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Title

Computer mediated communication theories and phenomena: Factors that influence collaboration over the Internet

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Abstract

The Internet as a communication and social environment is one of the hot topics in psychology and communication research. Computer Mediated Communication (CMC) is an interdisciplinary field that analyses various phenomena that arise from the use of the Internet for human communication. The theories of CMC are briefly outlined in the paper as well as the research findings that support these theories. Various psychosocial phenomena that are related to the use of the Internet are also illustrated. Finally, conclusions are drawn regarding the impact of the Internet related psychosocial phenomena and of the results of CMC research on collaboration and teamwork over the Internet.

Introduction

The Internet is a multifaceted medium that challenges traditional theories and concepts of interpersonal and mass communication. It enables diverse forms of communication: from mass communication *via* the *World Wide Web*, group discussions in Internet chat forums (or in the *Listserv* or *Usenet* groups), to person-to-person communication by e-mail. Furthermore, the complexity of messages can vary from the use of multimedia and interactivity to one-way and text only messages. This paper examines the potential of the Internet to enhance *group communication in collaborative work* and it also outlines how some *computer mediated communication* (CMC) theories and phenomena can influence the way collaboration is formed,

advanced, maintained, and eventually disrupted when using the Internet as a communication medium.

The Internet enables varied configurations of communication exchange like e-mail, file transfer, newsgroups and mailing lists, bulletin boards, chat systems, text or audio and video conferences, group calendars, workflow systems, collaborative writing systems, decision support systems and other elaborate systems for the support of work groups and teams. For instance, *Group Support Systems (GSS)* and *Computer-Supported Cooperative Work (CSCW)* systems are technical information systems that are designed to provide a communication interface to an information environment that is shared by a group of users, so as to enable them to achieve mutual goals or solve shared problems. Such systems are referred to as *groupware* and can be implemented on the Internet.

Groupware is technology based on modern computer networks that is designed to assist collaborative work and is preferred because of numerous potential advantages when compared to single-user systems (Brinck, 1998), as it:

- facilitates communication (makes it faster, clearer, more persuasive);
- enables communication where it wouldn't otherwise be possible;
- enables telecommuting;
- cuts down on travel costs;
- can bring together multiple perspectives and expertise;
- can form groups with common interests where it wouldn't be possible to gather a sufficient number of people face-to-face;
- can save time and cost in coordinating group work;
- facilitates group problem-solving;
- enables new modes of communication, such as anonymous interchanges or structured interactions.

Computer mediated communication (CMC) involves exchanges of information in textual, audio, and/or video formats that are transmitted and controlled by the use of computer and telecommunication technology. It must be noted that CMC is the basis of interpersonal interaction *via* groupware systems. An interesting definition of CMC is given by December (1997): "*Computer-Mediated Communication is a process of human communication via computers, involving people, situated in particular contexts, engaging in processes to shape media for a variety of purposes.*"

The approaches to the study of CMC are diverse and are related to research of *interpersonal, group, and mass communication*. Various theories and phenomena that are related to CMC are outlined in the continuation of this paper and some conclusions are also drawn regarding their impact on collaborative work and communication *via* the Internet.

Social presence theory and face-to-face communication versus CMC

Social presence theory (Short, Williams & Christie, 1976) states that different communication media enable different levels of experience of the social presence of individuals who are engaged in communication. The level of experience of the *social presence of other people* is related to the

quality of the medium, i.e. to the quantity of different social cues or active nonverbal channels when social/interpersonal information is transmitted through a medium. While *face-to-face* (FtF) communication has the highest level of social presence, the level of social presence in *CMC* is considerably lower.

Analyses of FtF communication have revealed numerous qualities that are absent in most CMC interactions:

- auditory and visual nonverbal communication channels are not activated in prevalent types of CMC;
- there is much less immediacy in CMC because of its asynchronicity and lack of nonverbal cues;
- message feedback is greatly reduced in quality and quantity, thus increasing uncertainty and the possibility of misunderstandings;
- the communicator(s) can be anonymous and no information on their body image has to be provided in CMC;
- information that is related to cultural and ethnic background, social status, gender, and age is often reduced, suppressed, or simply not present in CMC;
- the "social presence" of the recipient(s) of the message is reduced in CMC and this facilitates problematic behaviors like disinhibition, flaming, etc.

