Mobile Phone Communication Competence (MPCC): Development and Validation of a New Measure

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MOBILE PHONE COMMUNICATION COMPETENCE (MPCC): DEVELOPMENT AND VALIDATION OF A NEW MEASURE

by

Emil Bakke

A Thesis
Submitted to the
Faculty of The Graduate College
in partial fulfillment of the
requirements for the
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School of Communication

Western Michigan University
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2008
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Emil Bakke
MOBILE PHONE COMMUNICATION COMPETENCE (MPCC):
DEVELOPMENT AND VALIDATION OF A NEW MEASURE

Emil Bakke, M.A.
Western Michigan University, 2008

More than two billion people around the world have adopted mobile phones for communication. Interpersonal communication research has found that communication competence is an essential human need required to fulfill interpersonal objectives to achieve physical and psychological satisfaction (Spitzberg and Cupach, 1984), however, mobile phone communication competence has yet to be studied. The purpose of this study is to develop and validate a new scale designed to measure Mobile Phone Communication Competence (MPCC); a principal component factor analysis uncovered the structure and dimensionality of the MPCC measure. The results from the factor analysis in this study identified six constructs: asynchronous communication, willingness to use, feature selection, comfort with technology, communicator competence and communicator affect. The relationship of the constructs in the MPCC measure is synthesized in a three-step process of mobile phone communication competence: initiation, interaction and outcome. The MPCC scale and process of communication competence aid researchers to identify areas of users’ mobile phone communication competence, furthermore, the process of MPCC creates a framework for future discourse and research.
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CHAPTER I

INTRODUCTION

Remember using a watch to tell time, carrying around bulky organizers or using a payphone to communicate when traveling? Today, people use the mobile phone. Not only does it allow people to communicate via sound, text and video, it has also become a personal organizer, source of entertainment, a fashion statement, and lastly, a primary communication between peoples’ personal and social networks (Campbell, 2008; Katz 2006; Leung & Wei, 2000; Ling, 2004).

Because of its converged quality, a large part of mobile phone research takes place in the interdisciplinary field of Computer-mediated Communication (CMC). The mobile phone is a CMC device; it is controlled by a combination of computer and telecommunication technology involving text, audio and video exchanges (Bubas, 2001; Spitzberg, 2006). Historically, CMC research focused on its limitations compared to that of Face-to-Face communication (FtF). Though, current research indicates that lack of nonverbal cues facilitate or even surpass FtF interactions by removing the emphasis people place on nonverbal cues such as clothing and appearance. It illustrates the vital role of CMC and mobile phone research in the study of human communication.

In addition to the growing body of CMC research, users or consumers of such technologies operate within cultural norms and practices, learned from a variety of perspectives, and within particular psychological contexts. Mass communication theories such as Katz and Blumler’s (1974) theory of uses and gratifications account for such social, cultural and psychological nuances of individual media users. A focus
on the individual suggests that people actively search among media and select the medium that provides the most content gratification. Users choose mobile phones as a primary communication medium for its converged quality, content gratifications and access to social networks. Currently, more than two billion individuals around the world have embraced mobile phones as a communication medium (International Telecommunication Union, 2005).

While interactants benefit from mobile phones’ new and efficient ways of communicating, research also indicates that mobile phone communication is of public concern and many struggle to navigate private conversations in public spaces (Katz, 2006; Ling, 2004; Licoppe & Heurtin, 2001). People do not share a dichotomous view of mobile phone’s positive or negative attributes, as indicated by the wide range of information emerging from mobile phone usage research. Although personal and cultural differences shape people’s mobile phone uses and attitudes (Campbell, 2007; Katz & Aakhus, 2002), mobile phones are woven into the fabric of daily communication and represent the most basic “communicative aspect of human existence” (Kasesniemi & Rautiainen, 2002). A comprehensive social and cultural analysis of mobile phone usage is beyond the scope of this study, yet research findings and needs certainly warrant such exploration. Scholars and policy makers should not study mobile telephony as a passing trend because it is here to stay (Johnsen, 2003). In fact, based on growing usage, mobile phones are becoming the primary medium of communication – both interpersonally and across regions not yet ‘wired’ for traditional telephone service.

There are several typologies of mobile telephone research. Safety and security motivate individuals to adopt a mobile phone. For others, the lack of technical knowledge may dissuade interactants to communicate by picture and text messages,
while skilled communicators modify their mediated communication to create an appropriate and effective outcome. Motivation, knowledge and skill establish the construct of communication competence. Spitzberg and Cupach (1984) summarized communication competence as an essential human need required to fulfill interpersonal objectives to achieve physical and psychological satisfaction. Though it provides a method to understand interactants’ mobile phone communication, mobile telephone research has yet to study communication competence.

This study will construct and validate a new scale designed to measure mobile phone communication competence. The Mobile Phone Communication Competence (MPCC) measure draws its theoretical underpinning from Spitzberg’s model of Computer-mediated communication competence (2006). The MPCC scale measure interactants’ mobile phone communication competence along the constructs of: motivation, knowledge, self-efficacy, skill and outcome.

Although competence is a primary aspect of mobile phone communication, research has yet to measure interactants’ mobile phone communication competence. Chesebro and Bonsall state the significance of human beings to “control the technologies they employ” (1989, p. 126). Such control will be achieved by understanding the medium. The MPCC measure is a resource to understand interactants mobile phone communication competence. According to Thorbjørnsen and Nysveen (2005), the public should be encouraged to integrate the use of mobile phones in everyday life; moreover, interactants must spend time and money to refine one's mobile phone performance. Mobile phones serve as an important relationship-building tool, and interactants’ level of communication competence influence interpersonal relationships’ satisfaction.

Two studies are used to develop and validate the MPCC scale. The purpose of
Study One is to adopt items from Spitzberg’s (2006) proposed model of Computer-mediated Communication Competency, apply it to mobile phones to create and validate the Mobile Phone Communication Competence scale (MPCC). Development of the MPCC scale consisted of the following steps: a) wording of items on the existing CMC Competence scale were modified and pilot tested, b) an exploratory factor analysis was conducted to examine the factor structure of the new instrument, and c) the instruments test-retest reliability was evaluated. Study Two tested the validity of the MPCC measure.

Chapter two provides a historical framework of mobile telephony, overview of current mobile telephone research, and explores CMC and communication competence research as it applies to mobile telephony. The review of literature illustrates that there is a viable need to further mobile phone communication competence research. Results of the study offer a mobile phone communication competence scale and a process of mobile phone communication research. Finally, in the discussion section, the relationship of the constructs in the MPCC measure is synthesized in a three-step process of mobile phone communication competence: initiation, interaction and outcome.

The MPCC measure and three-step process of communication competence aid researchers to identify areas of users’ mobile phone communication competence. Mobile phone communication research is multidisciplinary (including the area of mass communication, psychology, sociology, anthropology and communication studies). As such, this study creates a framework for future discourse and research. The MPCC measure and process of mobile phone communication competence will assist future mobile phone researchers to test assumptions and outcomes of mobile phone communication.
CHAPTER II

REVIEW OF LITERATURE

Mobile Telephony

Overview

Mobile telephone technology and history must be considered to fully comprehend its impact on human communication. Early inventors recognized accessibility, coordination and security as principal reasons for mobile telecommunications, and they continue as primary reasons for individuals to acquire mobile phones to this day. According to the industry analyst group, Unstrung, the number of mobile telephone users exploded from thousands to billions in two decades (2006). However, political and corporate disagreements over technological standards have influenced the current state of mobile telephony. As such, mobile telephone users are not a homogenous group. For example, while the mobile phone was invented in the United States, its popularity has lagged behind other western countries (Robbins & Turner, 2002). Several topologies must be considered when researching contexts. Unique pricing structures, handset incompatibilities, varying quality and accessibility of mobile telephone service influence interactants’ mobile phone communication.

Historical Considerations

The mobile phone is a result of the foresight, research and development of early inventors of telephony and wireless radio. Graham Bell invented the telephone
in 1876, and Guglielmo Marconi, patented a wireless telegraph system in England in 1897 after testing wireless radio communications of Morse code in London (Agar, 2004; Gershon, 2003). Marconi sought the English Royal Navy as a beneficiary of his new technology for two reasons. First, the batteries required to create the spark of electricity needed to transmit the radio waves were massive and the navy’s large ships were capable of transporting the batteries. Second, it created a perfect opportunity for the fleet to warn of maritime dangers and to keep the fleet organized at war (Agar, 2004). It would take a little more than thirty years before the mobile phone was sought on land.

The automobile enabled people to travel further and faster, as such; pioneering work on car-bound radio communication was initiated in the 1920 (Agar, 2004). The first mobile car telephone system was adopted by the Detroit Police Department in their effort to catch up with criminals increased mobility. The system was introduced in 1921 and was fully automated by 1928 (Agar, 2004; “Mobile Phone Safety,” 2004). Early attempts to communicate via airwaves were based on mobile radio communication and were not compatible with the telephone network. This changed in 1946 when the first commercial Mobile Telephone Service (MTS) was launched in St. Louis, Missouri (Agar, 2004; Gershon, 2003). The immediate success of the MTS highlighted issues of cross channel interference that occur when mobile users share radio waves, for example, 730 mobile phone users in New York City had to share 12 channels.

Over the next few decades, American telecommunication companies continued working on refining mobile telephony. Ultimately, in the 1970s, AT&T and Motorola developed a radio scheme that reused frequencies in a geographic service area by dividing the area into separate coverage areas named “cells”
Cellular technology allows a set of frequencies to be re-used non-adjacent cells so handsets with low powered transmitters (to prevent co-channel interference) can connect. Advanced Mobile Phone Service (AMPS), an analog-based cellular service, was tested using 10 cell sites in Chicago, Illinois, 1978. Five years later, in 1983, AMPS became the first commercially available cellular service in North America.

By this time, American telecommunication companies moved from being technological leaders, to playing catch-up with European and Japanese mobile technology. According to King and West (2002), “The question is not whether they missed the boat, but rather how they missed it given their advantage at the time” (pg. 190). Multiple reasons were suggested as factors in this turn of events: 1) US telecommunications were enjoying great profits from wired telephony and did not have a monetary incentive to push new technology, 2) they experienced difficulty from Federal Communications Commission (FCC) in receiving necessary radio-wave licenses to expand the cellular phone network, and 3) The US government ultimately split up the Bell System in 1984 due to regulatory concerns. Thus, the Bell System lost some of the momentum and unity (or monopoly) needed to launch a standardized cell phone system across the country (Agar, 2004; Gershon, 2003; King & West, 2002). Both European and Japanese Telecommunication Companies enjoyed a de jure (legal) institutional role, thus easily developed a standardized mobile phone network (King & West, 2002). This standardization proved essential to mobile telephony. It created the foundation for features like multimedia messaging which elevated the mobile phone to a CMC device, and it fueled the explosion of users embracing mobile telephone communication.
Europe – Setting the Standard

The Nordic countries, Norway, Sweden and Finland have played a central role in developing, and organizing mobile phone technology and industry. Sweden performed trials with over-the-air police radio as early as 1933, and in the 1950s, Swedish Telecommunications Administration tested what many believe to be the world’s first automated mobile telephone system (Gershon, 2002). In 1962, the Nordic countries gathered in Norway to discuss the future of a multinational collaborative mobile phone network. The result was a standard called Nordic Mobile Telephony (NMT). In 1981, Sweden, Saudi-Arabia and Norway had implemented the first multinational automated mobile phone system. Within a year, Norway had 30,000 mobile phone subscribers – the largest of any country (Nordsveen, 2005). It was an early sign of mobile phone’s tremendous popularity. The NMT standard was expanded to include several European countries; it grew to become Europe’s largest mobile telephone system in 1991. Although it competed with the new digital European Groupé Special Mobile (GSM) standard since it was launch in 1991, the NMT system was used in Norway until 2004 (Agar, 2004; “One year left with NMT,” 2003).

Just as NMT was a result of a Nordic collaboration, GSM would prove to be a successful collaboration among European countries sharing a vision of a digital mobile telephone network that allowed users to roam across nations without service interruption. Talks regarding GSM started as early as 1982, though it would take another decade before it was launched (Agar, 2004). Along with the new GSM standard, innovative features we find in today’s mobile phones emerged, in addition, big mobile telecommunication corporations created a solid hold on the mobile telephone market Early players, such as Ericsson, Motorola and Nokia are still
industry giants with a combined mobile phone handset market share of 60 percent (Mobile Tracker, 2006).

**Current Mobile Telephone Standards**

*Analog Mobile Telephones*

The first commercially available mobile telephone system was analog. Systems such as AMPS and NMT are therefore referred to as 1st Generation (1G) systems. These handsets had good voice quality, but they did not include features we expect in today’s mobile phones. This changed when mobile phone handsets converged with computer technology to enable transfer of digital voice and data.

*Digital Mobile Telephones*

The 2nd Generation (2G) mobile telephone handsets were digital and included additional features besides voice communication such as text messaging and the ability to transfer data. Mobile phone carriers also welcomed the digital phone’s ability to compress data. Between three to ten digital handsets use as much bandwidth as one analog mobile phone (Gershon, 2003). There are currently three types of handset technology used in the current 2G market: 1) Groupé Special Mobile (GSM), 2) Code Division Multiple Access (CDMA), and, 3) Integrated Digital Enhanced Network (iDEN).

The most common mobile phone standard is GSM. The technological backbone of GSM service is called Time Division Multiple Access (TDMA). It is a multiple access method that splits each frequency into time slots so each user receives an allocated time slot for when their communication occur (Gershon, 2003). Naturally, this process takes place so quick that users do not notice a delay in service.
The technology is made possible by compressing the data, so the transmission is smooth due to lowered bandwidth. GSM telephone service is currently available in more than 180 countries and far surpasses that of any competitor. According to the industry analyst group Unstrung, GSM dominates the wireless market with more than 80 percent share (2006).

Code Division Multiple Access (CDMA) is the second largest mobile phone standard. Gershon (2004) explains, “CDMA uses spread spectrum technology, which involves spreading the transmission over a range of frequencies rather than directing it toward a single channel like conventional radio” (p. 186). One can compare CDMA technology with encryption, where the transmitter will send signals to many phones simultaneously, however, only one handset has the “key-code” needed to decrypt and understand the message or transmission. Less than forty countries worldwide offer CDMA service. Last year CDMA experienced a growth of almost 50 million subscribers, which is about 10 percent of GSM service (“Mobile market hits 2.5B,” 2006).

*Third Generation (3G) and Beyond*

3G mobile phone handsets are currently available around the world as countries adopt the new technology. Both GSM and CDMA systems have their proprietary 3G technologies. 3G mobile phones feature an incredible convergence of technology by combining video, voice and high-speed data transfers. 3G mobile phone users will be able to videoconference other subscribers, download and exchange large amounts of data, access the internet with broadband speed or use their telephone to watch TV (“3G,” 2006). As such, the mobile telephone has become a true multimedia CMC device.
Computer-mediated Communication and Mobile Phones

Computers and technology have played a significant role in the academic field of human communication for several decades. In 1949, Shannon and Weaver introduced The Mathematical Theory of Communication with a model of communication based on information technology. Current models of interpersonal and mass communication include elements such as receiver, channel, message and noise that came from the Shannon and Weaver model. Technology continues to impact communication research as mediated communication changes human communication practices.

