The Influence Of Computer-Mediated Communication (CMC) Competence On Computer-Supported Collaborative Learning (CSCL) In Online Classroom Discussions

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Abstract

The present study examines the influence of student knowledge, motivation, skill, apprehension, and the communication medium on the degree of participation in online classroom discussions. Regression analysis shows that student knowledge of the computer-mediated communication (CMC) medium is the strongest predictor, $\beta = .41$. Skill in communicating through the medium is second, $\beta = .23$. Apprehension, $\beta = -.17$, and motivation, $\beta = .11$, also affect student participation. The medium itself has little effect, $\beta = .01$. Results suggest that teaching students strategies for communicating in a CMC medium: coping with the reduced nonverbal cues available, engaging with specific conversational tactics, and using instructor techniques to reduce CMC apprehension and increase student motivation, can facilitate greater participation in online in computer-supported, collaborative learning (CSCL) classroom environments.

Key Words: CMC, computer-mediated communication competence, CSCL, computer-supported collaborative learning, online classroom discussion, CMC apprehension, knowledge, motivation, skill.
The use of computer-supported collaborative learning environments has spawned a debate that is often framed in terms of the positive and negative characteristics of the computer medium. Within this debate the human learner is placed in a passive role as an educational recipient who is positively or negatively affected by the social network characteristics of the medium (Herold, 2012). These network characteristics have been shown to influence student communication patterns and group social dynamics in ways that affect participation and learning (Sundararajan, 2009, 2010).

However, theories of computer-mediated communication (CMC) take a different approach to examining the interaction of participants in a computer-based communication medium. Theories of computer-mediated communication are grounded in the study of interpersonal communication, assume strategic human agency in communication, and use theories such as social penetration and uncertainty reduction to develop predictions for participant communication in a CMC medium (Wang, Leow, Allen, Tran, & Davis, 2011). Hence, theories of computer-mediated communication focus on how people, as active agents, learn to use CMC to strategically construct their messages and develop their relationships within the constraints imposed by the characteristics of the person, relational context, and medium (Sherblom, 2010).

**Computer-Mediated Communication Competence**

Two computer-mediated communication research approaches that analyze this active, strategic use of communication to construct relationships within the constraints of person, context, and medium inform the present analysis of student participation in computer-supported collaborative learning environments. These approaches analyze the influences of computer-mediated communication competence. One approach identifies participant knowledge and motivation as the two primary influences on a person's computer-mediated communication competence (Bubas, Radosevic, & Hutinski, 2003; Bunz, 2005). Having the knowledge of how to communicate in the CMC medium, express oneself appropriately, interpret the meanings of others, and develop successful online conversations and relationships is an important influence. Motivation to engage in those potential conversations and relationships is another. A skill develops with increased knowledge and motivation that shapes a person's ongoing computer-mediated communication competence within the constraints of the communication context, medium, and message (Spitzberg, 2006, 2011). Knowledge, motivation, and skill build upon each other, and together affect the participant attentiveness and expressiveness in a computer-supported collaborative learning environment. Hence, a positive experience with CMC generates more knowledge and a greater sense of computer-mediated communication competence. This sense of CMC competence, in turn, produces an increased motivation to participate more, gain more experience, and increase that competence further (Spitzberg, 2006, 2011).

A second line of research focuses on the affective predispositions that participants have toward computer-mediated communication. Participant apprehension and reticence about using a CMC medium, more than their cognitively-based knowledge, motivation, and skill, affect their participation. Computer-mediated communication apprehension identifies a negative emotional predisposition toward using text-based communication such as email and messaging (Wrench & Punyanunt-Carter, 2007). Reticence describes feelings of anxiety and inhibition toward using the computer-mediated communication medium to express personal meanings and emotion (Kelly,
Keaten, Hazel, & Williams, 2010). Computer-mediated communication apprehension and reticence identify affective predispositions toward using the CMC medium for online discussion in ways that negatively affect a person's CMC skill and ability to effectively participate in computer-supported collaborative learning.

The present study uses these two approaches to CMC competence to examine the cognitive influences of knowledge and motivation, the negative affective predispositions of CMC apprehension and reticence, and the effects of experience and skill on student participation in online, computer-supported collaborative learning (CSCL) environments. These CSCL environments include the use of online discussion boards, virtual environments, and other types of computer software used to facilitate the posting and discussion of topics, group project participation, and student interaction with other participants in the course. The use of CMC in education has moved beyond the one-way transmission of lectures to include more interactive learning environments in which students can participate and become part of an active learning community (Sherblom, 2010; Sundararajan, 2009). This use of CSCL has become a part of many courses in higher education. It is important to understand the multiple influences upon student participation and learning in these environments (Sundararajan, 2010).