It is clear from this brief comparison of FtF communication and CMC that there is considerable potential for degradation of communication outcomes when using CMC. In fact, when *appropriateness* and *effectiveness* of communication channels were analyzed in relation to various communication motives, only the fax machine received a lower mean rating than e-mail as a form of CMC, while FtF, telephone, voice-mail, and letters were all rated better (Westmyer *et al.*, 1998). In fact, the low social presence of CMC could lead to *depersonalized* communication or more *business-like* interaction with a lower degree of friendliness and emotional display.

Media richness and CMC

Because of numerous channels (verbal, audio, visual, tactile, etc.) and immediate feedback in a two-way communication process, FtF is characterized by more flexibility and diversity in forms of information exchange, e.g. FtF has greater "richness" in communication than electronically mediated communication. According to the *media richness theory* (Daft & Lengel, 1986), the transmission of *rich information* requires instantaneous feedback and a higher level of interactivity that is characterized of a *rich medium*. Richer electronic media permit more types of information and feedback, enabling more comprehensive transmission and reception of messages and a better adaptation of the message to the particular recipient. For instance, *video teleconferencing* is richer than a *textual Internet chat*. Also, richer media enable increased "social presence" of those who are engaged in electronically mediated communication.

Spitzberg (2001) has listed several attributes that can be used to analyze the richness of a specific medium:

- *Speed* refers to how rapid the production, sending, and receiving of a message can be (both e-mail and "snail-mail" are *slower* media compared to the telephone).

- *Interactivity* is related to the possibility of *two-way information exchange* and *feedback*, as well as to the time lag between the sending and reception of a message.
- *Completeness* designates the degree to which the medium can transmit the nonverbal forms of a message and representations of emotional content (i.e. *video teleconferencing* can more completely transmit an interpersonal message than a *Usenet discussion group*).

Effectiveness in communication is related to the *appropriate choice of a medium* to deliver a *specific message* (regarding how complex, ambiguous, impersonal, and/or emotional the message should be). For instance, *electronic media* are commonly considered more appropriate for *task-oriented activities*, while *FtF* is more appropriate for *socially sensitive and intellectually challenging information*. Also, it has been found that groups using e-mail could have greater difficulty in reaching a consensus than *FtF* groups. Therefore, it is important for managers and team leaders to *select an appropriate medium* for a particular interaction context, message content, and/or communication task. However, the selection of a medium to best fit communication contexts and goals may not always be achievable in real-world settings because of task complexity, media availability, preference for certain media, managerial requirements, or organizational practices (see Haythornthwaite *et al.*, 1998).

CMC in a work environment should be utilized in a way that enhances the potential advantages of a *computer network* as a medium. For example, even though in *computer-supported cooperative work* (CSCW) most participants of a work group or a team may regularly be *on-line*, the *speed* of message delivery can be combined with asynchronicity in responding, so as to enable an *improved formulation of messages* compared to the use of *FtF* or telephone. In fact, the level of *interactivity* in responding to a message could be *moderated* (e.g. better controlled) by all participants when using CMC, with greater possibilities of adapting the *content* and *timing* of a message to individual and group communication goals. As far as *completeness* of messages is concerned, simple activities such as idea-sharing, assigning tasks, or performance reports could benefit from the reduced richness (i.e. lack of the nonverbal message component) of CMC.

Impression management on the Internet

The reduced social cues and additional time available to formulate a response message in CMC enable better *control over the impressions* others form of a more or less anonymous person engaged in CMC interaction. Commonly, various communication skills (*composure, adaptability, nonverbal expressiveness*, etc.) contribute to more effective "*real-time*" interpersonal message design and production in *FtF* communication. The physical and vocal characteristics of an individual also play an important part in impression formation during *FtF* communication. However, asynchronous and text-only communication in most CMC interactions place much less importance on such skills and personal physical appearance.