According to Kerr and Hiltz (1982), Computer-mediated Communication (CMC) is "more than a replacement for the telephone, mails, or face-to-face meetings, computer communication is a new medium for building and maintaining human relationships" (p. 9). More than two decades ago, Kerr and Hiltz (1982) coined the term CMC and predicted its impact on communication and ability to transform its users. A CMC user may be troubled by the lack of nonverbal cues and struggle to replicate the accuracy and vibrancy expressed in Face-to-Face (FtF) communication. However, once comfortable with CMC, users learn to appreciate the computational power of CMC, the convenience of asynchronous messaging, and lastly, the sense users feel that "it is possible to be in more than one place at a time and to be in several times at one place" (Kerr and Hiltz, 1982, p. 102). Chesebro and Bonsall (1989) conclude that computer-human communication creates new social consequences by modifying users' sociology and psychology "involving new time and space relationships, new vocabularies, and more organized human relationships" (p. 125).
Fundamentally, CMC not only impacts how and with whom we communicate. Research even indicates that CMC interaction surpass that of FtF. While early CMC research focused on its limitations compared to that of FtF interactions, current research indicates that the lack of nonverbal cues can facilitate interpersonal interactions. CMC can act as a catapult to interpersonal interactions by removing nonverbal cues such as interactants’ mannerism, clothing and tone of voice. As a result, interactants feel liberated from having to focus on nonverbal cues (Walther & Parks, 2002). People also tend to rate their CMC network and groups more positive than FtF on social and intimacy dimensions, and even outperform FtF groups when looking at interpersonal communication. Walther suggest that "hyperpersonal communication" is a useful label for CMC interactions because it is interpersonal, yet it gives the sender and receiver additional options when communicating (1996). Senders have time to edit messages before they are transmitted to make sure they are positively projected, while receivers tend to inflate the perception they have of the sender by filling in the missing cues with favorable information.

Early CMC studies observed the effects of mediated channels such as landline telephones, fax and stand-alone computer terminals; current research focus on networked computer systems and the Internet. Although there are more mobile telephone users in the world than computer and landline telephone users combined, little CMC research has focused on mobile telephony (Campbell & Russo, 2003; International Telecommunication Union, 2005; Tilak, 2006). New generation mobile phones have the capability to replace or substitute all the traditional CMC channels people currently use. The added features of mobile phones will strengthen the relationship between the device and its user, and a dependency on the medium is potentially created. The uses-and-gratification theory provides a theoretical
foundation that explains and predicts users’ mobile phone behavior and dependency.

Uses and Gratifications of Mobile Phones

What are the gratifications for mobile phone users to spend money on screensavers and interface-themes? The Uses and Gratifications Theory focuses on mobile phone interactants’ socio-psychological choices. In 1974, Blumler and Katz’s developed the uses and gratification theory, it suggests that the consumer of media play an active role when they select and use a medium. The uses-and-gratification theory adapts a sociopsychological view focusing on the individual – the consumer of media. “The audience member is largely responsible for choosing media to meet needs and knows his or her own needs and how to meet them” (Littlejohn & Foss 2005, p. 286). Based on earlier analog telephone gratifications research, Leung and Wei found that mobility and immediate access gratifications were primary reasons for mobile phone users to adopt the technology (2000); mobile phone users are motivated to spend more time using their phone when they see the entertainment, time management and social interaction value in cell phone use. Furthermore, Westmyer, DiCioccio and Rubin (1988) researched effectiveness and appropriateness of media channels in a study framed within uses and gratifications theory; people view the use of oral communication such as FtF and telephony as more competent when satisfying interpersonal needs.

The relationship among audience, media and the larger social system reflects the dependency component of Uses and Gratifications research. Individuals have a choice among media, and will choose based on the most gratifying media within their culture and socially acceptable environment. However, media independency is contingent on media plurality. Consumers are less dependent on media when they
have multiple gratifying media to choose among. According to the theory, users will only become more dependent on the mobile phone as existing media converge. With the emergence of 3G mobile phones, media such as: television, cameras, computers, and telephones are combined into one medium – the mobile phone. Individuals will no longer have to select among multiple media, instead they may depend on the mobile phone.

Although the mobile phone device creates gratifying uses and dependency, social factors also play a large part in shaping mobile phone use. Early critics of the uses and gratification theory underscore the importance of social influences. Katz, Blumler, and Gurevitch (1974) researched typologies of media uses and gratifications in an early attempt to systematize research in the field. They concluded that there has been too much focus on the media message in uses-and-gratifications research, and that the research must advance past simple profiling and documentation of media consumers to actually finding the “social and environmental circumstances that lead people to turn to the mass media for the satisfaction of certain needs” (Katz, Blumler & Gurevitch, 1974, p. 516). Furthermore, Katz and Sugiyama critique the application of Uses and Gratifications mobile phone use because of lacking logical clarity (2005). While Ruggiero suggests that the Uses and Gratifications theory is insufficient when explaining people’s "old" media, such as television consumption, the introduction of telecommunication provide media consumers with a range of medium to choose among (2004; Ruggiero, 2000). In this context, uses and gratifications research may provide clues as to why people select one medium over another, and how users decide to interact with the medium. For example, Canary and Spitzberg (1993) discovered that lonely users in some cases select media based on the gratification of combating loneliness.
According to Wei (2008), a major motivation and gratification for using the mobile phone is its ability to bridge interpersonal communication with that of a mobile device. The following section outlines current mobile phone research to illustrate a topology of mobile phone uses.

Current Trends in Mobile Phone Research

Overview

Mobile phones have a central role in the communication practices for more than two billion people in the world (International Telecommunication Union, 2005). While research indicates that some people believe mobile phone communication is a public nuisance, others find the mobile phones’ ability to remove time and space constraints in communication only positive. It is important to note that a debate between positive and negative aspects of mobile communication is not a dichotomy; rather cultural and personal differences determine people’s attitudes toward mobile phones (Katz & Aakhus, 2002).

The tremendous growth of mobile phone use has been the most intense in Scandinavia, but is commonplace across Europe, Japan, Korea, Israel and rapidly growing in North America (Ling, 2004). According to the International Association for the Wireless Telecommunications (2008), 256 million Americans own a mobile phone. This is up from 34 million subscriptions in 1995 (U.S. Census Bureau, 2004). Incredibly, it means that over 200 million US users adopted the technology in a little more than a decade. The adoption rate of American mobile phone ownership is a reflection of that of other countries. For example, a survey found that 100 percent of teens aged 16-20 own a mobile phone in Norway, and that 86 percent of all Norwegians over the age of eight had a mobile telephone (Ling, 2006). As such, the
importance of the mobile phone in our society cannot be overstated. The following
sections will highlight current research on the mobile phone as CMC medium.

Adoption and Use

According to Ling and Haddon (2003), safety, display, and coordination are
the primary reasons for purchasing a mobile phone. Research reveals that people feel
much safer when owning a mobile phone and that safety is the basic reason for people
to acquire mobile phones even though no real emergency ever took place (Ling,
2004). Ling discovered that 82 percent of participants completely agreed with the
belief that mobile phones are useful safety devices. While there is no gender
difference, older people are the most content about mobile phones safety capabilities.
Campbell (2007) also discovered cultural differences; mobile phone users from
Sweden were significantly less likely to use their mobile phone for safety and security
than those from the US. Ironically, safety is also of concern when using the mobile
phone. Research concludes that driving a car while talking on the phone will greatly
increase the chance of accidents, in addition, there are insignificant differences
between those using the handset or those utilizing hands-free systems (Ling, 2004).

Katz and Sugiyama (2005) researched mobile phone’s role as a display
statement about a person’s status in a larger cultural society. Indeed, almost 50
percent of college students believe that a mobile phone should look “cool.” The
mobile phone as a style and status symbol is more important for younger mobile
phone users. Additionally, younger heavy mobile phone users are more concerned
about style than younger users who are not considered heavy users. The significance
of mobile phones as a fashion statement or decoration is apparent. Mobile phone
users display blinking blue-tooth cordless earpieces, wear handsets visibly attached to
belts, purchase expensive decorative handset covers, or simply install a fake antenna on vehicles to create the appearance of owning a mobile phone.

The mobile phone is consistently used for social coordination. It removes the need to plan and organize activities because the phone makes it easy to contact people directly either through voice or text messaging. Ling and Yttri (2002) coined the term micro-coordination to describe how mobile phone users can use the phone to arrange the day as it takes place. Before the mobile telephone, people setup meetings which participants were expected to attend in a timely matter. About 30 percent of its users will use their mobile phone to coordinate, plan, arrange and re-arrange agreements. Ling indicates the mobile phone users' social- and micro-coordination allow for "softening of schedules." For example, people get upset if someone shows up 30 minutes late for an appointment; however, it is accepted if the individual calls to notify that they will be 30 minutes late. Coordination also saves travel time because time can be managed when en route. According to Ling and Haddon (2003), those using mobile phones saved almost twice the amount of travel compared with those that only used landline phones.

Public and Private Space

Constant connectivity has created tension between mobile phone users and their environment in private, public and work settings. In Western culture, observers of public phone conversations often interpret public mobile phone use negatively. There are two aspects of public mobile phone use that are most disturbing. People act publicly as if they are in a private setting by changing the modulation of their voice conversing about private matters, and secondly, it makes those around the mobile phone user uncomfortable because they are eavesdropping on a private conversation
(Ling, 2002). Cumiskey (2005) describes a negative response felt by observers, of public mobile phone use, as being "morally excluded by the mobile phone user" when the supposedly “private” conversation takes place among a public audience (p. 233).

Interestingly, mobile phone users also view public phone use negatively. According to Cumiskey (2005), participants in a study reported mixed emotions about their own public mobile phone use. One hand, phone users realize that they might violate expectations about social behavior if they answer a ringing phone, but at the same time, they feel trapped because they do not want to turn down or disappoint those calling. Ito (2005) found teen mobile phone users struggling with privacy, intimacy and autonomy regarding friends' constant mobile phone use and accessibility. Furthermore, Katz (2006) discovered that young people found it irritating and threatening when friends received frequent calls from their buddies. In an attempt to develop a model to explain people's attitudes toward mobile phone use in public, Love and Kewley (2005) discovered that personality affects people’s attitudes; while extroverts were comfortable being close to mobile phone use in public space, introverts would attempt to avoid the situation. As much of the current research focuses on the impact mobile phones have on people’s behavior in social places, Love and Kewley (2005) suggest there is a need for further socio-psychological mobile phone research.

Mobile communication has changed from being a supplement to traditional communication media to a replacement. According to Julsrud (2005), this has sparked creation of a mobile workplace infrastructure that integrates the mobile worker. Examples of changes include open work-zones, movable desks, small rooms that fulfill the need for quiet and private space, as well as, flexible work schedules. Companies pay for employee’s mobile phones to replace their office phones and
increase worker availability. Although beneficial for both workers and employers, Julsrud (2005) argue that it creates a tension between public and private communication space. Sociologist Ervin Goffman described the tension as a theater stage with a public front stage versus private back stage (Julsrud, 2005). The theater stage is analogous with individuals’ need to juggle privacy while performing publicly. People use mobile phones to call individuals, not places. As such, those receiving calls have little control managing the call. The receiver of the call feels tension if the location is public, but topic of conversation is private.

Fortunati (2005) offered a critique of Goffman's front stage and back stage analogy when analyzing mobile phone communication. While researching 20 mobile phone users over 200 hours, Fortunati discovered that mobile phone communication is weakening the tension between private and public communication. For example, people are now accustomed to eavesdropping on others private mobile phone conversations in public, or having intimate phone conversations in public themselves. Furthermore, mobile phone communication does not end in the privacy of the house, instead, it is expected that mobile phone users answer their phone wherever they are located.

*Students and College Classrooms*

Campbell (2006) researched perceptions of mobile phone use in classrooms among students and faculty. Subjects showed general negative attitudes about mobile phones in the classroom environment. Ringing in the classroom was universally regarded as a serious problem. Participants supported policies restricting use of mobile phones, though younger users were significantly less likely to support policies regarding mobile phone use. It is interesting to note that subjects did not believe that...
mobile phones were a resource for cheating. The belief that the context and age determines users’ attitudes and perceptions toward mobile phone use is consistently found in research. Younger users are more tolerant toward mobile phones; teens do not experience use of mobile phones in schools as a concern, as long as, students turn the sound off (Katz, 2003; Ling & Yttri, 2005). Students also prefer text messaging for communication in education since it would least likely interfere with those around them. Ling and Yttri (2005) predicts that Norwegian teens will further their mobile telephone use as they become older; however, the expressive and intensive use they currently exhibit as teens will fade away.

Social Networks

The mobile phone stimulates change in how people negotiate space (Weilenmann, 2001). Research suggests the mobile phone will not only strengthen the bond among members in personal and social networks, but mobile communication is today’s social network (Johnsen, 2003; Leung & Wei, 2000). Additionally, mobile phone interactants’ gratifications for using the mobile phone motivate family and social communication (Leung & Wei, 2000). Women are more likely to use the mobile phone to strengthen social ties, while men tend to use their mobile phones to coordinate daily activities. Unlike calling landline phones, calling an individual’s mobile phone is more personal because one is calling the individual and not a household, thus people are more comfortable making personal calls because it is directly to the individual (Ling, 2004).

Mobile phone users display commitment and show reciprocity to individual mobile phone users in their social network by giving out their mobile number, answering calls, sending text messages and initiating mobile phone conversations
There are two trends in use of mobile phones that affirm the strength of interpersonal relationships: lengthy mobile phone conversations, sometimes even ritualized, which take time out of each person's day, and the short and frequent conversation gestures such as text messages (Licoppe, 2003). Active and committed mobile phone users not only feel greater satisfaction using mobile phones, they find others' public mobile phone conversations less disturbing and bothersome.

Fortunati (2001) discovered that people who live at the same residence for more than 20 years had a higher penetration of mobile phones than those who move often; thus, they suggest ownership of a mobile phone does not mean the owner is mobile. On the other hand, Kim (2002) proposed the mobile telephone promotes a nomadic lifestyle because people are no longer required to go home to communicate with others either through wired telephones or F2F interactions.

Perceptions and uses of mobile phones can be socially constructed. In their research, Campbell and Russo (2003) discovered that members of a personal communication network share feelings of comfort with the technology. Members also agree on uses such as microcoordination and hypercoordination (Ling & Yttri, 2002); furthermore, they share the perception that the mobile phone handset is important for display, safety and security. In a unique study with members of the social support group Alcoholic Anonymous, Campbell and Kelley (2006) discovered that group members consider the mobile phone a valuable and central part of an individual's recovery because they had direct and constant access to the support. This was even the case among members who were new mobile phone users.

