Seven motives for CMC and non-CMC usage were identified in this study by employing a U&G approach. Thus, this study extends existing research in U&G and reaffirms its usefulness in the study of new media.

Furthermore, this study has contributed to the literature on using CMC in a university context. As universities continue to adopt and use of computers and Internet within their teaching, research in this domain can assist universities to maximize the educational potential of CMC. This study emphasized the importance of satisfying student needs relating to information seeking, convenience, connectivity, problem solving, content management, social presence, and social context cues. This suggests the validity of a user-centered perspective, and encourages further research to focus on the needs of the user rather than media characteristics.

This study also has practical implications for university course designers and marketing groups with the aim to improve their understanding of students' needs for communication. This research has identified seven motivations for university students to utilize CMC and non-CMC media. University course designers who are aware of students' motivations can select or customize one or more media that best satisfy these motivations and incorporate them into their teaching. 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 the various educational goals noted earlier (such as access, engagement and participation) (Rice et al. 2005).

The advanced understanding of university students' motivations for using CMC and non-CMC media is also useful for marketing groups. When targeting university students, marketing groups can create advertisements or utilize forms of communication that are perceived as likely to satisfy students' learning needs. This knowledge can help marketing groups catch the attention of students and improve the likelihood of responding. Additionally, with the knowledge of the likely media that university students use, marketing groups wishing to target students can use those media as venues for advertising and promotion.

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

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