Impression management is related to the *tactics* people use to present themselves in whatever light they think appropriate for a certain *social context*, for instance to be liked, to dominate, or to induce fear or respect from some person(s) or audience (Wallace, 1999, pp. 28-31). It must be emphasized that effective impression management also implies *avoiding* behaviors that could create the perception of social manipulation, or false self-presentation for a social advantage.

The CMC creates a somewhat different communication context than FtF and facilitates a creation of (one or more) personal *cyberidentities* that may be substantially different than the real social identity of an individual. By controlling the content of verbal information in a CMC message, the sender can induce various projections of personal attributes that are ascribed to him/her by the recipients of the message. Thus, because of reduced social cues, the task of *impression management* on the Internet and *via* CMC is simplified in situations when someone is (a) trying to transmit *socially favorable* personal information, attitudes, and values while omitting socially disadvantageous personal data; or (b) engaging in *social deception* by conveying socially agreeable but untrue or incorrect personal information.

The implications of impression management in CMC for work groups or teams that collaborate *via* the Internet are considerable:

- gender, age, and ethnic differences may become less important while *task expertise, quality of individual-group CMC interaction, and work related effectiveness* could have a more adequate role;
- individuals who may not be effective in FtF interaction because of interpersonal incompatibility may find that they can work together quite well in the nonverbally less rich CMC interaction environment;
- more individual control over the impression formation process may create an overall *greater interpersonal satisfaction and mutual attraction* in a group or team with predominantly CMC interaction.

However, because *interpersonal deception* is facilitated *via* CMC, there should be *strict norms* in work groups or teams that utilize the Internet as a communication medium in terms of *integrity* and *fairness* in communication exchange. Furthermore, the recipients of interpersonal messages in CMC should have some reserve toward their *CMC-only* impressions of individuals they interact with before they have more "real world" knowledge and FtF experience of them.

Hyperpersonal communication

Even though CMC can be characterized as less rich in available communication channels and with a lower social presence of participants, sometimes *strong involvement, intense relationships and reciprocation* can occur within such a seemingly deficient communication environment. *Hyperpersonal* communication is a construct introduced by Walther (1996) that denotes *communication that appears more desirable than what we tend to experience in analogue FtF interactions*. The opposite to hyperpersonal is *impersonal* communication, which is primarily task-oriented and with a low level of social interaction. Finally, *interpersonal* communication is more socially oriented than impersonal, but with a less exaggerated experience of relational satisfaction and involvement than hyperpersonal communication.

Several characteristics of the CMC environment can contribute to the experience of high commonality and closeness as in *hyperpersonal* communication:

- idealized perception of message producer(s);
- optimized self-presentation;
- asynchronous channels that support information management;
- positive feedback loop(s) that allow intensification in an interaction with minimal cues.

The phenomenon of *hyperpersonal* interaction can contribute to *relationship development* and *cohesiveness* within work groups and teams that collaborate through a CMC environment. However, those who are experiencing such effects must bear in mind that eventual subsequent interaction in the real world surroundings may cause *disillusionment* and disappointment in their previously idealized CMC interaction partners, as well as that more detailed insights into their physical and cultural characteristics should not lead them to decreased collaboration and team performance.

Uses and gratification theory and CMC

The *uses and gratification theories* of media use have been developed for research into traditional media (Blumer & Katz, 1974; Rosengren *et al.*, 1985), and recently they have been widely utilized for analyses of the Internet as a communication medium. These theories try to explain the *choice* of consumers/users for use of a specific medium when other communication media are also available, by assuming that *people use a given media to satisfy certain needs or desires*. Media offer *different gratification opportunities*, i.e. they differ in the way they can satisfy certain needs and reward their use. For instance, *e-mail* is superior to the *telephone* when it comes to adjusting the use of the medium to other people's work schedules and communicating with people who are in different time zones, far away, or not available for meeting in person (Dimmick *et al.*, 2000).