Mobile phone communication reinforces and supports social ties among members by organizing the topic of talk in smaller groups, and ultimately, initiates F2F communication (Taylor, 2005). Taylor refers to this phenomenon as parallel talk.
because the mobile communication complements instead of substitute FtF communication (2005). The reverse is also true; individuals who frequently meet FtF are most likely to communication with mobile phones (Ishii, 2006)

Asynchronous Communication via Text Messaging

When Nokia sent the first text message in 1993, they had no idea that they just revolutionized mobile telephony (Agar, 2004). The technology is referred to as Short Message Service (SMS) and allows users to share messages up to 160 characters in length between compatible handsets. Text messaging has two advantages: it is relatively inexpensive and it is asynchronous so recipients of text messages do not have to read the message immediately (Ling, 2005). Text messaging is also a convergence of written and verbal language; uniquely adapted to work with handsets’ tiny keypads and SMS’ limited message length (Ling, 2004). According to Hård af Segerstad, the average mobile phone text message is 64 characters, well below the maximum allowed, and the user takes advantage of asterisks and emoticons to enhance their messages, while frequently abbreviate words in "the form of unconventional and not yet established abbreviations" (2005, p. 331). Additionally, he also discovered that text message language style simulates that of informal spoken interactions.

In a Norwegian study, teenagers find SMS to be the preferred form of interaction, more so than e-mail, instant messenger, landline telephone or voice over mobile phones (Ling, 2004). In the same study, one teenager claimed that mobile telephony equals the importance of text messaging. Women, teens and young adults are the most frequent text messengers. More than 85 percent in this group text message daily and only 2 percent of this group did not send text messages.
Interestingly, over one third of all text messages sent have to do with coordination messages such as "the car is done so we can get it at 4" (p. 340). Kasesniemi and Rautiainen described the importance of text messaging in Finland to manage everyday activities from reading horoscopes, to accessing the yellow pages (2002). Mobile phone users in Finland can even purchase a paperback guidebook that contains pre-made templates of expressions that mobile phone users can copy as their own text message if they need creative assistance. This example: "Sorry, I've got a feeling my keypad's locked today. See you around," is an original way of letting someone know that they do not feel like text messaging that day.

Although it takes time typing text messages, mobile phone users feel they save time text messaging because they do not waste time with verbal banter. According to Ling (2004), people use text messaging in groups to maintain, coordinate and case for social contacts. One example is what Ling refers to as "grooming messages." These messages are considered "gifts" to the recipient. Examples are messages such as "great party last week," or "it was so nice to see you again." These messages are expected to be answered in a timely manner to show sign of reciprocity. Ling credited 17 percent of all text messages to be "grooming" messages, while one-third deals with coordination and one-fourth are miscellaneous questions and answers. As with interpersonal communication, men are more likely to send text messages to plan activities, while women are more prone to send grooming messages. Women also tend to write longer messages. While teenagers who frequently use mobile phone text messaging and Internet chatting, are more likely to spend time with friends and to participate in social activities (Torgersen, 2004). Research also indicates that it is the communication that motivates users to send messages, the mobile phone technology such as the SMS or a mobile phone device's
advanced features is not that important (Kasesniemi & Rautiainen, 2002; Puro, 2002).

**Cross Cultural Research**

Cross-cultural mobile phone research is two-part; one deals with social and communicative similarities and differences among countries and cultures, while the others focus on mobile telephony as an agent of change in developing countries.

There is a parallel of mobile phone use in countries that have wide spread mobile phone adoption rate. People across cultures, gender and socioeconomic status tend to use mobile technology in similar patterns (Ito, 2005; Kim, 2002). Katz and Aakhus identified similarities in communication habits associated with mobile phone use in Finland, Israel, Italy, Korea, the United States, France, the Netherlands, and Bulgaria. The authors explained, “despite the great variations in cultures – from teen dating to family arrangements and from economic based to social hierarchies – the use and folk understanding of the mobile phone seem to be pressing toward conformity and uniformity” (2002, pp. 313-314). An example, while countries such as Norway and Japan are culturally different, teen’s mobile telephone practices such as hypercoordination and softening of schedules are found in both countries (Ito, 2005). In a similar study, Mante (2002) revealed that mobile phone needs and values did not differ between the Netherlands and USA.

There are also culturally created differences in uses and attitudes. According to Campbell (2007), attitudes and perception of mobile phone use in public settings varied among cultural groups: Swedish and American students were more tolerant of mobile phones than those from Japan. While other cultures may struggle with mobile phone disturbance in public space, Israelis have a very different attitude. Israelis talk louder on their mobile phones everywhere and all the time (Lemish and Cohen,
"There is virtually no place where Israelis do not use their mobile phone: on public buses and trains, in restaurants, banks, offices, clinics, theaters and classrooms, and of course the streets" (Schejter & Cohen, 2002, p. 40). Schejter and Cohen (2002) explains, Israelis "have never been known for their exemplary behavior and elegant manners" (p. 39), and their mobile phone communication style is simply representative of other communication patterns.

In Japan, mobile phones and text messaging becomes an important communication channel among friends because teens do not socialize much together due to lack of space in Japanese homes (Ito, 2005). Japanese students have the highest phone bills of all Japanese mobile phone users, and while Japanese teens’ parents do not have a problem with the frequency of their child's mobile telephone conversations, they do assist in controlling their telephone pattern (Ito, 2005). There are also very different norms and ethics regarding use of mobile phones in public. In Japan, people do not talk while using public transportation and a phone ringing is violation of public space. Some bus drivers will even prohibit people that talk on the phone to enter the bus. Thus, unlike their western counterparts, Japanese teens meet to socialize in public spaces and keep their mobile phone conversations at home. Ito (2005) found that, in some examples, Japanese teen’s text messaging during the day would eventually lead to a voice call later at night. Not only do text messaging lead to increased social interactions, communication that spans across cultures and technologies, such as the mobile phone, promotes social change (Spitzberg and Cupach, 1984).

Rheingold (2002) illustrates the following as examples of grass roots organized events that created social change with mobile phone technology: 1) President Joseph Estrada of the Philippines was ousted from power when more than
one million residents organized demonstrations via text messaging, 2) the World Trade Organization 1999 meeting in Seattle was disrupted by anti-globalization grass roots organizations equipped with mobile phones and internet access, 3) a British activist group outraged at the cost of gasoline, organized gas-strikes via mobile phones and internet activism.

Horst and Miller examined the role mobile communication plays in the lives of low-income and impoverished Jamaican’s and found that it had become “integral to people’s relationship to health, crime, and other people as well as to their own sense of self” (p. 2). According to Host and Miller (2006), mobile phones create and strengthen interpersonal relationships instead of replacing face-to-face communication. Mobile phones change the value of communication, thus should not only be considered a replacement of wired telephones or simply a short-lived new technology. The relatively low expense of mobile phone compared to other mediated channels, such as computers, will further its penetration into Jamaican’s lives. Horst and Miller point out similarities with other developing countries, such as those in Asia and Africa. The mobile phone has become a vehicle for anti-globalizing efforts and is expected to be a valuable tool for “development and poverty alleviation throughout the world” (p.2).

Mobile phones are also favored, over the Internet, as the technology used to fight worldwide poverty. For example, the mobile phone has become an important step toward a universal phone system for the impoverished nation of Bangladesh. Telenor, a Norwegian mobile operator, teamed with Grameen Bank, a Bangladesh micro-lender, provides mobile phones to women with good credit history. These “phone ladies” rent out their mobile phone to villagers. The result is that villagers can now communicate despite the nation’s poor infrastructure. According to Sullivan, the
“phone ladies” earn about twice the national average after they have paid off interest for their loan, and mobile phones are closing the digital divide because it allows hundreds of millions of people to inexpensively connect and communicate with the world (2007).

Overview of current research illustrates a variety of uses for mobile telephones. For example, safety motivates many people to own mobile phones, while the lack of knowledge prevents many mobile phone users to take advantage of features such as picture and text messaging. Skilled people alter mobile phone use based on context to create appropriate and effective interpersonal communication. Motivation and knowledge are the building blocks that give competent communicators the skill to create interpersonal communication with effective and appropriate outcome. However, mobile phone research has yet to combine all of these elements to study the communication competence of mobile phone users.

Spitzberg (2006) offers the following metaphor when explaining the value of studying and developing CMC competence theory: Imagine a theatre performance, the actor must be motivated to give a good performance, however, motivation alone is not sufficient if the actor does not know the script. CMC competence is the script. To successfully research mobile phone communication, one must have a universal understanding of the interaction among contexts. Instead, current mobile phone research focuses on actors’ props (technological devices) when analyzing a performance (competency). The following section briefly outlines interpersonal communication competence research, summarizes Spitzberg’s model of Computer-mediated Communication Competence and argues the need to create an instrument to measure Mobile Phone Computer-mediated Communication Competence.
Communication Competence

According to Spitzberg and Cupach (1984), communication competence is an essential human need required to fulfill interpersonal objectives and achieve physical and psychological satisfaction. Foote and Cottrell (1955) coined the term interpersonal competence. However, communication competency does not enjoy a consistent definition in literature (Backlund & Wiemann & Backlund, 1980; Livingstone, 2004). Spitzberg and Cupach (2002) define interpersonal competence "as the evaluative impression of the quality of interaction" (p. 575). In Backlund and Wiemann's research, competence is understood to be dependent on both knowledge and the ability for use (1980). Furthermore, an individual's ability to read or write is the historical meaning of literacy; thus, literacy and fluency are additional terms used to describe competency (Bunz, 2003; Livingstone, 2004). Some scholars view competency from a behavioral perspective, focusing on the skills needed to complete tasks. A cognitive approach does not try to explain the events or processes; instead, it looks at the cognitive process underlying the event (Wiemann & Backlund, 1980). A cognitive view of communication competence analyzes the potential for performance, while behavioral approach is concerned with the effectiveness of the communication (Wiemann & Backlund, 1980).

Communication competence is a matter of degree; not an absolute because there are multiple levels of appropriate and effective interpersonal situations (Spitzberg, 1988). Research shows interactants perceive a competent communicator to be relaxed, empathetic, supportive and able to change their communication practice depending on the interpersonal encounter (Wiemann, 1977). As such, people's
assessment of an interaction means more to the relation than the effect of the message (Canary, Cupach, & Serpe, 2001). According to Spitzberg and Cupach (1989), a person’s level of effectiveness and appropriateness is based on five factors: knowledge, motivation, skill, context and outcome. Spitzberg proposed a model of computer-mediated communication competence based on interpersonal communication competence research.

A Model of Computer-mediated Communication Competence

Contemporary research on technology use and social trends, places CMC as key for people to form interpersonal relationships. It is critical in communication research to understand the cognitive motivation and knowledge that stimulate interactants’ behavior and CMC experience. Kerr and Hiltz recognize the cognitive impact of CMC competence; "learning of new communication skills can become an unending process of users of computer-mediated systems" (1982, p. 99). As with interpersonal communication, increased CMC competence creates psychological and physical satisfaction thus elevates the quality of the mediated interaction. However, in early stages of new technology, research is predominantly focused on the CMC technology, while users’ computer competence and motive for using the new technology is scarcely researched. With this in mind, Spitzberg proposed a model of CMC competence along the lines of “motivation, knowledge, skills, context, and outcomes as a metaphorical typology for organizing existing CMC competence” (2006, p. 640). "The most fundamental difference between a theory and a model is that the former is an explanation whereas the latter is a representation" (Hawes, 1976, p. 111). Thus, a model can be used to describe behavior. Spitzberg’s model consists of the following factors: motivation, knowledge, self-efficacy, skill and outcome;
although context is not measured in the model, it is an important consideration when analyzing data (Spitzberg, 2006). The importance of the psychosocial view in CMC is reflected through a strong emphasis on the individual and social context.

The model of computer-mediated competence can be described in the following three steps: (1) Motivation is the initial step in energizing a knowledge search and application of skills. (2) It is followed by transmission through a selected media and is filtered through the receiver’s expectations for messages in that media. (3) During this process, both sender and receivers CMC competence will determine which channel to use, and how to encode and decode the computer-mediated communication. Spitzberg's model of CMC competence is the underpinning of the Mobile Phone Communication Competence (MPCC) measure. The following section argues for the need of a scale to measure mobile phone communication competence. Furthermore, it describes the new MPCC scale along with potential uses.

**Mobile Phone Communication Competence**

Johnsen (2003) suggests that research must move beyond analyzing what we already know: the mobile phone is here to stay. Scholars and policy-makers should not study mobile phones as a passing trend because it reflects "the most basic communicative aspects of human existence" (Kasesniemi & Rautiainen, 2002, p. 190). To understand interactants’ mobile phone communication is key to interpret uses of technology. Communication competence research provides a method to understand people’s mobile phone communication. The MPCC scale is based on Spitzberg’s (2006) model of CMC competence and measures interactants’ mobile phone communication competence along the following constructs: motivation, knowledge, self-efficacy, skill and outcome.
Motivation is an energizing component and a predictor of competency. Spitzberg defines it as "the ratio of approach to avoidance attitudes, beliefs and values in given CMC context" (2006, p. 640). As such, motivation is the first step to either induce or dissuade mobile phone communication. Individuals' willingness to adopt technology, uses and gratifications, and positive attitudes about equipment will increase the likelihood that interactants use mobile telephony. For example, Ling and Haddon (2003) stated that safety, display, and coordination are primary reasons for adopting mobile phones; thus, making it a principal motivator for mobile phone communication. On the other hand, feelings of anxiety or uncertainty regarding technology or technical features create a state of mobile phone apprehension; thus, dissuade mobile phone communication. Text messaging is one example. If a mobile phone user is apprehensive about text messaging, they will be excluded from communicating from a large group of mobile phone users. In a Norwegian study, Ling (2004) found that only two percent of mobile phone interactants refrained from sending text messages.

Knowledge, the second construct, is a measure of the cognitive function of mobile phone competence. Previous CMC research often refers to knowledge as communication literacy. Knowledge is operationalized as the "cognitive comprehension of content and procedural processes involved in conducting appropriate and effective interaction in the computer-mediated context" (Spitzberg, 2006, p. 641). Knowledge can be measured in two sub-constructs: procedural and content knowledge. Procedural knowledge is the ability to use mobile phone technology and features – it is a "how to" measure. One example is the technical knowledge required to send text and picture messages, as well as, the procedural knowledge that a grooming text message – messages that are considered gifts to the
recipient - should be returned in a timely manner to show sign of reciprocity (Ling, 2004). The second sub-construct is content knowledge. Content knowledge is the knowledge required to understand the content of a mobile phone communication – it is a “what to” measure. For instance, interactants need to know what to say considering the context of the mobile phone conversation; a private conversation in a public setting may be disruptive and uncomfortable for others.

Self-efficacy, the third construct of the MPCC measure, is a feedback-loop between motivation and knowledge. Self-efficacy is the link between motivation and knowledge that allow interactants to self-monitor their communication. For example, while first time mobile phone interactants may have levels of apprehension toward the technology, they increase their knowledge by using mobile phones thus their apprehension will fade away. Self-efficacy may also change the motivation for purchasing a new handset. While new mobile phone users buy a handset for safety-reasons, experienced users change their priority and are motivated to buy handsets for looks and technical features.