Knowledge, motivation, apprehension (including both CMC apprehension and reticence), skill, and medium are the five major influences identified in the literature. It is unclear which are the most influential upon student willingness to participate in CSCL discussions. Once these influences are analyzed suggestions will be made for how an instructor can better prepare students to participate in online discussion.

Method

The 91 participants in the present study were students at two mid-western universities. Participant ages ranged from 18 to 25 years old. All study participants completed an anonymous, online survey containing 104 questions. These questions were compiled from Spitzberg's (2006) computer-mediated communication competence questionnaire and Wrench and Punyanunt-Carter's (2007) computer apprehension measure. Survey questions queried self-perceptions of CMC knowledge, motivation, skill, apprehension, medium, and degree of participation in the online classroom discussion. Responses were factor analyzed using a principal axis extraction and varimax rotation (Gorsuch, 1983). These responses loaded on six factors that accounted for 59% of the variance. These six factors showed clean loadings for knowledge, motivation, skill, apprehension, medium, and involvement as those concepts are defined by Spitzberg (2006) and Wrench and Punyanunt-Carter (2007). The items loading on each of these factors were entered into a linear regression analysis, using a direct entry method. The regression model analyzed the influences of knowledge, motivation, skill, apprehension, and medium as predictors of student participation in the online discussion of the course.

Results

The regression analysis accounted for 24% of the variance in student responses, with an adjusted $r^2=.24$, and produced the following regression model:

$$\text{Participation} = 21.10 + .41 \text{Knowledge} + .23 \text{Skill} - .17 \text{Apprehension} + .11 \text{Motivation} + .01 \text{Medium}$$

Knowledge, which includes feelings of competence, confidence in one's ability to learn a new technology quickly, and having experience with past uses of computer-mediated communication, provides the strongest predictor of student participation in discussion, with a $\beta=.41$. Perceived skill in one's ability to be articulate, expressive, and effective in conversation is
second with a $\beta = .23$. Increased apprehension with the use of CMC provides a negative incentive toward online discussion with a $\beta = -.17$. Motivation, indexed by how much a respondent uses, accomplishes, produces, relies on, and is efficient in the use of CMC had a $\beta = .11$. Finally, medium, representing a respondent's impressions of the communication benefits, responsiveness, and synchronicity of the medium, contributed little to the regression model with a $\beta = .01$.

**Discussion**

The present results show that knowledge, skill, apprehension, and motivation are influences on the likelihood that students will participate in an online classroom discussion. Instructors who are knowledgeable about these influences can prepare students and, potentially, increase their involvement in that online discussion through foresight and planning. The CMC medium has less of an effect on student participation, but its effect is worth a brief mention after the discussion of these other influences.

First, knowledge of the computer-mediated communication medium is an important influence. The student participants in this study report that they are frequently at a loss as to what to say and are unfamiliar with how to communicate in the CMC medium. Consequently, they become cautious and hesitant when they do not know how to say what they mean and are unsure of how to adapt their messages to the medium. To effectively manage personal expressions, interpret the meanings of others, and develop relationships online participants must develop new communication strategies specific to the CMC medium which may have reduced social cues. As students increase their knowledge and understanding of the learning environment they participate and share their comments and opinions with others more frequently (Sundararajan, 2010). However, the lack of communication training specific to the communication medium reduces participant competence, increases student anxiety, and negatively affects participation (Sherblom, Withers, & Leonard, 2009). Effective computer-mediated communication takes practice. Explicitly discussing communication strategies and tactics for engaging in effective online discussion can help students develop the necessary knowledge and understanding. Role playing exercises and other experiential learning techniques engaged in within the specific medium can target specific conversational tactics and strategies and effectively develop the knowledge and skill necessary for online discussion.

Second, students need to develop **skill** in the mundane but necessary computer-mediated communication conversational strategies and tactics. This skill includes knowing when and how to open and close a conversational topic, how to manage the interaction, and how to time responses in a computer-mediated communication medium that often has reduced, or differently emphasized, nonverbal social cues. The reduction and shift in emphasis of nonverbal social cues means that online discussion differs from face-to-face conversation in important ways. There are at least six conversational adaptations participants can make (Walther & Bunz, 2005). One: recognize that it takes longer to develop group tasks through computer-mediated discussions. Therefore, participants need to get started discussing those tasks as soon as possible. However, participants often feel hesitant and may put off serious discussion of important issues until they have developed more confidence in communicating through the medium and more comfort within the group. This reluctance means that online discussions often start more slowly than face-to-face ones, and participants run out of time before their discussions reach a satisfactory conclusion. Two: participants should communicate frequently. The CMC medium provides a slower, often asynchronous, flow of communication, particularly when that communication is
reliant upon typing rather than speaking. Even in its nearly-synchronous forms, CMC often limits the amount of nonverbal information conveyed in each message. This limitation means that more information must be conveyed verbally which slows down the conversation even further. Message frequency is also important to developing the relational aspects of the discussion as well. Greater frequency in communication helps to build participant trust, further involvement, and an ongoing willingness to communicate among the other participants. Three: participants need to take advantage of the ability to multitask. In a computer-mediated communication medium participants can simultaneously organize and discuss issues. Multiple side conversations among participants can co-occur without disrupting the ongoing conversational flow of the larger group. Participants can divide up the work more easily and use the text-based records to quickly review the history of ideas and to identify areas of agreement and disagreement rather than negotiate every aspect as a group of the whole. Four: computer-mediated communication participants should explicitly acknowledge having read each message. In face-to-face conversation it is easier to tell when someone is paying attention and has heard a message. In computer-mediated communication, explicit acknowledgment is necessary to facilitate ongoing discussion, stimulate increased participation, and assure an ongoing common understanding. Five: provide explicit positive and negative feedback. With fewer nonverbal cues participants in online discussions find it more difficult to know if others agree or disagree with them. Explicit verbal feedback makes up for the lack in nonverbal cues and facilitates more effective discussions. Six: set explicit deadlines as a group and hold participants responsible for meeting them. The perceived anonymity of computer-mediated communication often means less accountability. Making deadlines explicit helps reduce participant uncertainty, and increases participant trust, liking, and involvement (Walther & Bunz, 2005).