Papacharissi and Rubin (2000) investigated motives for Internet use and found that the Internet is used as a *functional alternative* by users for whom other communication channels are *not available or rewarding*. They found that the *primary motives* for use of the Internet were (1) information seeking for an instrumental purpose, (2) interpersonal utility - used as a channel for interpersonal interaction, (3) convenience, (4) entertainment, and (5) passing time.

In another study, Flanagin & Metzger (2001) analyzed which *groups of communication needs* exist and which groups of needs are best fulfilled by *different means of communication*. The investigated channels that were rated in their research for specific needs fulfillment were associated with *common interpersonal communication* (FtF, phone), *traditional mass communication* (TV, newspapers, books and magazines), and *CMC/Internet communication* (e-mail, WWW conversation, WWW information giving, WWW information retrieval). This study revealed that FtF was usually the most preferred means for communication, but also that at least one mode of communicating by the Internet received *one of the four highest ratings* for all of the rated needs: *information, learning, play, leisure, persuasion, social bonding, relationship maintenance, problem solving, status, and personal insight*.

In a common work environment, CMC would probably be used alongside other means of communication among members of a work group or a team. A single communication activity (e.g. persuasion, presentation, negotiation, business meeting) often contains many types of information (social, task related, attention seeking, entertaining, etc.) with diverse channels that may be activated, and empirical research revealed that those who *frequently communicate* or engage in *important information exchanges* tend to combine the use of diverse media (Haythornthwaite *et al.*, 1998). Generally, even though it is not always possible to make an

adequate *message-medium fit*, the choice of media should be made on the basis of utility, group or organizational standards, acceptance of a medium by those that have to use it, and the importance of the message(s) to be conveyed.

Because of the diversity and complexity of communicative situations, CMC should be only one *opportune media choice*. As an example, many of those who frequently send important e-mail messages have probably found themselves wishing to pick up a phone or meet FtF to adequately present what they mean to say. However, to ensure *greater gratification* of CMC in work groups and teams that collaborate *via* the Internet, those who engage in using this medium should have *adequate training and experience*, e.g. the needed *knowledge* and *skill* for its competent use.

Problematic behaviors related to Internet use and CMC

One of the consequences of reduced social presence and the relative anonymity of CMC is a tendency for *misuse of the Internet as a medium*. Users of the Internet often manifest reduced self-restraint and significant percentages of them engage in behaviors in this medium that are not in concordance with *social norms*. Such problematic behaviors are subject to *less self-control* because of the *lower amount of social/interpersonal information* (in comparison to FtF interaction) that Internet users have about other interacting participants, and that the other participants or bystanders in the CMC process have about them. Since there is very little or no *immediate nonverbal feedback* in CMC regarding (a) the *emotional impact* of interpersonal messages on *other* people, or (b) the *social evaluation* of one's behavior on the Internet, some Internet users tend to lose concern for the potentially negative effects of their socially unacceptable manners of Internet use. Among the most problematic behaviors that are related to the interpersonal aspects of Internet use are *behavioral disinhibition*, *flaming*, *verbal aggression*, and *inappropriate self-disclosure*.

Behavioral disinhibition

The most general cause of problematic behaviors when using the Internet is related to the phenomenon of *behavioral disinhibition*. In FtF communication, individuals are constrained by the social rules that govern interpersonal interaction, immediate negative feedback, and visible consequences of their inappropriate behavior, as well as by possible social sanctions. However, when using the Internet the users reside in relative *anonymity* and *physical safety*, distant from others in interaction, often unaware of their identities and personalities, as well as of the negative consequences of their risky or potentially damaging behavior. This contributes to the expression of anger or aggression, inappropriate self-disclosure, or personal use of socially doubtful material on the Internet, like pornography. Disinhibition on the Internet could be defined as *behavior that is less inhibited than comparative behavior in real life and that is characterized by an apparent reduction in concern about socially favorable self-presentation and the positive judgement of others* (Joinson, 1998).

Disinhibition can be manifested in many behavioral domains, and members of work groups and teams that collaborate *via* CMC should have in mind both the *social norms* and the *potential*

negative consequences of inconsiderate, unrestrained, and risky behaviors when using the Internet.