Skill is the fourth construct in the MPCC measure. While motivation, knowledge and self-efficacy represent the cognitive aspect of communication competence, skills represent interactants’ behavior. Interactants’ skill is composed of attentiveness, composure, coordination and expressiveness. Attentiveness measures mobile phone users’ awareness of other interactants, such as correctly timing returning text messages, and modifies communication based on interactants competence. Composure is a measure of interactants’ confidence in using a mobile phone –a level of self-promoting skill. People, who are skilled at composure, frequently initiate mobile phone interactions, use expressive language and “avoid cues of uncertainty” in their messages (Spitzberg, 2006, p. 642). Coordination and
expressiveness are the final two skill sub-constructs. Coordination deals with interactants’ ability to manage topics. For example, Licoppe (2006) state that coordination of interactants daily communication, from lengthy conversations to short frequent messages, affirms the strength of interpersonal relationships. Finally, expressiveness is a measure of skill directed at verbal and non-verbal self-expression. This is especially important to mobile telephone communication; for example, while text messaging is central to mobile phone communication the technology is limiting, consequently interactants are required to adapt their language with emoticons and abbreviations to add speed, clarity and expressiveness to their messages.

The last factor in the MPCC scale is the outcome of the communication; it is a consequence of the success of the communication based on sender’s intentions. The construct suggests mobile phone interactants’ ability to maintain social networks. Outcome consists of the following six sub-factors: co-orientation, appropriateness, effectiveness, satisfaction, efficiency and relational development. Co-orientation is the correspondence between sender’s intention and receiver’s understanding of the communication. For example, a sender display lack of co-orientation if the recipient of a text message is unable to decode the emoticons used to create an expressive message.

Appropriateness measures the fit of the message considering the context, at the same time as accounting for others’ expectations and needs in a communication. This sub-construct signifies an important dialectic tension in mobile telephony because contexts in mobile communication vary due to mobility. For example, research indicates that private conversations in public space are not always socially accepted; conversely, it may not be appropriate to use the mobile phone to communicate about work while having a private dinner.
The third sub-construct is effectiveness. It measures the ability to reach the goals in a communication interaction. Hypercoordination and microcoordination are examples of the types of communication that rely on the effectiveness sub-construct. The fourth sub-construct is satisfaction.

Satisfaction is the feeling of accomplishment when implementing a successful communication. In mobile telephony, grooming messages are a sign of satisfaction because the messages are intended to make the interactants feel satisfied.

Efficiency, the fifth sub-construct, is a measure of the economy of outcome. The communication is efficient when interactants achieve an effective and appropriate outcome by spending less rather than more time communicating a message. The efficiency of asynchronous text messaging has made it a preferred method of communication for many mobile phone users. Lastly, relational development is the last outcome sub-construct. Relation development measures the degree of breadth, depth, intimacy, closeness, commitment and attraction achieved in a relationship. Parallel talk is an example of relation development. According to Taylor (2005), mobile phone communication complements FtF communication and further reinforces and supports social ties among members in social networks.

The ability to measure mobile phone communication competence is a missing link in mobile phone communication research, although, it may be one of the most fundamental and most important aspects of mobile telephony. "Human beings should control the technologies they employ. Such control can be achieved in part by understanding the consequences of using ones medium of communication" (Chesebro and Bonsall, 1989, p. 126). The MPCC measure is key to achieving such control. As such, the MPCC measure can be used as a tool in educating mobile phone users. Thorbjørnsen and Nysveen (2005) state that mobile phone users "should be
encouraged to integrate the use of mobile services into their everyday life tasks and to spend time and money learning and using the service” (p. 405; also see Bunz, 2004). This is especially important because the mobile phone serves as an important relationship-building tool, and user competency will determine the level of satisfaction users receive from mobile phone use.

The highest penetration of mobile phones is found among teens. While parents are able to understand the technical aspect of the mobile phone, they do not comprehend the symbolic and social value of teens’ mobile phone interactions. In his research, Ling (2004) discovered that children and teens cannot rely on their parents’ advice and guidance in regard to learning new technology; furthermore, Skog (2002) found that teenagers who owned mobile phones are more likely to use other technologies compared to non-users due to socioeconomic differences in society. Social institutions should actively educate children in technologies, such as the mobile phone, to ensure that all children and teenagers share a standard of technological knowledge. Because technology training and education is particularly important to educate all socioeconomic groups, this study is designed with data from a population that is central to mobile phone communication competence. The samples to validate the MPCC measure are from a key group of mobile phone users and serve as a central predictor for future mobile phone use; a communication competence scale that is validated with this population will serve as tool for educators in assessing a mobile phone users competence.

Conclusion

In this chapter, a synergy between users of mobile phones and the device is illustrated. According to the uses and gratifications theory, this synergy has created a
dependency on the mobile phone. The ability to measure mobile phone competence is important because the outcome of communication is dependent on competence. However, the cognitive and social processes by which responses are constructed have not been studied in mobile phone research, and according to Ling and Haddon (2003), quantitative research is needed to tap into peoples motivation to better understand their decision making process. According to Spitzberg (2006), the goal of CMC is an efficient, understood, appropriate and satisfactory outcome. To achieve this, one must be a competent mobile phone communicator. By conducting two studies, this thesis will assist in the ongoing research on measuring mobile phone communication competence. The first study is designed to develop and factor analyze a Mobile Phone Communication Competence (MPCC) measure, while Study Two is designed to validate the MPCC scale through face validity and construct validity.
CHAPTER III

METHODS

Overview

The previous chapter explored the mobile phone as a computer-mediated communication (CMC) device, outlined current research on mobile telephony and CMC competence, and ultimately, addressed the need to measure mobile phone CMC competence. The following provides the method to develop, validate and test the Mobile Phone Communication Competency scale (MPCC). The method section contains a description of participants and the procedure used to collect data. It outlines Study One, the development, factor analysis and reliability testing of the MPCC scale, and Study Two, testing the MPCC scale’s face validity and construct validity.

Study One: Development and Factor Analysis of the MPCC Measure

Overview

According to Spitzberg, the mobile phone is a CMC medium because it is a digitally based technology, thus, it “will increasingly converge with all of the various characteristics currently associated exclusively with computers” (2006, p.631; see Bubas, 2001 and Bunz, 2003). The purpose of Study One is to take items from the Computer-mediated Communication Competency scale and apply it to mobile phones to create and validate a Mobile Phone Communication Competence scale (MPCC). Development of the MPCC instrument consists of the following two steps: a)
modifying the wording of items on the existing CMC Competence scale followed by pilot testing, and b) conducting an exploratory factor analysis.

Participants

The sample for Study One was composed of 350 students enrolled in a large mid-western university. Thirty-four percent of the participants ($n = 118$) were male, while sixty-four percent ($n = 224$) were female. A majority ($n = 279$) of the students identified as Caucasian, followed by African American ($n = 33$). Participants' age ranged between 18 to 46 years, with a mean of 21.22 ($SD = 3.51$). Mobile phone ownership ranged from less than a year ($n = 2$) to fifteen years ($n = 1$) with a mean of 5.46 years ($SD = 2.08$). The majority of participants owned a mobile phone for six years (21%, $n = 73$). Mean cost of mobile telephone handsets was $155.92$ ($SD = 107.83$). Mean reported average monthly mobile phone bill was $71.49$ ($SD = 43.71$), most of the participants reported an average monthly mobile phone bill of less than $111.00$ (90%, $n = 235$).

Procedure

The following procedure was used to recruit participants for Study One. The questionnaire was distributed in an introductory interpersonal communication class, an introductory communication theory class and a communication inquiry class. The author received permission to conduct the study from the classroom instructors, as well as, the university’s institutional review board prior to data collection (See Appendix A).

Each participant was asked to complete a questionnaire (See Appendix B). The student investigator read a script containing instructions to the participants before
distributing the questionnaire (See Appendix C). An anonymous consent form outlining the procedure accompanied each survey (See Appendix D). Participants were asked to complete a seven-page questionnaire. The questionnaire consisted of 141-items in four sections: 1) MPCC competence, 2) perceptions and uses of mobile phones (Campbell & Russo, 2003), 3) attitudes about mobile phone use in college classrooms (Campbell, 2006), and 4) demographics with questions about general mobile phone use. Participants’ answers were anonymous, so they were instructed to not put their name anywhere on the questionnaire. Participants could leave questions they choose not to answer blank and withdraw from participation at any time. If they decided to not participate, they were requested to sit quietly at their desk while others complete the survey. Upon completion of the surveys, participants were asked to leave it on their desk with the printed side down to ensure privacy. The survey was collected from the entire class about 25 minutes after distribution - whether they answered questions or left them blank. After collecting the questionnaire, the data was entered into SPSS, electronic files were backed-up on a password protected computer system and the paper copies of the questionnaire were securely stored.

The sample can be considered a convenience sample; no special steps were taken to ensure a diverse sample, instead, all students above the age of 18 were invited to participate. Students who participated received extra credit from his or her instructor for taking part in the study whether or not they completed the questionnaire.
Instrument

Scale Development

The MPCC scale is based on the Computer-mediated Communication (CMC) competency scale grounded in Spitzberg’s proposed theory of CMC Competence version 4 (2006). The underlying and original model consists of 77 items representing 15 constructs (Morreale, Spitzberg, & Barge, 2001; Spitzberg, 2006). While Spitzberg’s measure (2006) has not yet been validated, Bunz (2003), tested, evaluated and shortened the scale to 43 items and eight constructs based on principal component factor analysis with varimax rotation. Out of the eight constructs, six are labeled as proposed by Spitzberg in his model. The following lists the eight constructs in the Bunz (2003) study: comfort (α = .99, M = 3.48, SD = .72), efficacy (α = .86, M = 3.59, SD = .83), interaction management (α = .99, M = 3.54, SD = .83), media factors (α = .81, M = 2.83, SD = .73), general usage (α = .81, M = 2.97, SD = 1.04), and effectiveness (α = .99, M = 3.78, SD = .80), while Bunz labeled the two revised constructs: contextual factors (α = .99, M = 2.95, SD = .39) and rapport (α = .99, M = 2.95, SD = .39). Bunz’s current CMC competency scale has 43 items in eight sufficiently reliable sub-scales. Additionally, in prior research, Rice and Bunz (2006) utilized the scale and achieved reliability from .52 to .94 in seven of the eight sub-scales. One sub-scale, “contextual factors,” did not prove reliable and was dropped from the study. However, the sub-scale achieved excellent reliability of .99 in the original testing and validation of the instrument (Bunz, 2003). All of the 43 items have a 5-point Likert-type response format ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).
For the current study, wording from the original 77-item scale such as “CMC” and “Computer” was replaced with “Mobile Phone” (See Appendix C). For example, the question “I enjoy communicating using computer media” was changed to “I enjoy communicating using a mobile phone.” 12 of the 77 items stayed unchanged. Items referring to technology in general, such as, “Having to learn new technologies makes me very anxious” was modified to “mobile phone features” thus read “Having to learn new mobile phone features makes me very anxious.”

The “media factors” construct had the largest number of changes to the text; the purpose of the items in the construct is to better understand the participants’ media choice. Because the current study only covers one medium, the mobile phone, all items were be modified from “medium” to “feature.” The following is an example of this change: “I choose which medium to send some messages by (i.e., CMC, mail, phone, or face-to-face)” was changed to “I choose which feature to use (i.e., text, picture message, or voice).”

After modifying each item, the reworded items were pilot tested with a small sample for final assessment of the wording. Pilot testing included an evaluation and review of the measure’s wording and readability by ten student volunteers in an introductory interpersonal class. Participants wrote feedback directly on the measure. Their comments were incorporated into the finalized Mobile Phone Communication Competence Instrument before it was distributed to participants for data collection.

Factor Analysis

The deductive method of principal component factor analysis with a simple structure orthogonal varimax rotation was selected as the most appropriate procedure to examine the factor structure of the new instrument. The objective of a factor
analysis it to reduce a set of variables to be represented by a smaller set of hypothesized variables (Kim and Mueller, 1978). According to Poole, McPhee and Canary (2002), factor analysis is "the most common clustering technique in interpersonal communication research" (p. 54). To address the issue of overly relying on existing constructs in a proposed scale (Poole, et al, 2002), the initial factor extraction included an assessment of a scree plot of the factor clustering to substantiate the presence of constructs. According to Green and Salkind, a visual assessment of eigenvalues on a scree plot "yields accurate results more frequently than the eigenvalue-greater-than-1 criterion" (2005, p. 317).

The factors were orthogonally rotated with the varimax methodology to make the data the most interpretable and meaningful by outlining distinct clusters of relationships (Green and Salkind, 2005, Rummel, 1970). After completing the exploratory factor analysis, correlations were also computed to assess the degree of the relationship between the MPCC scale’s six constructs. The correlation is one method of testing the internal validity of the scale because the constructs should be related to a certain degree.

The size of participant sample is a key facet of scale development and factor analysis. A factor analysis that is based on a large number of subjects will have a significant higher degree of stable factor loadings compared to a smaller sample factor analysis. According to DeVellis (2003), between five to ten subjects per item is acceptable; however, this ratio can be relaxed when the sample reaches 300. For example, DeVellis note that 400 subjects are adequate for a 90-item factor analysis, and that a sample of 500 would be “very good” (p. 137). The completed MPCC scale consists of 56 items, thus data from the 350 participants yields more than six subjects per item. The results will be further discussed in the results section of this study.
Overview. The MPCC scale was tested and re-tested for reliability on a smaller sample once it was validated through factor analysis. According to Carmines and Zeller (1979), “reliability concerns the extent to which an experiment, test, or any measuring procedure yields the same results on repeated trials” (p. 11). To assess the reliability of the MPCC scale, it was re-tested with the same sample to obtain correlations between the constructs of the two identically administered tests. According to Carmines and Zeller (1979), the retest method “one of the easiest ways to estimate reliability of empirical measurements” (p.37), moreover, it “represent an intuitively appealing procedure by which to assess reliability” (p.39).

Participants. The test-retest was composed of 25 participants. Forty-eight percent of the participants (n = 12) were male, while fifty-two percent (n = 13) were female. Three participants did not complete the surveys, so only 22 samples were used for the test-retest.

Procedure. The student investigator read a script containing instructions to the participants before distributing questionnaire. An anonymous consent form outlining the procedure accompanied each survey. Participants were asked to create and memorize an easy to remember four-digit identification number - such as the last four digits of their phone number. Participant will then be asked to complete a two-page questionnaire with the 77-item MPCC scale. Student answers were anonymous, so they were not required to put their name anywhere on the questionnaire, instead, they were asked to write their identification number on the survey.

Participants could leave questions they choose not to answer blank and withdraw from participation at any time. If they decided to not participate, they were requested to sit quietly at their desk while others complete the survey. Upon
completion of the surveys, participants were asked to leave it on their desk with the printed side down to ensure privacy. The survey was collected from the entire class about 25 minutes after distribution - whether they answered questions or left them blank. After collecting the questionnaire, the data was entered into SPSS, electronic files were backed-up on a password protected computer system and the actual questionnaire’s were stored.

The procedure was repeated after a two-month period to ensure that the participants did not remember what they had previously answered on the MPCC questionnaire. The student investigator then used the identification number to match the test-retest samples. Results are presented in the results section of the study.

Study Two: Validation of the MPCC Measure

Overview

The purpose of Study Two was to validate the MPCC scale through face validity and construct validity. Face validity was assessed based on the results of an independent samples t test, while the scale’s construct validity was assessed by investigating the relationship between factors on a) the MPCC scale with b) Campbell and Russo’s Perceptions and uses of mobile phones scale (2003). This section outlines the measures was used in the study and describes the data analysis that was employed to test the MPCC measure’s validity.