Third, today's students who have grown up in a digitally rich communication environment may still suffer from computer-mediated communication apprehension. The present study participants, who are 18 to 25, report feeling tense, nervous, and jittery when attempting to communicate using a new, unfamiliar computer-mediated communication medium. Students need training and instructor support to help them feel calm and relaxed, especially when using technologies for educational purposes rather than for entertainment (Herold, 2009). Lack of adequate training can make students feel personally inadequate and cause them to become anxious, depressed, inhibited, reticent, and socially withdrawn (High & Caplan, 2009; Scott & Timmerman, 2005). Careful instruction and support can reduce these feelings and facilitate greater participation online discussions.

Fourth, an instructor can build a rapport and engage in frequent confirmation to reduce student anxiety and increase motivation. Some students enjoy participating in CMC, but many report being nervous, anxious, and not very motivated. Those who experience a strong rapport with their instructor report greater motivation to participate in the class discussions. Rapport reduces student anxiety and increases a willing to express ideas (Frisby & Martin, 2010). Instructor online communication that shows respect, values ideas, and encourages students, while providing critical feedback, can increase student confidence and participation (Rocca, 2010). The network design of computer-mediated communication de-emphasizes the role of the instructor as an authority figure. This can facilitate student-instructor rapport and encourage students to engage in online discussion in creative ways (Robbins-Bell, 2008; Schrire, 2004, 2006). Instructor confirmation can increase student motivation and involvement as well (Sidelinger & Booth-Butterfield, 2010). However, this instructor confirmation can be more challenging to achieve in a computer-mediated communication medium. The perceived anonymity provided by
the medium can lead students to believe that they are less connected, and less accountable to the instructor, their classmates, and the course. Instructors must make an explicit verbal effort to articulate an awareness and acceptance of student contributions to foster sense of rapport and confirmation.

Fifth, medium shows a surprisingly small effect in the present study and proves not to be a major influence on student participation. However, providing an explicit rationale for choosing an online discussion medium and indicating the communication benefits of that medium are relatively easy for an instructor to do. Past research has shown that participants can learn to use a medium effectively for the discussion of complex issues when they understand the reason behind choosing the medium for that purpose (Walther & Bazarova, 2008). Articulating an explicit rationale and expectations for the use of a particular CMC medium may increase student participation in some classroom contexts. Being aware of the communication patterns and social network structures that develop during online discussions and intervening in supportive ways that build rapport and respect among the students may also enhance participation (Sundararajan, 2009).

**Conclusion, Limitations, and Future Work**

The present study, however, shows that student knowledge, skill, apprehension, and motivation are the strongest influences on student participation in online classroom discussion. The CMC medium is a less important influence. Student knowledge preparation for how to develop effective messages in the computer-mediated communication medium, skill training in the use of specific conversational tactics and strategies that are effective in facilitating online discussion, and instructor support for reducing student apprehension and increasing student motivation can all positively affect student participation in online computer-supported collaborative learning classroom discussion environments. Instructors can prepare students for increased participation and learning in a CSCL course by increasing their knowledge, skill, and motivation, and decreasing their apprehension with the communication medium. The present results indicate that this may be a more effective means of facilitating student participation than using the indirect method of attempting to shape the social relationship networks that develop within that medium.

The present analysis is based on a relatively small sample of students, but the results provide a direction for developing greater student CMC competence and CSCL participation and discussion in the online portions of courses. By locating the important influences that affect online participation in the predispositions and training of the students rather than in the medium, the present analysis is able to offer a number of suggestions for improving student engagement in that CSCL discussion. Future work should examine these influences with other groups of students in other online classroom discussion contexts.
References