Flaming

One of the adverse phenomena in CMC is related to using *verbal expressions* that can cause *hurt* or *insult* to others. Just as the disinhibition effects that are caused by relative anonymity, physical safety, and the reduced social presence of others can lead to more openness and self-disclosure, they can also cause Internet users to *feel free to express anger or hatred* in the form of "*flaming*", e.g. hostile comments, insults, name calling, cursing, etc. (Reid, 1998).

Such episodes of verbally inappropriate behaviors are relatively common in *discussion forums* on the Internet, but can also occur in *e-mail messages* and subsequently disrupt relationships or team atmosphere. Both the lack of "social presence" and immediate FtF feedback, as well as the potential of CMC for communicating an impulsive message when the receiver is unavailable for other means of contact, can lead to flaming in work groups or teams.

Aggression

Hostile actions over the Internet may be triggered by the *frustration* that is commonly experienced when using this medium. Failure of computer hardware or software is a common cause of frustration for users, as well as disruption or the low speed of the communication link with the Internet. Also, the time lag in confirmation of a receipt of a message, or when waiting for a full reply to a message, can sometimes lead to disappointment or anger expressed toward the interaction partner(s). According to Wallace (1999, p. 113), frustration is more likely to bring out an *aggressive response* when we are *close to a goal* and something, or someone, *blocks us from achieving it* (this is typical for projects with deadlines and limited resources). A hasty remark on the tip of the tongue, or even written on the keyboard, with only one "click" needed to send the damaging note, sometimes without a possibility for amends, is a common consequence of the frustration often experienced when using computers that are linked to the Internet.

Those who engage in collaborative work *via CMC* must *avoid verbally aggressive reactions* to any potential frustration that could be caused by either the *computer* or the *network* as a medium, as well as by the *characteristics of CMC* itself. Some additional causes for frustration on the part of the *interaction partners* could be their potential inability to express the full content of the message without the use of nonverbal channels, the lack of timely and FtF feedback from the recipient(s) of the message, time consuming use of the computer keyboard in comparison to the speed of vocal transmission of the message, and the uncertainty of message outcomes because of asynchronicity and reduced social cues. Other commonly recognized factors are *misunderstanding* and *cultural differences*. All these factors can contribute to potential frustration in use of CMC for collaboration and also to hostile or aggressive behaviors among members of work groups and teams. It is important that they are aware of the potential for frustration and aggression in CMC to damage work relationships and team performance.

Inappropriate self-disclosure

One of the consequences of uninhibited behavior and poor impression management in CMC is *inappropriate self-disclosure*. Self-descriptions *via* the Internet are mostly related to e-mail, discussion forums, and personal home pages. Most Internet users present only a brief biography, a *Curriculum Vitae*, or job related data on their personal homepages (Dominick, 1999). Several things should be kept in mind by those who self-disclose in CMC: (1) it is preferable to use the available time for message design to your advantage and think twice how your personal data may be interpreted or misused before disclosing it in CMC; (2) the apparent anonymity and confidentiality of CMC can be deceiving because confidential e-mail can be forwarded to numerous other recipients, or true personal identity in discussion groups can be eventually retrieved and exposed; (3) the attempts to project an idealized self-image on a personal homepage or in other forms of CMC interaction may appear boastful or delusive to the recipient(s); (4) some communication contexts require more formal and business/task oriented disclosure of personal information (e.g. like a *C.V.*), while others may favor disclosure of more everyday experiences, hobbies, personal likes and dislikes, etc.

Members of workgroups and teams that collaborate *via* the Internet should keep their personal self-disclosure in accordance with the *norms* and *context of interaction*. Task related self-disclosure regarding fields of expertise, skills, and professional experience may be required and welcome in initial CMC encounters, while more personal and confidential/intimate disclosures would be appropriate in the subsequent process of relationship development among team members. However, both should be moderated to a degree that facilitates interpersonal attraction and satisfaction within the team, and prevents eventual *disillusionment* (as a consequence of *hyperpersonal* communication) when team members finally meet FtF and/or gain more knowledge and experience of each other.