Instrument

The original version of perceptions and uses of mobile phones survey was published as a self-report survey containing 54 items (Campbell & Russo, 2003). 47 questions assessed the variability of perceptions and uses of mobile telephony while
seven questions assess demographics and general mobile phone use. The latter was left out of this study because a new demographics section specific to this study was created. Campbell and Russo’s perceptions and uses of mobile phones scale have the eight constructs loaded with three to five items each. The scale’s reliability estimates are consistent, though slightly lower, than previous studies. The constructs are listed with internal reliability and sample items from the current study: 1) display ($\alpha = .73$, $M = 17.26$, $SD = 3.61$), “I don’t really care if my mobile phone reflects my sense of style,” 2) driving attitudes ($\alpha = .80$, $M = 14.24$, $SD = 3.91$), “I don’t think using a mobile phone while driving is a hazard,” 3) comfort with service ($\alpha = .75$, $M = 12.77$, $SD = 3.40$), “I don’t have trouble understanding the services and promotions offered by my wireless provider,” 4) safety/security ($\alpha = .73$, $M = 14.55$, $SD = 3.54$), “I own a mobile phone in case I need it for security,” 5) public use ($\alpha = .67$, $M = 13.26$, $SD = 3.06$), “I find it irritating to hear someone talking on a mobile phone while in a restaurant,” 6) microcoordination ($\alpha = .63$, $M = 17.3$, $SD = 2.26$), “A good reason for owning a mobile phone is to make plans with others,” 7) hypercoordination ($\alpha = .78$, $M = 13.71$, $SD = 1.82$), “I use my mobile phone to “catch up” with friends or relatives,” and lastly, 8) comfort with technology ($\alpha = .43$, $M = 15.69$, $SD = 2.48$), “I find the buttons on my phone difficult to use.” All of the items that were used in this study contained a 5-point Likert-type response format ranging from 1 (Strongly Disagree) to 5 (Strongly Agree).

**Data Analysis**

Validity is the extent that the instrument measures what it has been developed to measure (Carmines and Zeller, 1979; Reinard, 2006). The MPCC measure’s validity was assessed by combining the method of both face validity and construct
validity. Face validity entails a review and argument of validity based on the content of the measurement. According to Reinard (2006), “this method has been the most common approach taken by researchers to argue the validity of their measures (p. 127). To evaluate the content of the measure, independent samples t-tests were conducted on all of the MPCC measure’s six constructs in order to test the means between female and male participants. Based on the literature, there are differences in male and female uses of mobile telephone communication. A second method of validity testing, construct validity, was also conducted.

Construct validity testing is a method of validity testing where factors of the new MPCC measure is correlated with factors from a measure that has already been validated (Reinard, 2006). As such, the MPCC measure was correlated with factors from Campbell and Russo’s (2003) perceptions and uses of mobile phones measure. Pearson’s correlation coefficient was used to assess the degree of relationship between factors within the MPCC measure, with factors from the perceptions and uses of mobile phones measures (Green & Salkind, 2005).
CHAPTER IV

RESULTS

Overview

While the previous section described the methods implemented to develop, validate and test the Mobile Phone Communication Competency scale (MPCC), the results section explores the results from Study One, factor analysis and reliability testing of the MPCC scale, and Study Two, testing the MPCC scale's face validity and construct validity.

Study One: Development and Factor Analysis of the MPCC Measure

Factor Analysis

A principal component factor analysis uncovered the structure and dimensionality of the 75-item Mobile Phone Communication Competence (MPCC) scale. The following three criteria were used to determine the number of scale factors: 1) previous research, 2) the scree plot and 3) interpretation of factor solutions.

The MPCC scale is modified of Spitzberg's (2006) computer-mediated communication competence scale, so a review of previous factor loadings of the scale gave an indication of the number of constructs that were expected to emerge in the MPCC scale. In the past, variations of the CMC competence scale have returned between 8 and 15 factors (Bunz, 2003; Spitzberg, 2006).
Figure 1. Scree Plot of Factor Analysis

Initial factor analysis of the 75 items in the MPCC scale uncovered seventeen factors with eigenvalues above 1, though an analysis of the scree plot in Illustration 1 suggested a more conservative range between five to nine constructs. A five-step process determined the final and absolute number of constructs:

1) Based on the scree plot in Illustration 1, an initial principal component factor analysis was conducted to extract nine factors with varimax rotation.

2) A review of the rotated component matrix with suppressed coefficient values below .20 indicated that three of the nine factors contained several items with coefficient values below .35 that cross-loaded with other factors. According to Spector (1992), a minimum value of .30 to .35 is required for an item to be considered.
3) In order to ensure that all constructs have items with coefficient values above .35, the items with the lowest coefficient values were removed. A secondary factor analysis was conducted to extract one less construct than previously carried out. Subsequent review of the rotated component matrix revealed additional weak or cross-loading items.

4) Step 3 was repeated until analysis of the rotated component matrix indicated that all constructs had items with coefficient values above .35 that did not cross-load with other factors.

5) As a result, the final and absolute factor analysis yielded six constructs that contained items with coefficient values above .38. All six factors have internal reliability above .80, thus exceeding the standard for acceptable reliability in widely used scales (Carmines & Zeller, 1979; Nunnally, 1978). The constructs and descriptive statistics are listed in Table 1, furthermore, the rotated component matrix of constructs with respective scale items are listed in Table 2.

| Table 1 |

<table>
<thead>
<tr>
<th>Descriptive Statistics: Mobile Phone Communication Competence Subscale</th>
</tr>
</thead>
<tbody>
<tr>
<td>α</td>
</tr>
<tr>
<td>-----</td>
</tr>
<tr>
<td>Asynchronous Communication (Async)</td>
</tr>
<tr>
<td>Willingness to Use (Use)</td>
</tr>
<tr>
<td>Comfort with Technology (Comfort)</td>
</tr>
<tr>
<td>Medium Selection (Select)</td>
</tr>
<tr>
<td>Communicator Competence (Comp)</td>
</tr>
<tr>
<td>Communicator Affect (Affect)</td>
</tr>
</tbody>
</table>
Table 2

*Mobile Phone Communication Competence Scale: Rotated Component Matrix*

<table>
<thead>
<tr>
<th>Items</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Asynchronous Communication</strong></td>
<td></td>
</tr>
<tr>
<td>31 Display certainty in text message</td>
<td>.779</td>
</tr>
<tr>
<td>35 Confident style</td>
<td>.726</td>
</tr>
<tr>
<td>26 Adapt text message to receiver</td>
<td>.721</td>
</tr>
<tr>
<td>34 I can emphasize my objective</td>
<td>.719</td>
</tr>
<tr>
<td>27 Articulate and vivid text message</td>
<td>.705</td>
</tr>
<tr>
<td>32 Assertive writing style</td>
<td>.701</td>
</tr>
<tr>
<td>22 Skilled at prioritizing text</td>
<td>.652</td>
</tr>
<tr>
<td>21 Skilled at timing text response</td>
<td>.622</td>
</tr>
<tr>
<td>25 Show empathy in text messages</td>
<td>.620</td>
</tr>
<tr>
<td>29 Use humor in text</td>
<td>.620</td>
</tr>
<tr>
<td><strong>Willingness to Use</strong></td>
<td></td>
</tr>
<tr>
<td>72 Use mp constantly</td>
<td>.821</td>
</tr>
<tr>
<td>71 Rely on mp</td>
<td>.758</td>
</tr>
<tr>
<td>74 Heavy Mobile Phone (MP) user</td>
<td>.757</td>
</tr>
<tr>
<td>75 Tend to use MP</td>
<td>.744</td>
</tr>
<tr>
<td>01 Enjoy MP communication</td>
<td>.642</td>
</tr>
<tr>
<td>69 Most efficient using MP</td>
<td>.614</td>
</tr>
<tr>
<td>68 MP more productive than FtF</td>
<td>.572</td>
</tr>
<tr>
<td>73 Can't go a week without MP</td>
<td>.563</td>
</tr>
<tr>
<td>67 Get a lot accomplish using MP</td>
<td>.558</td>
</tr>
<tr>
<td>03 Motivated to use MP</td>
<td>.534</td>
</tr>
<tr>
<td>04 Look forward to use MP</td>
<td>.508</td>
</tr>
<tr>
<td>70 MP is timesaver</td>
<td>.488</td>
</tr>
</tbody>
</table>
Table 2 - Continued

*Mobile Phone Communication Competence Scale: Rotated Component Matrix*

<table>
<thead>
<tr>
<th>Items</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Comfort with Technology</td>
<td></td>
</tr>
<tr>
<td>16 Quickly learn new features</td>
<td></td>
</tr>
<tr>
<td>11 Not skilled learning features (R)</td>
<td></td>
</tr>
<tr>
<td>13 Confident learn future MP tech.</td>
<td></td>
</tr>
<tr>
<td>17 Can learn new technology</td>
<td></td>
</tr>
<tr>
<td>06 Knowledgeable MP communication</td>
<td></td>
</tr>
<tr>
<td>12 Capable of using features</td>
<td></td>
</tr>
<tr>
<td>08 Familiar with features</td>
<td></td>
</tr>
<tr>
<td>14 Nervous to learn features (R)</td>
<td></td>
</tr>
<tr>
<td>15 Changes in tech is frustrating (R)</td>
<td></td>
</tr>
<tr>
<td>10 Adapt messages to feature</td>
<td></td>
</tr>
<tr>
<td>Medium Selection</td>
<td></td>
</tr>
<tr>
<td>40 Select: Info in message</td>
<td></td>
</tr>
<tr>
<td>38 Select: lively interaction</td>
<td></td>
</tr>
<tr>
<td>45 Select: Interchange of idea</td>
<td></td>
</tr>
<tr>
<td>43 Select: Intimacy of message</td>
<td></td>
</tr>
<tr>
<td>44 Select: Quickly you need response</td>
<td></td>
</tr>
<tr>
<td>37 Select: Quickly/ Speed of message</td>
<td></td>
</tr>
<tr>
<td>39 Select: Access others’ feature</td>
<td></td>
</tr>
<tr>
<td>42 Select: Longetivity of message</td>
<td></td>
</tr>
<tr>
<td>41 Select: Sender’s access to feature</td>
<td></td>
</tr>
<tr>
<td>Communicator Competence</td>
<td></td>
</tr>
<tr>
<td>53 Effective interactions</td>
<td></td>
</tr>
<tr>
<td>52 Achieve goals in interaction</td>
<td></td>
</tr>
<tr>
<td>54 Effective in conversations</td>
<td></td>
</tr>
<tr>
<td>55 Get ideas across clearly</td>
<td></td>
</tr>
<tr>
<td>56 Comments are accurate</td>
<td></td>
</tr>
</tbody>
</table>
Table 2 - Continued

*Mobile Phone Communication Competence Scale: Rotated Component Matrix*

<table>
<thead>
<tr>
<th>Items</th>
<th>Communicator Competence (Continued)</th>
<th>Component</th>
<th>Component</th>
<th>Component</th>
<th>Component</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>09</td>
<td>Know how to say</td>
<td>.518</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>58</td>
<td>Understood when interact</td>
<td>.511</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>Skillful at revealing composure</td>
<td>.465</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>No trouble expressing opinion</td>
<td>.459</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>07</td>
<td>Always know what to say</td>
<td>.384</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65</td>
<td>Make friends easy</td>
<td>.707</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>64</td>
<td>People would like to know me</td>
<td>.699</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>63</td>
<td>Get people to like me</td>
<td>.690</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>66</td>
<td>People enjoy my company</td>
<td>.676</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>62</td>
<td>Pleased with interactions</td>
<td>.652</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>61</td>
<td>Feel good about conversations</td>
<td>.647</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>Enjoy interacting</td>
<td>.612</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. Only Coefficient Values >.36 Are Listed*

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.
* Rotation converged in 6 iterations.

To summarize the procedure, 17 of the original 75 items in the MPCC scale were deleted. The dimensionality of the final 57 items from the Mobile Phone Communication Competence measure was analyzed using a principal component factor analysis with a varimax rotation procedure as shown in Table 2. The rotated solution yielded six factors. Cronbach’s alpha was conducted to investigate the internal consistency of the questionnaire. Internal reliability of all constructs exceeded the standard for acceptable reliability: Asynchronous Communication (α =
Willingness to Use (α = .89), Comfort with Technology (α = .89), Medium Selection (α = .86), Communicator Competence (α = .83) and Communicator Affect (α = .86).

After completing the exploratory factor analysis, correlations were computed to assess the degree of the relationship between the MPCC scale’s 6 constructs. The results of the correlation analysis presented in Table 3 show that all the correlations were statistically significant at the .001 level and were greater or equal to .30.

According to Koenker (1961), the correlation between the subscales ranged from slight to a fair degree of relationship. The weakest relationship was between the Communicator Affect and Asynchronous Communication subscales $r(345) = .30, p < .001$. While the strongest relationship was between Communicator Affect and Communicator Competence subscales $r(346) = .55, p < .001$. The results suggest that there is a relationship among the subscales in the MPCC scale, however, the relationships are not so marked that the subscales measure the same constructs.

Table 3

<table>
<thead>
<tr>
<th></th>
<th>Async</th>
<th>Use</th>
<th>Comfort</th>
<th>Select</th>
<th>Comp</th>
</tr>
</thead>
<tbody>
<tr>
<td>Async</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use</td>
<td>.37</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comfort</td>
<td>.39</td>
<td>.42</td>
<td>-</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Select</td>
<td>.41</td>
<td>.39</td>
<td>.31</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Comp</td>
<td>.39</td>
<td>.42</td>
<td>.43</td>
<td>.33</td>
<td>.55</td>
</tr>
<tr>
<td>Affect</td>
<td>.30</td>
<td>.38</td>
<td>.31</td>
<td>.32</td>
<td>.55</td>
</tr>
</tbody>
</table>

*Note.* All correlations were significant at the $p < .001$ level.
Table 4

Correlations Between MPCC Subscale Test-retest

<table>
<thead>
<tr>
<th>MPCC Subscales</th>
<th>Test-retest</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>r</td>
<td>N</td>
</tr>
<tr>
<td>Asynchronous Communication (Async)</td>
<td>.63</td>
<td>22</td>
</tr>
<tr>
<td>Willingness to Use (Use)</td>
<td>.87</td>
<td>22</td>
</tr>
<tr>
<td>Comfort with Technology (Comfort)</td>
<td>.93</td>
<td>22</td>
</tr>
<tr>
<td>Medium Selection (Select)</td>
<td>.84</td>
<td>21</td>
</tr>
<tr>
<td>Communicator Competence (Comp)</td>
<td>.65</td>
<td>22</td>
</tr>
<tr>
<td>Communicator Affect (Affect)</td>
<td>.65</td>
<td>21</td>
</tr>
</tbody>
</table>

Note. All correlations were significant at the p < .004 level.

Test-retest

To further assess the reliability of the MPCC scale, the final measure with six constructs and 57 items was given twice to a selected sample for the purpose of testing consistency and correlation between scores of two identically administered MPCC tests. Using the Bonferroni approach to control for Type 1 error across the 12 correlations, a p value of less than .004 (.05 / 12 = .004) was required for significance.

The results of the correlation analysis presented in Table 4 show that all the subscale correlations between the test-retest were statistically significant at the .004 level and were greater or equal to .63. Three of the test-retest subscale correlations had a marked relationship; Asynchronous Communication $r(20) = .63, p < .004$,
Communicator Competence $r(20) = .65, p < .004$, and Communicator Affect $r(19) = .65, p < .004$. The correlation between the last thee constructs exhibited a highly dependable relationship (Koenker, 1961); Willingness to Use $r(20) = .88, p < .004$, Comfort with Technology $r(20) = .93, p < .004$, and Medium Selection $r(19) = .84, p < .004$. The results suggest that the MPCC scale’s reliability is dependable based on results of the test-retest.

Study Two: Validation of the MPCC Measure

Construct Validity

The purpose of study two was to test the validity of the mobile phone communication competence measure. In order to test the MPCC scale’s construct validity, correlation coefficients were computed to investigate the relationship between the six MPCC subscales and Campbell and Russo’s (2003) perceptions and uses of mobile phones’ eight subscales. The 14 subscales are listed in Table 5.

Using the Bonferroni approach to control for Type 1 error across the 48 correlations (6 x 8 constructs), a $p$ value of less than .004 (.05 / 14 = .0035) was required for significance. Results of the analysis indicate that 14 of the correlations were statistically significant and were greater than or equal to .25. In general, there were slight to fair degrees of relationships between all the constructs in the MPCC scale and the constructs in the perception and uses of mobile phones dealing with mobile phone uses. Additionally, there were no significant relationships between the constructs in the MPCC scale and the constructs in the perception and uses of mobile phones dealing with participants’ perceptions of other mobile phone uses. For example, participants MPCC had no effect on perception of others’ use of mobile
phones in public. This is as expected because the MPCC scale is not designed to measure participants attitudes about others’ mobile phone communication.

Table 5

<p>| Study Two Descriptive Statistics: MPCC and Perceptions and Uses of Mobile Phones Subscales |
|---------------------------------|-----------------|-----------------|------|</p>
<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MPCC Subscales</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asynchronous Communication (Async)</td>
<td>35.13</td>
<td>8.26</td>
<td>347</td>
</tr>
<tr>
<td>Willingness to Use (Use)</td>
<td>44.70</td>
<td>9.13</td>
<td>349</td>
</tr>
<tr>
<td>Comfort with Technology (Comfort)</td>
<td>42.21</td>
<td>6.50</td>
<td>349</td>
</tr>
<tr>
<td>Medium Selection (Select)</td>
<td>36.08</td>
<td>6.46</td>
<td>347</td>
</tr>
<tr>
<td>Communicator Competence (Comp)</td>
<td>38.15</td>
<td>5.22</td>
<td>348</td>
</tr>
<tr>
<td>Communicator Affect (Affect)</td>
<td>29.28</td>
<td>3.95</td>
<td>349</td>
</tr>
<tr>
<td><strong>Uses of Mobile Phones Subscales</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Display (Display)</td>
<td>20.47</td>
<td>4.50</td>
<td>141</td>
</tr>
<tr>
<td>Driving Attitudes (Driving)</td>
<td>14.45</td>
<td>3.89</td>
<td>166</td>
</tr>
<tr>
<td>Comfort with Service (Service)</td>
<td>12.60</td>
<td>3.56</td>
<td>166</td>
</tr>
<tr>
<td>Safety and Security (Security)</td>
<td>14.39</td>
<td>3.80</td>
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<tr>
<td>Public Use (Public)</td>
<td>13.26</td>
<td>2.99</td>
<td>166</td>
</tr>
<tr>
<td>Microcoordination (Micro)</td>
<td>17.53</td>
<td>2.08</td>
<td>166</td>
</tr>
<tr>
<td>Hypercoordination (Hyper)</td>
<td>14.01</td>
<td>1.33</td>
<td>166</td>
</tr>
<tr>
<td>Comfort with Technology (Tech)</td>
<td>15.69</td>
<td>2.48</td>
<td>141</td>
</tr>
</tbody>
</table>

The highest degree of relationship was found between the two comfort with technology subscales $r(138) = .52, p < .001$. Additionally, two other notable
relationships existed between 1) a mobile phone users’ communication competence and both micro- and hypercoordination, and 2) a mobile phone user’s level of communicator affect can be considered a fair predictor of mobile phone users’ micro- and hypercoordination. The results of the analysis are presented in Table 6.

Table 6

<table>
<thead>
<tr>
<th></th>
<th>Async</th>
<th>Use</th>
<th>Comfort</th>
<th>Select</th>
<th>Comp</th>
<th>Affect</th>
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<td>Display</td>
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<td>.27*</td>
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<td>.18</td>
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<td>.06</td>
<td>.33*</td>
<td>.13</td>
<td>.15</td>
<td>.05</td>
</tr>
<tr>
<td>Security</td>
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<td>.16</td>
<td>.02</td>
<td>.27*</td>
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<td>.09</td>
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<td>.39*</td>
<td>.27*</td>
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<td>.27*</td>
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</tr>
<tr>
<td>Tech</td>
<td>.12</td>
<td>.21</td>
<td>.52*</td>
<td>.27</td>
<td>.12</td>
<td>.13</td>
</tr>
</tbody>
</table>

*Correlation is significant at the p < .001 level

The relationship between the six MPCC subscales and Campbell and Russo’s (2003) perceptions and uses of mobile phones’ eight subscales impacts the construct validity of the MPCC scale for two reasons. First, the constructs that deals with mobile phone uses in the perceptions and uses of mobile phone scale is conceptually known to be directly related to constructs in the MPCC scale. Secondly, the constructs that measure perceptions in the perceptions and uses of mobile phone scale is not expected to be directly related constructs in the MPCC scale.
Face Validity

In order to assess the scale's face validity, six independent samples t test were conducted to compare the mean of male and female participants for each of the MPCC scale's six constructs. Based on literature, male and female differ in their mobile phone communication. For example, there is evidence that women tend to use their mobile phones more frequently than men (Horrigan, 2008), women also send more grooming messages than men (Ling, 2004), furthermore, women tend to stress the importance of non-technical functions of the phone such as ring-tone and design while men stress technical aspects of their mobile phone. As such, results from the t tests evaluate the constructs and tests its face validity.

Using the Bonferroni approach to control for Type I error across independent samples t test, a p value of less than .008 (.05 / 6 = .008) was required for significance. In order to test if there is a difference in male and female asynchronous mobile phone communication competence, an independent samples t test was conducted. Levene's test for equality of variance is not significant, $F = 3.813, p = .052$, indicating that the assumption of homogeneity of variance was tenable. The t test was not significant, $t (337) = 2.556, p > .008$. Results indicated that females ($M = 35.89, SD = 7.92$) and males ($M = 33.48, SD = 7.92$) did not report a significant difference in asynchronous mobile phone communication.

A second independent sample t test was conducted in order to test if there is a difference between male and female participants' willingness to use mobile phone communication. Levene's test for equality of variance was not significant, $F = 1.048, p = .307$, indicating that the assumption of homogeneity of variance was tenable. The t test was significant, $t (339) = 5.358, p < .008$. Results indicated that females ($M = 46.60, SD = 8.43$) reported a significantly higher willingness to use mobile phone
communication than men ($M = 41.22$, $SD = 9.50$).

A third independent sample $t$ test was conducted in order to test if there is a difference between male and female participants’ comfort with mobile phone communication. Levene’s test for equality of variance was significant, $F = 6.086$, $p = .014$, indicating that the assumption of homogeneity of variance was not tenable. The $t$ test was not significant, $t (339) = .998$, $p > .008$. Results indicated that females ($M = 42.37$, $SD = 5.90$) and males ($M = 41.22$, $SD = 7.57$) did not report a significant difference in comfort with mobile phone communication.

A fourth independent sample $t$ test was conducted in order to test if there is a difference between male and female participants’ mobile phone medium selection. Levene’s test for equality of variance was not significant, $F = 2.744$, $p = .099$, indicating that the assumption of homogeneity of variance was tenable. The $t$ test was significant, $t (337) = 4.975$, $p < .008$. Results indicated that females ($M = 37.25$, $SD = 5.76$) reported a significantly higher selectivity of media in their mobile phone communication than did men ($M = 33.70$, $SD = 7.07$).

A fifth independent sample $t$ test was conducted in order to test if there is a difference between male and female participants’ mobile phone communicator competence. Levene’s test for equality of variance was not significant, $F = .000$, $p = .993$, indicating that the assumption of homogeneity of variance was tenable. The $t$ test was not significant, $t (338) = 2.199$, $p > .008$. Results indicated that females ($M = 38.55$, $SD = 5.17$) and males ($M = 37.24$, $SD = 5.29$) did not report a significant difference in mobile phone communicator competence.

Lastly, a sixth independent sample $t$ test was conducted in order to test if there is a difference between male and female participants’ mobile phone communicator affect. Levene’s test for equality of variance was not significant, $F = .001$, $p = .978$,
indicating that the assumption of homogeneity of variance was tenable. The $t$ test was significant, $t(339) = 3.517, p < .008$. Results indicated that females ($M = 29.84, SD = 3.83$) reported a significantly higher degree of mobile phone communicator affect than did men ($M = 29.84, SD = 3.83$).

Six independent samples $t$ tests were conducted to test the MPCC scale’s face validity. The results of the six independent $t$ tests suggest that several of the constructs in the MPCC scale measure significant differences between male and female mobile phone users.
CHAPTER V

DISCUSSION

Overview

This chapter begins by offering methodological and theoretical explanations of the six factors that emerged from the development, factor analysis and validation of the MPCC measure. Furthermore, the relationships among the factors are explained in a proposed three-step process of mobile phone communication competence; mobile phone communication competence can be explained through the process of initiation, interaction and outcome. This section also discusses the implications and limitations of the study. In particular, there is a further need to study the contextual impact of mobile phone interactions. Three specific future studies are suggested to address the limitations of this study: 1) investigating the relationship between mobile phone communication and interactants' cultural background, 2) investigating the relationship between mobile phone communication competence and interactants' social networks, and lastly, 3) investigate the relationship between mobile phone communication competence and interactions in public and private space.
Explanation of the Six-Factor Mobile Phone Communication Competency (MPCC) Measure

Overview

The Mobile Phone Communication Competency scale is theoretically grounded in Spitzberg’s (2006) model of CMC competence, which is modeled to measure interactants’ Computer-mediated Competence along five constructs: motivation, knowledge, self-efficacy, skill and outcome. Although the MPCC measure is theoretically grounded in the model of CMC competence, the factor analysis identified constructs that are unique to the mobile phone. The results from the factor analysis in this study identified six Mobile Phone Communication Competence constructs: asynchronous communication, willingness to use, feature selection, comfort with technology, communicator competence and communicator affect (See Appendix E).

Factor 1: Asynchronous Communication

Construct Operationalized

High scores on the asynchronous communication factor indicate that respondents display certainty and confidence in text message interactions and demonstrate an ability to uniquely adapt text messages to recipients. Respondents who score high on this factor also display an assertive writing style, craft articulate and vivid text messages that incorporate empathy and humor. Moreover, the respondents are skilled at timing and triaging their asynchronous communication.

The construct is operationalized based on interpretation of the scale-items that
loaded on the respective factor; refer to Table 2 for a complete list of items and factors.

*Construct Description*

It is not surprising that the highest loading items in the scale represent asynchronous communication. Text messaging has revolutionized mobile telephone communication and has become a primary means of mobile phone communication for many interactants. Interactants are motivated to use text messaging because of its low cost, convenience and ability to coordinate events (Leung, 2006). In a recent report on mobile phone devices and frequency of text messaging conducted in the US, 60 percent of respondents between 18-29 years of age use their mobile phone device to send and receive text messages on a daily basis, while 32 percent of respondents aged 30-49 send and receive text messages daily (Horrigan, 2008).

Asynchronous communication is not simply about one specific technical feature of the mobile phone, it is its ability to maintain and define personal interaction within social networks that makes it such a central theme in mobile telephone communication research. Studies on mobile phone interactants in Norway and Finland have documented that some mobile phone users even exclusively communicate via text messaging (Ling, 2004; Kasesniemi & Rautiainen, 2002). Similar trends can be found in the US. Campbell and Park (2008) suggests that many teenagers maintain and differentiate social networks based on whether they communicate via text messaging; for example, young people exclusively use text messaging to maintain relationships with peers while parents are “relegated” to voice communication. Social networks can be defined by its membership of interactants sending text messages.
The asynchronous communication factor is closely related to the “skills” construct in Spitzberg’s Model of CMC Competence (2006). As such, the asynchronous communication construct measures respondents’ behavior, specifically, their attentiveness, expressiveness, composure and coordination. The construct assess respondents awareness of other interactants, their confidence in using a mobile phone, ability to manage phone interactions, and lastly, it is a measure of respondent’s self-expressiveness. As such, a measure of mobile phone communication competence must gauge respondents’ skill and ability to successfully communicate asynchronously.

Factor 2: Willingness to Use

Construct Operationalized

High scores on this factor indicate that respondents are constant users of mobile phones and rely on daily mobile phone communication. Respondents who score high on this factor also enjoy mobile phone communication, believe that the mobile phone is a timesaver and that mobile phone interaction are more productive than Face-to-face (FtF) interactions. Moreover, the respondents are motivated and look forward to using a mobile phone to converse with others.

The construct is operationalized based on interpretation of the scale-items that loaded on the respective factor; refer to Table 2 for a complete list of items and factors.

Construct Description

Any measure of mobile phone communication competence must include an assessment of interactants’ willingness to use the technology. The factor “willingness
to use" is similar to the motivation construct in Spitzberg's CMC competence model (2006). Interactants' willingness to use a mobile phone for communication is indeed a positive motivator, an energizer to incorporate mobile phones in daily interactions. Competent mobile phone communicators will actively seek and use their mobile device because, not only do they enjoy mobile phone interactions, but a competent mobile phone communicator believe that their mobile phone interactions are more productive than their Ftf interactions. This assessment is consistent with CMC research and interpersonal relationships; Walther suggests that CMC contributes to the progress of interpersonal relationships because it is interpersonal, yet it gives the sender and receiver additional options when communicating such as planning an interaction by writing and editing a text message (1996).

Though the willingness to use factor is motivational, it can also provide clues to mobile phone dependency. The factor is a dialectical tension between using the phone for enjoyment and productivity while at the same time having to rely on it for daily interactions. Respondents who score high in this factor self-identify as heavy users of mobile phone communication and state that they can rarely go a week without mobile phone interactions. Though higher scores on this factor indicates a competent mobile phone communicator who is willing to use the phone, further research must attempt to discover at which point the willingness to use will be transformed to a mobile phone dependency.

**Factor 3: Comfort with Technology**

*Construct Operationalized*

High scores on this factor indicate that respondents are capable of using all the features on their current mobile phone device and are comfortable with current
mobile phone technology; they are quick to learn new features and confident learning new technology. In general, respondents who score high on this factor consider themselves knowledgeable about how they communicate with a mobile phone and tend to adapt their message and communication style to selected feature. Moreover, the respondents do not find changes in mobile phone technology frustrating and believe they can quickly adapt to technological change.

The construct is operationalized based on interpretation of the scale-items that loaded on the respective factor; refer to Table 2 for a complete list of items and factors.