Risky CMC

The Internet is the communication technology that is probably most highly rated for its potential for "*Big Brother*" and "*Peeping Tom*" types of privacy violation. At numerous points in the communication channel, from the information provider to the consumer of information, the Internet enables *snooping* of its users and *looting* of their private information (see Kermek & Bubaš, 2000). Despite this fact, a substantial percentage of Internet users engage in potentially embarrassing CMC by visiting pornographic sites on the Web, downloading illegal copies of software or artwork, revealing their emotional, social, or health problems in discussion groups, or simply by sending e-mail messages that disclose their private selves, negative attributes, opinions of other people, dishonest acts, hostile attitudes, etc.

Numerous Internet users have accidentally sent a personal e-mail to a group of people instead of to only one person, or had the content of their private e-mail message disclosed by the recipient or forwarded to others who were not meant to see it. Even worse, many corporations regularly monitor Internet use by their employees and systems administrators can be found who abuse their authority by invading the privacy of the users. Even though Internet users are generally aware of such risks, their impression of anonymity and their low estimate of the actual risk of their privacy being violated often are *insufficient inhibitors* of risky behaviors on the Internet. In fact, Witmer

(1998) has found that about 50% of Internet user considered this medium to be *private*, while about 35% considered it *public or extremely public*. However, about 58% of the Internet users *considered privacy unimportant*. An in-depth view of the problem of privacy on the Internet on the basis of surveys performed in the US is provided by Rainie (2001).

Members of work groups and teams that collaborate *via* the Internet should be *aware of risks* that are associated with the use of this communication medium. Even though it seems like private, personal space, it can eventually become more public and exposed than the incautious user could imagine. Avoiding risky CMC is an important element of *competent use* of this medium. Efforts invested in *impression management* in the workplace, gaining *credibility* and *authority*, or manifesting *competence* and *professionalism* could all be *put to jeopardy* by risky CMC. Professional norms and practice in use of CMC based media, tools, and resources for collaboration of workgroups and teams can not only *save the face of an individual*, but also the results of *numerous working hours* since risky behavior on the Internet also involves *neglecting security risks* related to confidential information, passwords, and computer viruses.

A model of competence in CMC

For more and more people CMC is becoming an important part of their private and professional lives. However, most CMC theories only *describe or explain* related phenomena and user behavior, while very few can be found that would more explicitly *prescribe or guide* what types of behaviors by means of CMC would be more effective and appropriate. One of the most comprehensive models that outlines *numerous factors of competence in CMC* has been recently developed by Spitzberg (2001), and in the next section of this paper some elements of this model will be presented and interpreted in the context of collaboration via the Internet.

The *pace of change* in the occupational world regarding *the introduction and adoption of various technologies* that support or enable different forms of *electronically or computer mediated communication* has tremendously increased over the last decade and has forced many to cope with the requirements of a brave new *techno-environment*. While some acquire the new technologies and adapt more or less successfully to their features, other risk being left behind, forgotten, or disregarded. However, those who choose to employ the innovations in computer supported telecommunication are compelled to develop competence (e.g. *motivation, knowledge, and skills*) in using such technical systems. In Figure 1 some elements of the *Model of Mediated Communication Competence* (Spitzberg, 2001) are presented that can be utilized for such purpose.

Competence in CMC begins with *motivation* as an important prerequisite. With *negative motivation* the knowledge and skill that someone has can not be adequately put to use. Furthermore, a *need or desire* to use a technical system that supports CMC and the *belief* that this activity will *result in a positive or desired outcome* will influence how much such a system is used. The more a motivated Internet user engages in CMC, *the greater the knowledge and skill of this user* and, consequently, the proportion of his/her achieving the preferred outcome increases. *Knowledge* is another component of CMC competence that can be attained by different means: trial-and-error approach, learning from printed or on-line material, instruction from a colleague or an expert, or more systematic education, such as classes or training seminars. However,

knowledge of *how a technical medium operates* is not sufficient, since it is also necessary to familiarize oneself with the *conventions, rules, and roles* of communication exchanges *via CMC* in specific professional environments. Finally, *skills* are repeatable goal-oriented behaviors that manifest the ability of an individual to perform a certain communication related task. The CMC related skills are associated both with the *technical system* that is used for CMC and to *conduct* in interpersonal communication.