**Construct Description**

Interactants’ comfort with technology is an essential aspect of measuring mobile phone communication competence. The factor “comfort with technology” is theoretically based on the knowledge and self-efficacy constructs in Spitzberg’s (2006) Model of CMC competence. Comfort with technology measures interactants procedural and content knowledge; procedural knowledge is a “how to” assessment, while content knowledge is a “what to” assessment. Thus, the comfort with technology constructs measures interactants technical skill to use a mobile phone for communication, as well as interactants’ ability to assess what to communicate when using mobile phones. For example, respondents who score high on this factor will adapt their message and communication style to the selected mobile phone feature. Comfort with technology also measures the level of self-monitoring respondents exhibit regarding their mobile phone communication. It is theoretically founded on the concept of self-efficacy that Spitzberg proposed in his Model of CMC competence (2006).
It is important to not interpret respondents' scores on this factor exclusively as a measure of technical skill. Instead, the comfort with technology construct measures interactants' procedural- and content knowledge, furthermore, it assesses interactants' ability to self-monitor their mobile phone communication; the comfort with technology construct is essential when measuring respondents' mobile phone communication competence.

*Factor 4: Feature selection*

*Construct Operationalized*

High scores on this factor indicate that respondents consciously select a mobile phone features such as voice, text and picture message based on communication needs. For example, users are likely to use a specific feature based on the quantity of information communicated and the degree of reciprocity the interactions require; such as, interchange of ideas, communication liveliness and intimacy. Moreover, the respondents select features based on communication urgency, whether they need to archive the communication and how quickly they expect a response. Respondents also select the mobile phone feature based on recipient's access to the selected feature.

The construct is operationalized based on interpretation of the scale-items that loaded on the respective factor; refer to Table 2 for a complete list of items and factors.

*Construct Description*

The feature selection construct measures respondents' awareness of selecting a mobile phone feature based on communication needs and contexts. Selectivity is not
considered a measured construct in Spitzberg’s (2006) model of CMC competence; instead media selectivity is viewed as a contextual influence on the CMC competence model. Because the MPCC measure deals specifically with one medium, the mobile phone, the wording of the items are modified to measure the degree to which a respondent select a mobile phone feature such as voice, text or picture messaging. A competent mobile phone communicator will select a mobile phone feature based on their comfort with technology, willingness to use a mobile phone and asynchronous communication competence. In other words, the cognitive and behavioral MPCC will act as an antecedent to competent feature selection. A measure of mobile phone communication competence must therefore include an assessment of mobile phone feature selection.

Factor 5: Communicator Competence

Construct Operationalized

High scores on this factor indicate that respondents are goal-oriented communicators who view their mobile phone communication as consistently effective and accomplished. Moreover, respondents who score high on this factor are able to consistently express themselves with knowledge, clarity and composure in mobile phone interactions.

The construct is operationalized based on interpretation of the scale-items that loaded on the respective factor; refer to Table 2 for a complete list of items and factors.
Construct Description

Communicator competence is one of two constructs that measure the outcome of respondent’s mobile phone communication. The factor “communicator competence” is theoretically based on the competence outcomes constructs in Spitzberg’s Model of CMC competence (2006). Communicator competence measures interactants effectiveness and appropriateness when assessing the competence of a mobile phone interaction. Appropriateness is an assessment of the fit of the message when one considers the context while simultaneously account for others’ expectations and needs in a mobile phone communication. Effectiveness is the second measure; it is an assessment of participants’ ability to reach the goals in a communication interaction. Communicator competence is significant assessment of interactants’ mobile phone communication goal competence along with “communicator affect” - the final construct in the MPCC measure.

Factor 6: Communicator Affect

Construct Operationalized

High scores on this factor indicate that respondents self report that they are affective communicators who enjoy communicating and are well liked when interacting with others on mobile phones. Moreover, respondents who score high on this factor are satisfied with their interactions and enjoy their mobile phone interactions.

The construct is operationalized based on interpretation of the scale-items that loaded on the respective factor; refer to Table 2 for a complete list of items and factors.
Construct Description

Communicator affect is the last of two constructs that measure the outcome of respondent’s mobile phone communication. The factor “communicator affect” is theoretically based on the competence outcomes constructs in Spitzberg’s Model of CMC competence (2006). Communicator affect measures interactants’ satisfaction and attractiveness when assessing the competence of a mobile phone interaction outcome. Satisfaction is interactants’ feeling of accomplishment when implementing successful communication. Attractiveness is a measure of interactants’ feeling of social accomplishment when using a mobile phone for communication. According to Canary, Cupach, & Serpe (2001), interactants’ assessment of the communication means more to a relation than the actual effect of the message. As such, Communicator Affect is a significant assessment of interactants’ mobile phone communication outcome competence. Affective and competent communicators are more likely to have a favorably impression of their mobile phone interaction outcome thus increase the likelihood of initiating further mobile phone communication. The next section describes the relationship among all six factors in a three-step process of mobile phone communication competence.

Process of Mobile Phone Communication Competence

Overview

The six factors in the MPCC measure are synthesized through a three-step process of mobile phone communication competence: 1) initiation, 2) interaction and 3) outcome. The following section explains the relationship between the six factors in the three-step process of mobile phone communication competence (see Figure 2).
Initiation

The process begins with an initiation of the mobile phone communication. Initiation represents a synergy of three MPCC factors: Willingness to use, Comfort with Technology and Asynchronous Communication. Interactants' self-monitoring of mobile phone communication creates a feedback loop between the two constructs "willingness to use" and "comfort with technology." Respondents' positive motivation and willingness to use will increase their comfort with mobile phone technology. Conversely, a lack of comfort with technology will decrease interactants' willingness to use mobile phones to communicate. Initiation is a cognitive and behavioral predictor of mobile phone interactions.
Asynchronous communication competence is a skill-based measure that works in concert with interactants' willingness to use a mobile phone and their comfort with mobile phone technology. It is a central actor in initiating mobile phone communication. As discussed earlier in this thesis, some users exclusively interact via asynchronous communication while others find the limitations of text messaging too cumbersome to use. Asynchronous communication, along with willingness to use and comfort with technology, acts as an antecedent to the mobile phone interaction. The degree of interactants’ willingness to use, comfort with technology and asynchronous communication competence will determine the level of interaction the mobile phone user initiates.

Interaction

Interaction entails the MPCC construct “feature selection” and is the second phase in the mobile phone communication process. When interacting, a mobile phone user will select a feature that, in their judgment, offers the greatest chance for a successful outcome of the interaction. Mobile phone users base this decision on their competency level and contextual influences. According to Spitzberg (2006), a model of CMC competence must account for the influence context has on the CMC interaction. Similarly, context plays an important role in shaping mobile phone interactions: cross cultural factors, age, sex, location and social networks shape and define mobile phone communication. Studies that investigate interactants’ mobile phone communication competence must take care to account for contextual influence.
Outcome

Outcome is the final step in the process of mobile phone communication competence. A mobile phone competence outcome is a measure of two constructs: communicator competence and communicator affect. The two constructs measure the outcome of the mobile phone communication interaction along the lines of effectiveness, appropriateness, satisfaction, and attractiveness. Ultimately, the user’s perceived success of the outcome in a mobile phone interaction will determine the chance for repeated mobile phone communication. When interactants have a feeling of social and personal accomplishment after using a mobile phone for communication, they are more likely to repeat the use mobile phone communication. Conversely, if mobile phone users are not able reach their goals in a mobile phone interaction, they are less likely to repeat that use of mobile phone communication. Figure 2 offers a visual description of the process of mobile phone communication competence.

Future Directions

The purpose of this study was to create a scale to aid advancement in mobile phone communication competence research. The relationship of the constructs in the MPCC measure is synthesized in a three-step process of mobile phone communication competence: initiation, interaction and outcome. Not only does the MPCC scale and process of communication competence aid researchers to identify areas of users’ mobile phone communication competence, the process of MPCC also creates a framework for future discourse and research. Mobile phone communication
research is multidisciplinary; mass communication, psychology, sociology, anthropology and human communication are just a few examples of the disciplines that currently research mobile phone communication. However, mobile phone research is missing a framework for discourse that can predict, describe and evaluate interactants’ mobile phone communication. While this study offers such framework, the MPCC measure is limited in that it does not investigate the relationship between mobile phone communication competence and contextual factors.

Mobile phone interactions vary based on contexts, therefore, mobile phone communication competence research must investigate contexts to assess its effect on mobile phone communication competence. Current mobile phone research has identified a typology of contexts. Based on the exhaustive review of literature earlier in this study, the following three areas emerge a logical application of the MPCC scale in future studies to further the understanding of mobile phone communication competence: 1) investigate the relationship between mobile phone communication and interactants’ cultural background, 2) investigating the relationship between mobile phone communication competence and interactants’ social and personal networks, and lastly, 3) investigate mobile phone communication competence and mobile phone interactions in public and private space.

According to Spitzberg (2006), “Culture consists of patterns of behavior, attitude, belief, value, and ritual transmittable across generations. These patterns coalesce in variables of nationality, ethnicity, race, religion, and gender.” Currently, mobile phone research has identified unique uses of mobile phones dependent on interactants’ cultural background. For example, interactants nationality affects interactants attitudes and perception of mobile phone use (Campbell, 2007, Lemish and Cohen, 2005), age can be a predictor of why interactants adopt the technology
(Ling, 2004), while gender can determine the frequency of mobile communication (Horrigan, 2008). The mobile phone communication competence measure should be used within the mentioned cultural contexts to advance an understanding of culture and its effect on the process of mobile phone communication competence.

Regarding the relationship between mobile phone communication competence and interactants’ social and personal networks, a vast body of research on mobile phone communication and social networks currently exists. For example, members of same networks share feelings of comfort of technology (Campbell and Russo, 2003); mobile phones stimulates how people negotiate space (Weilenmann, 2001) and is used to create maintain and strengthen personal and social networks (Johnsen, 2003). Because of this, mobile phone communication competence research must investigate the relationship between social and personal networks and interactants’ mobile phone communication competence. Future studies should also include studies of the contextual impact large-scale social networks, such as mobile versions of MySpace and Facebook, have on mobile phone communication competence.

Lastly, a third study should investigate the relationship between mobile phone communication competence and mobile phone interactions in public and private space. For example, teens struggle with privacy, intimacy and autonomy regarding friends' constant mobile phone use and accessibility, even to the point of feeling threatened when friends received constant mobile communication from others (Katz, 2006; Ito, 2005). Additionally, although much of the current research focuses on the impact mobile phones have on people’s behavior in social places, Love and Kewley (2005) suggest there is a need for further socio-psychological mobile phone research investigating people’s behavior in social places. Mobile phone communication competence research provides additional insight to interactants’ negotiation of
public and private space.

Future mobile phone communication competence research will benefit from the MPCC measure. By synthesizing the MPCC measure in a process of mobile phone communication competence, future mobile phone research can organize mobile phone communication discourse and research along the process of initiation, interaction and outcome. Because mobile phone communication research is multidisciplinary such framework is an essential aid to predict, describe and evaluate interactants mobile phone communication.

Conclusion

Communication competence is an essential human need; According to Spitzberg and Cupach (1984), communication competence is required to fulfill interpersonal objectives and achieve physical and psychological satisfaction. Though it may be one of the most fundamental and most important aspects of mobile telephony; a measure of mobile phone communication competence is a missing link in mobile phone communication research.

"Human beings should control the technologies they employ. Such control can be achieved in part by understanding the consequences of using ones medium of communication" (Chesebro and Bonsall, 1989, p. 126). The MPCC measure is key to achieving such control. The MPCC measure can be used as a tool in educating mobile phone users. Thorbjørnsen and Nysveen (2005) state that mobile phone users "should be encouraged to integrate the use of mobile services into their everyday life tasks and to spend time and money learning and using the service" (p. 405; also see Bunz, 2004). This is especially important because the mobile phone serves as an important relationship-building tool, and user competency will determine the level of
satisfaction received from mobile phone interactions.

The MPCC measure along with the three-step process of mobile phone communication competence will aid communication researchers to clearly identify areas of users’ mobile phone communication competency. Accordingly, the process of mobile phone communication competence will guide future mobile phone researchers to test assumptions and outcomes of mobile phone communication.
REFERENCES


Appendix A

Human Subjects Institutional Review Board (HSIRB) Approval
Date: October 22, 2007

To: Chad Edwards, Principal Investigator
Emil Bakke, Student Investigator for thesis

From: Amy Naugle, Ph.D., Chair

Re: HSIRB Project Number: 07-03-17

This letter will serve as confirmation that your research project entitled “Mobile Phone Communication Competence: Development and Validation of a New Measure” has been approved under the exempt category of review by the Human Subjects Institutional Review Board. The conditions and duration of this approval are specified in the Policies of Western Michigan University. You may now begin to implement the research as described in the application.

Please note that you may only conduct this research exactly in the form it was approved. You must seek specific board approval for any changes in this project. You must also seek reapproval if the project extends beyond the termination date noted below. In addition if there are any unanticipated adverse reactions or unanticipated events associated with the conduct of this research, you should immediately suspend the project and contact the Chair of the HSIRB for consultation.

The Board wishes you success in the pursuit of your research goals.

Approval Termination: October 22, 2008
Appendix B

Anonymous Consent Form
You are invited to participate in a research project entitled "Mobile phone communication competence: Development and validation of a new measure" designed to examine mobile phone users' communication competence and perception toward mobile phone technology. Chad Edwards and Emil Bakke from Western Michigan University's School of Communication are conducting the study. The research is part of Emil Bakke's Master Thesis.

This survey is comprised of 141 questions and takes approximately 20 minutes to complete. Your replies will be completely anonymous; do not put your name anywhere on the form. You may choose to not answer any question and simply leave it blank. If you choose to not participate in this survey, please sit quietly at your desk while others complete the survey. You may return a blank survey. Returning the survey indicates your consent for use of the answers you supply. When completed, leave the survey on your desk with the printed side down to ensure your privacy. The survey will be collected from the entire class 20 minutes after distribution.

If you have any questions, you may contact Chad Edwards at 269-387-0358, Emil Bakke at 269-267-6183, the Human Subjects Institutional Review Board (269-387-8293) or the vice president for research (269-387-8298).

This consent document has been approved for use for one year by the Human Subjects Institutional Review Board as indicated by the stamped date and signature of the board chair in the upper right corner. You should not participate in this project if the stamped date is more than one year old.
Appendix C

Recruitment Script
Appendix: Recruitment Script

You are invited to participate in a research project entitled "Mobile phone communication competence: Development and validation of a new measure" designed to examine mobile phone users communication competence and perception toward mobile phone technology. Chad Edwards and Emil Bakke from Western Michigan University’s School of Communication are conducting the study. The research is part of Emil Bakke’s Master Thesis.

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- You may choose to not answer any question and simply leave it blank. If you choose to not participate in this survey, please sit quietly at your desk while others complete the survey. You may return a blank survey.

- Returning the survey indicates your consent for use of the answers you supply.

- When completed, leave the survey on your desk with the printed side down to ensure your privacy. The survey will be collected from the entire class 20 minutes after distribution.

If you have any questions, raise your hand at any time. I will attempt to answer your concern.

You will receive an Anonymous Consent letter. Please retain the letter. It provides information if you have questions or concerns about this research.
Appendix D

Survey Distributed to Participants
MOBILE PHONE (CELL PHONE) COMMUNICATION

Instructions: We are interested in how people use mobile phones (cell phones) to communicate with others. The Information collected will be treated anonymously and confidentially. Please, do not put your name anywhere on this survey.