Interpersonal skills that are related to competence in CMC are numerous, but some are especially important because of the lack of nonverbal cues and feedback in CMC interaction:

- *attentiveness* is the ability to show interest in and concern for the interaction partner(s), which is difficult in CMC because of the lack of nonverbal cues;
- *interaction management* is related to the ability to control the time and relevance of communication, attract the interest of the interaction partner, engage him/her in desired communication activity, and succeed in regulating the pattern of interaction in a preferred way;
- *expressiveness* refers to the ability to animate the message, fill it with emotion, and make it lifelike or vivacious in order to capture and preserve attention, induce an emotional response and transmit a relational message (emoticons like ":", ":(or ":0" or other expressive textual forms are often used for this purpose);
- *composure* is the ability to display confidence, mastery, and comfortableness in CMC with a specific medium.

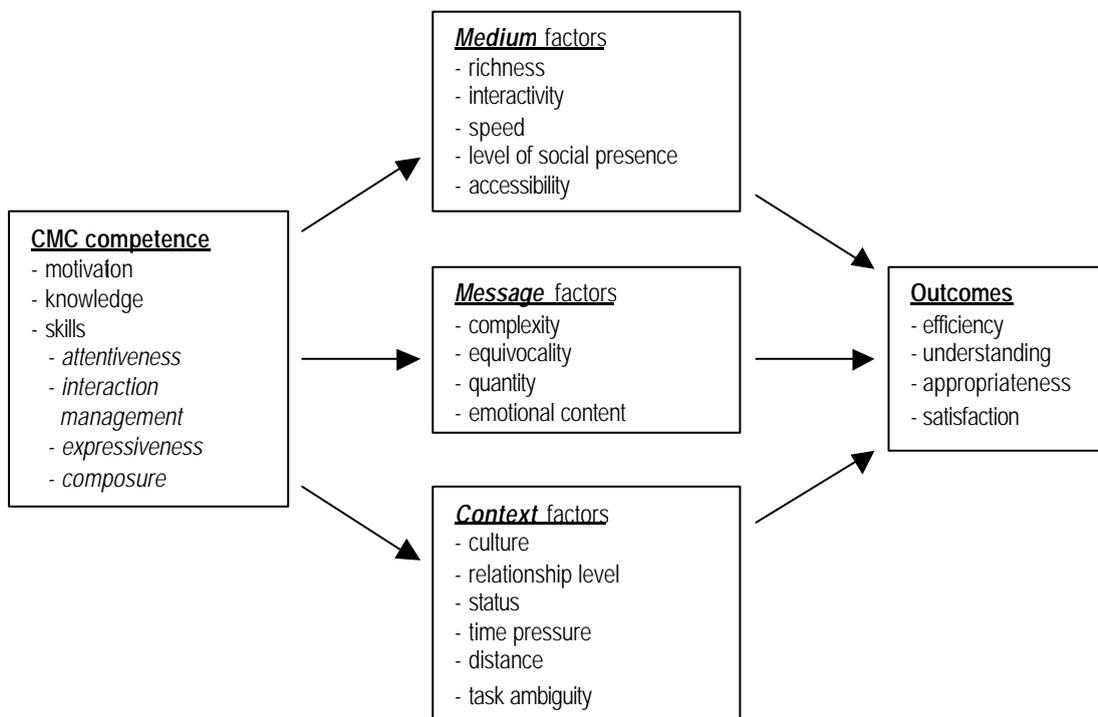


Figure 1. Computer mediated communication model (adapted from Spitzberg, 2001)

An important component of competence in CMC is *media sensitivity* or the awareness that *different media possess different characteristics*, and also that one should try to *fit the message to the medium* (or *vice versa*) in specific communication contexts. Also, quite often the specific interpersonal skills that were previously outlined should be used with *deliberation* to compensate for the disadvantages of CMC in conveying complex emotional and relational messages.