Indicate the degree to which you agree or disagree with each statement regarding your use of mobile telephony using the following scale:

1 = NOT AT ALL TRUE OF ME
2 = MOSTLY NOT TRUE OF ME
3 = NEITHER TRUE NOR UNTRUE OF ME; UNDECIDED
4 = MOSTLY TRUE OF ME
5 = VERY TRUE OF ME

Motivation
_01. I enjoy communicating using mobile phones.
_02. I am nervous about using the mobile phone to communicate with others.
_03. I am very motivated to use mobile phones to communicate with others.
_04. I look forward to using my mobile phone to converse with others.
_05. Communicating with a mobile phone makes me anxious

Knowledge
_06. I am very knowledgeable about how to communicate with mobile phones.
_07. I am never at a loss for something to say with mobile phones.
_08. I am very familiar with the features on a mobile phone.
_09. I always seem to know how to say things the way I mean them using mobile phones.
_10. When communicating with someone on a mobile phone, I know how to adapt my messages to the feature I use (i.e., voice, text and picture message, etc.)

Efficacy
_11. I don't feel very skilled in learning and using mobile phone features.
_12. I feel completely capable of using almost all the features available on a mobile phone.
_13. I am confident that I will learn how to use any new features that are due to come out.
_14. I'm nervous when I have to learn how to use a new mobile phone handset.
_15. I find changes in mobile phone technology very frustrating.
_16. I quickly figure out how to use new features on a mobile phone.
_17. I know I can learn to use new mobile phone technologies when they come out.
_18. If a mobile phone feature isn't user friendly, I’m likely not to use it.
Coordination
____19. I know when and how to close down a topic of conversation in mobile phone dialogues.
____20. I manage the give and take of mobile phone interactions skillfully.
____21. I am skilled at timing when I send my responses to people who text message me.
____22. I am skilled at prioritizing (triaging) my text messages.

Attentiveness
____23. I ask questions of the other person in my mobile phone interactions.
____24. I show concern for and interest in the person I’m conversing with in my mobile phone interactions.
____25. I can show compassion and empathy through the way I write text messages.
____26. I take time to make sure my text messages to others are uniquely adapted to the particular receiver I’m sending it to.

Expressiveness
____27. I am very articulate and vivid in my mobile phone text messages.
____28. I use a lot of the expressive symbols [e.g., 😊 for ‘smile’] in my text messages.
____29. I try to use a lot of humor in my text messages.
____30. I am expressive in my mobile phone conversations.

Composure
____31. I display a lot of certainty in the way I write my text messages.
____32. I use an assertive style when writing a text message.
____33. I have no trouble expressing my opinions forcefully when interacting on a mobile phone.
____34. I make sure my objectives are emphasized in my mobile phone text messages.
____35. My mobile phone text messages are written in a confident style.
____36. I am skillful at revealing composure and self-confidence in my mobile phone interactions.
1 = NOT AT ALL TRUE OF ME
2 = MOSTLY NOT TRUE OF ME
3 = NEITHER TRUE NOR UNTRUE OF ME; UNDECIDED
4 = MOSTLY TRUE OF ME
5 = VERY TRUE OF ME

Selectivity
I choose which mobile phone feature (i.e., voice, text and picture message, etc.) to communicate with based on...

___37. ... how quickly I need to get a message out to people.
___38. ... how lively the interaction needs to be.
___39. ... how much access the person I need to communicate with has to the feature.
___40. ... how much information is involved in the message I need to communicate.
___41. ... how much access I have to the channel or medium.
___42. ... how long I need people to hang on to or remember the message.
___43. ... how personal or intimate the information in the message is.
___44. ... how quickly the receiver needs to react to the message.
___45. ... the extent to which I need to get some "back and forth," "give and take," and interchange of ideas.
___46. ... how much the mobile phone provider charge to use the feature.

Appropriateness
___47. I avoid saying things that might offend someone.
___48. I pay as much attention to the WAY I say things as WHAT I say.
___49. I never say things that offend the other person.
___50. I am careful to make my comments and behaviors appropriate to the situation.

Effectiveness
___51. I generally get what I want out of interactions.
___52. I consistently achieve my goals in interactions.
___53. My interactions are effective in accomplishing what I set out to accomplish.
___54. I am effective in my conversations with others.
1 = NOT AT ALL TRUE OF ME  
2 = MOSTLY NOT TRUE OF ME  
3 = NEITHER TRUE NOR UNTRUE OF ME; UNDECIDED  
4 = MOSTLY TRUE OF ME  
5 = VERY TRUE OF ME  

Clarity  
_55. I get my ideas across clearly in conversations with others.  
_56. My comments are consistently accurate and clear.  
_57. My messages are rarely misunderstood.  
_58. I feel understood when I interact with others.  

Satisfaction  
_59. I am generally satisfied with my communication encounters.  
_60. I enjoy my interactions with others.  
_61. I feel good about my conversations.  
_62. I am generally pleased with my interactions.  

Attractiveness  
_63. If I can engage someone in conversation, I can usually get them to like me.  
_64. I come across in conversation as someone people would like to get to know.  
_65. I make friends easily.  
_66. People generally enjoy my company when interacting with me.  

Efficiency  
_67. I get a tremendous amount accomplished through mobile phone communication.  
_68. My mobile phone interactions are more productive than my face-to-face interactions.  
_69. I am more efficient using mobile phones than other forms of communication.  
_70. Mobile phones are tremendous time-savers for my work.  

General Usage/ Experience  
_71. I rely heavily upon my mobile phone for getting me through each day.  
_72. I use a mobile phone as means of communication almost constantly.  
_73. I can rarely go a week without any mobile phone interactions.  
_74. I am a heavy user of mobile phone communication.  
_75. If I can use a mobile phone for communicating, I tend to.
Indicate the degree to which you agree or disagree with each statement regarding your mobile phone communication and perceptions:

1 = STRONGLY DISAGREE
2 = DISAGREE
3 = UNDECIDED
4 = AGREE
5 = STRONGLY AGREE

Mobile Phone Communication Use And Perceptions

75b. The way a mobile phone looks would be an important consideration to me if I were to purchase a new one.

76. I do not use my mobile phone to coordinate plans with others.

77. I am comfortable with the technical features of the mobile phone that I use.

78. I own a mobile phone in case I need it for security.

79. I use my mobile phone to chat with friends/family.

80. It makes me nervous when an automobile driver makes a call on a mobile phone.

81. If I am running late to meet people, I often call them on my mobile to let them know.

82. I carry my mobile phone around at night because it makes me feel safer.

83. I would like to be able to personalize the way my phone looks.

84. I don’t really care if my mobile phone reflects my sense of style.

85. I do not use all of the features of my phone because I am not sure how.

86. It is rude for someone to talk on a mobile phone while riding on a bus.

87. People should not talk on mobile phones during meetings.

88. A good reason for owning a mobile phone is to make plans with others.

89. When acquiring my mobile phone, safety was not a primary consideration.

90. I find it irritating to hear someone talking on a mobile phone while in a restaurant.

91. I rarely call someone on my mobile phone to make plans.

92. I don’t think of my mobile phone as a security device.

93. I do not mind when people use mobile phones around me in a grocery store.

94. I don’t think using a mobile phone while driving is a hazard.

95. I find the buttons on my mobile phone difficult to use.

96. I think my mobile phone is easy to operate.

97. Most automobile accidents involving a driver on a mobile phone could probably be avoided if the phone was not in use.

98. I don’t have trouble understanding the services and promotions offered by my wireless provider.

99. I clearly understand all of the details of my calling plan.
1 = STRONGLY DISAGREE
2 = DISAGREE
3 = UNDECIDED
4 = AGREE
5 = STRONGLY AGREE

100. I am very familiar with the difference between digital service and analog service.
101. I think the promotions offered by my wireless provider can be confusing.
102. It makes me nervous when an automobile driver receives a call on a mobile phone.
103. I regularly use the mobile phone just to share something interesting with another person.
104. I am more interested in functionality than looks when it comes to mobile phones.
105. I frequently use my mobile phone to schedule appointments.
106. I bring my mobile phone while traveling in case I run into trouble.
107. It should be illegal to use a mobile phone while driving.
108. There is nothing wrong with taking a call on a mobile phone while in a public setting.
109. I clearly understand my service coverage area.
110. I use my mobile phone for personal reasons, like chatting with friends, catching up on gossip, or telling a joke.
111. I don’t care how a phone looks, as long as it works well.
112. I find mobile phones to be very useful to firm up meeting times and locations.
113. I use my mobile phone to “catch up” with friends or relatives.
114. In general, it is rude for people to use their mobile phones in public settings.

Mobile Phones in College Classrooms
114. I would agree with a university policy against mobile phone use (i.e., talking, text messaging, etc.) during class time.
115. I would agree with an instructor’s policy against mobile phone use (i.e., talking, text messaging, etc.) during class time.
116. I would agree with a university policy against mobile phones ringing during class time.
117. I would generally not agree with policies against mobile phone use in the classroom.
118. I think it is rude when students do not turn their ringers off or to silent mode during class.

119. When a mobile phone rings during class, it is a serious distraction.
120. I find it bothersome when a mobile phone rings during class time.
121. I do not think mobile phones are a serious problem in my classes.
122. Too often do I hear mobile phones ringing during class.
123. I complain to others about mobile phones ringing or being used in classrooms.
124. I hear people complain about mobile phones ringing or being used in classrooms.
1 = STRONGLY DISAGREE
2 = DISAGREE
3 = UNDEIDED
4 = AGREE
5 = STRONGLY AGREE

College Classrooms (Part II)
__125. I have heard/read about mobile phones being used for cheating in school.
__126. I think mobile phones have the potential to be an effective resource for cheating on tests.
__127. I do not mind when someone answers his/her mobile phone during class if he/she leaves the room to answer the call.
__128. Generally, I think mobile phones are a source of distraction in my classes.
__129. I do not mind when students use their mobile phones during class as long as they are not talking on the phone (i.e., it’s OK if they text message, browse the Web, etc.)
__130. If a student gets an important call on his/her mobile phone during class, I think it is OK for him/her to take the call during class time as long as he/she leaves the room.
__131. I would agree with an instructor’s policy against mobile phones ringing during class time.
__132. It irritates me when a student answers a mobile phone during class.
__133. I access the internet frequently with my mobile phone.
__134. I text message frequently with my mobile phone.
__135. I take pictures frequently with my mobile phone.

General Information
136. What is your sex? 1 = Female 2 = Male
137. What is your age? ________ 138. What is your age? ________
139. With which ethnicity do you most identify?
   ___ African American/Black ___ Pacific Islander
   ___ Asian American ___ White/European American
   ___ Mexican American/Hispanic ___ Other (______________________)
   ___ Native American ___ None
140. How long have you owned a mobile phone? _______ year(s) ________ months
141. Approximately, what is the price of the mobile phone handset you currently own? $____
142. On average, how much is your monthly mobile phone bill? $ ______________
Appendix E

Mobile Phone Communication Competence Instrument
MOBILE PHONE (CELL PHONE) COMMUNICATION

Instructions: We are interested in how people use mobile phones (cell phones) to communicate with others. The Information collected will be treated anonymously and confidentially. Please, do not put your name anywhere on this survey.

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3 = NEITHER TRUE NOR UNTRUE OF ME; UNDECIDED
4 = MOSTLY TRUE OF ME
5 = VERY TRUE OF ME

Willingness to Use

___ 01. I enjoy communicating using mobile phones.
___ 02. I am very motivated to use mobile phones to communicate with others.
___ 03. I get a tremendous amount accomplished through mobile phone communication.

___ 04. My mobile phone interactions are more productive than my face-to-face interactions.
___ 05. I am more efficient using mobile phones than other forms of communication.
___ 06. Mobile phones are tremendous time-savers for my work.
___ 07. I rely heavily upon my mobile phone for getting me through each day.

___ 08. I use a mobile phone as means of communication almost constantly.
___ 09. I can rarely go a week without any mobile phone interactions.
___ 10. I am a heavy user of mobile phone communication.
___ 11. If I can use a mobile phone for communicating, I tend to.

Communicator Affect

___ 12. I enjoy my interactions with others.
___ 13. I feel good about my conversations.
___ 14. I am generally pleased with my interactions.

___ 15. If I can engage someone in conversation, I can usually get them to like me.
___ 16. I come across in conversation as someone people would like to get to know.
___ 17. I make friends easily.
___ 18. People generally enjoy my company when interacting with me.
Asynchronous Communication

19. I am skilled at timing when I send my responses to people who text message me.
20. I am skilled at prioritizing (triaging) my text messages.
21. I can show compassion and empathy through the way I write text messages.
22. I take time to make sure my text messages to others are uniquely adapted to the particular receiver I'm sending it to.
23. I am very articulate and vivid in my mobile phone text messages.
24. I try to use a lot of humor in my text messages.
25. I display a lot of certainty in the way I write my text messages.
26. I use an assertive style when writing a text message.
27. I make sure my objectives are emphasized in my mobile phone text messages.
28. My mobile phone text messages are written in a confident style.

Comfort with Technology

29. I am very knowledgeable about how to communicate with mobile phones.
30. I am very familiar with the features on a mobile phone.
31. When communicating with someone on a mobile phone, I know how to adapt my messages to the feature I use (i.e., voice, text and picture message, etc.)
32. I don't feel very skilled in learning and using mobile phone features.
33. I feel completely capable of using almost all the features available on a mobile phone.
34. I am confident that I will learn how to use any new features that are due to come out.
35. I'm nervous when I have to learn how to use a new mobile phone handset.
36. I find changes in mobile phone technology very frustrating.
37. I quickly figure out how to use new features on a mobile phone.
38. I know I can learn to use new mobile phone technologies when they come out.
1 = NOT AT ALL TRUE OF ME
2 = MOSTLY NOT TRUE OF ME
3 = NEITHER TRUE NOR UNTRUE OF ME; UNDECIDED
4 = MOSTLY TRUE OF ME
5 = VERY TRUE OF ME

Selectivity

I choose which mobile phone feature (i.e., voice, text and picture message, etc.) to communicate with based on...

___39. ... how quickly I need to get a message out to people.
___40. ... how lively the interaction needs to be.
___41. ... how much access the person I need to communicate with has to the feature.
___42. ... how much information is involved in the message I need to communicate.
___43. ... how much access I have to the channel or medium.
___44. ... how long I need people to hang on to or remember the message.
___45. ... how personal or intimate the information in the message is.
___46. ... how quickly the receiver needs to react to the message.
___47. ... the extent to which I need to get some "back and forth," "give and take," and interchange of ideas.

Communicator Competence

___48. I am never at a loss for something to say with mobile phones.
___49. I always seem to know how to say things the way I mean them using mobile phones.
___50. I have no trouble expressing my opinions forcefully when interacting with a mobile phone
___51. I am skillful at revealing composure and self-confidence in my mobile phone interactions.
___52. I consistently achieve my goals in interactions.
___53. My interactions are effective in accomplishing what I set out to accomplish.
___54. I am effective in my conversations with others.
___55. I get my ideas across clearly in conversations with others.
___56. My comments are consistently accurate and clear.
___57. I feel understood when I interact with others.