The *personal competence attributes* in CMC interact with the *medium, message, and context* of communication. The important elements of the *medium* are richness, interactivity, speed, level of social presence, and accessibility. These characteristics of the medium should guide the process of setting communication goals, interaction planning, and message design (e.g. attentiveness, expressiveness, interaction management and other skills should be utilized in CMC). The important *message* factors are complexity, equivocality, quantity, and emotional content. In CMC it is difficult to transmit complex messages, the lack of nonverbal cues can deepen ambiguity, while emotional content is transferred with deficiency, and recipients find it difficult to retain attention to extensive messages (for instance, to a 10 page e-mail). Finally, some of the important *contextual* elements are culture, relationship level, status, time pressure, distance, and task ambiguity.

As one of the message factors, *culture* may determine the form in which someone prefers to be addressed or to address a partner in CMC, as well as his/her preferred degree of openness and level of self-disclosure. The *relationship level* determines the choice of a medium (at least occasional use of a *rich medium* would be preferred with a high relationship level) as well as the use of humor, self-disclosure, expressiveness, and emotional exchange. With greater *status difference* the communication between participants in interaction is expected to be *more formal*, and the sender should conform to the medium that the receiver prefers.

One way to assess personal competence in CMC is by the following *outcomes* of such interactions (if such outcomes are not adequately achieved, there is need for improvement in CMC competence):

- *efficiency* is related to the amount of investment (time, people, resources) in relation to how much of the planned results of CMC were achieved;
- *understanding* denotes the level at which the message was interpreted in relation to how it was intended by the sender;
- *appropriateness* is the degree to which CMC was fitting and acceptable in the given social and professional context;
- *satisfaction* denotes that both the sender and receiver of the message have a feeling that positive expectancies of CMC have been fulfilled.

To make a brief summary of the implications of the presented model, it can be stated that the results of collaboration *via* the Internet are dependent on the *motivation, knowledge, and skills* of members of work groups and teams in CMC and the use of the technology that supports it. The *factors of personal CMC competence* interact with attributes of the *medium, message, and context* to create *outcomes* that can be assessed on the basis of *effectiveness, appropriateness, understanding, and satisfaction*. For each of the elements of this model, those who engage in CMC can assess their level of competence in various aspects of CMC, as well as the requirements

of their professional and private environments for self-improvement in CMC. Thus, this model does not only theoretically *describe* CMC as a process, but it also provides the means for *self-assessment* and a guideline for *self-improvement*, i.e. how to correct and refine personal conduct and performance in technically mediated interpersonal interaction.

Conclusion

The Internet is a new medium for *collaboration* and it has a great potential for improvement of *effectiveness in communication* and increase in *production in work groups and teams*. The interdisciplinary field of *computer mediated communication research* not only shows how such interactions can be performed, but also how they can be effectively improved. According to Boergoon *et al.* (2000), new communication technologies open new arenas for communication, but also carry *potential risks* of misunderstanding, distrust, and poor decision making if used with disregard to different goals, tasks, and favorable levels of interpersonal relationships. However, if users *creatively adapt them to meet personal and organizational objectives*, they may accomplish unexpected benefits. In some professional tasks CMC was found to be *superior to FtF*, but CMC was even more effective when *combined with FtF* (Olaniran, 1994).

Walther (1997) concluded in regard to the results of CMC research in international collaboration that "certain social conditions and technology lead people from different places, who have never and will never see each other, to communicate more affection, to like each other more, to think they look better, and to work harder than people working together under other conditions in CMC or by working together face-to-face". Not only must one try to form a better message-medium fit, but also a more complex type of *optimization in choice of media and pattern of their use for collaboration* should be preferred that combines factors like (1) task, (2) message, (3) media-mix, (4) interaction partners, (5) CMC competence, (6) context, and (7) optimal outcomes.

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