The use of computer-mediated communication to enhance subsequent face-to-face discussions

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Abstract

A study assessing the effects of synchronous and asynchronous computer-mediated communication on subsequent face-to-face discussions was conducted. Participants were asked to read a short article about internet censorship. Then they were randomly assigned to one of three groups: a synchronous (internet chat) group, an asynchronous (internet discussion board) group and a control group. Both the internet chat group and the internet discussion board group engaged in an on-line dialog about the article they read. They then followed the on-line dialog with a face-to-face discussion. The control group had no on-line discussion but instead immediately began a face-to-face discussion. Finally, all completed a questionnaire about their experience. The results showed that face-to-face discussions preceded by either synchronous or asynchronous computer-mediated communication were perceived to be more enjoyable and include a greater diversity of perspectives than face-to-face discussions not preceded by computer-mediated communication. © 2001 Elsevier Science Ltd. All rights reserved.

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Computer-mediated communication (CMC) includes any form of exchange (e.g. video, audio, text) that requires the use of a computer. The primary advantage of CMC over other forms of communication is the lack of temporal or spatial constraint (Kiesler, Siegel, & McGuire, 1984; Kiesler & Sproull, 1992). CMC can occur at any time and in any place (Kiesler, 1997). Forms of CMC can be categorized as either synchronous or asynchronous. Synchronous CMC takes place in real time. That is, participants communicate with each other at the same time or with a very short delay. Examples include instant messenger, video conferencing, and Internet
Relay Chat (internet chat). Asynchronous communication does not occur in real time and there is often a substantial delay between departure and receipt of a communication. Examples of asynchronous CMC include electronic mail, internet bulletin/discussion boards, listservs, and newsgroups. While much has been written about the nature and implications of computer-mediated communications, we were interested in the face-to-face discussion that might follow CMC. The purpose of this study was to examine whether synchronous or asynchronous CMC would lead to face-to-face discussions that were perceived to be better (e.g. more comfortable, offer a greater diversity of perspectives) than face-to-face discussions not preceded by CMC.

1. The social psychology of computer-mediated communication

Clearly, the use of CMC has increased substantially in recent years (Haythornwaite, Wellman, & Garton, 1998), due predominantly to the popularity of the internet. The internet allows people to communicate via email, bulletin boards, listservs, and virtual chats with relative ease. It is estimated that approximately 16.4 million people use the internet (Hoffman, Kalsbeek, & Novak, 1996), and many more are poised to become internet users (Find/SVP, 1997). The recent State of the Internet Report (United States Internet Council & ITTA, 2000) showed that the internet has grown from less than 90,000 users in 1993 to more than 304 million in 2000. Current predictions suggest that internet users could exceed the one billion mark by 2005. With so many people using CMC for personal, professional, and academic purposes, it is worthwhile to examine the psychological processes of CMC, as well as the consequences of communicating in a medium devoid of the benefits of face-to-face contact.

1.1. Psychological processes

CMC can be quite different than face-to-face communication (Joinson, 1998). For example, in CMC, it is not possible to see the physical and facial reactions of the person with whom one is communicating. Differences such as these have led investigators to examine the psychological processes inherent in and unique to CMC. In CMC, there is an absence of social context cues (Sproull & Kiesler, 1986). These are aspects of the physical environment (e.g. location, size of the space, noise, environmental distractions) and nonverbal behaviors of the communicators (e.g. facial expression, tone of voice, body posture) that are only available in face-to-face interactions (Siegel, Dubrovsky, Kiesler, & McGuire, 1986). During computer-mediated communication, such as internet chat, communicators are usually unaware of the facial expressions, tone of voice, posture, etc. of the other participants. The availability of paralinguistic cues helps CMC users overcome some of these challenges (Spitzer, 1986). Paralinguistic cues are codes or marks that are used to express emotion and meaning. For example, communicators often use ellipses, exclamation marks, and capital letters to convey emotion.
Another psychological process that is especially prevalent in CMC is deindividuation. Festinger, Pepitone, and Newcomb (1952) describe deindividuation as diminished awareness of internal constraints. Internal constraints might include concerns about self-presentation, attention to social norms, and focus on the self. Zimbardo (1969) suggested that deindividuation is caused by anonymity and a reduced focus on the self. More recently, Prentice-Dunn and Rogers (1982) suggest that deindividuation is caused by a reduction of accountability and a loss of private self-awareness. Those engaging in CMC often experience a weakening of self-regulation and self-awareness (Diener, 1980; Kiesler, Siegel, & McGuire, 1984; Matheson & Zanna, 1990). Self-awareness involves an awareness of one’s feelings, attitudes, and beliefs, and can include concerns about self-presentation.

1.2. Consequences

The reduction in social context cues and feelings of deindividuation experienced by CMC users has numerous consequences for their behavior. On the positive end, compared with face-to-face communication, CMC is often “more impersonal and free” (Kiesler et al., 1984, p. 1126), more uninhibited (Siegel et al., 1984; Sproull & Kiesler, 1986, 1991), contains more disclosures of personal information (Joinson, 1997; Kiesler & Sproull, 1986), contains more equal-member participation (Sproull & Kiesler, 1991), and contains more task-oriented interactions (Connolly, Jessup, & Valacich, 1990). As a result, CMC often allows people to feel more comfortable and confident in their discussions.

On the negative end, computer-mediated communications can contain more “flaming” (hostile comments, insults; Dyer, Green, Pitts, & Millward, 1995; McGuire, Kiesler, & Siegel, 1987), be uninhibited and depersonalized (Garton & Wellman, 1995; Walther, Anderson, & Park, 1994), and be more likely to show decision shift (a change in one’s position on a decision-making problem; Siegel et al., 1986).

2. Using computer-mediated communication to enhance face-to-face discussions

Individuals communicating via a computer report feeling more free, uninhibited, and comfortable than in face-to-face communications. The disinhibition and deindividuation experienced by CMC users can have a number of positive behavioral benefits, such as greater disclosure of personal information and increased contributions to a discussion, for example. These benefits can greatly enhance the quality of a computer-mediated discussion. One question that remains unanswered is whether or not the psychological and behavioral benefits accrued in CMC discussions will carry over to subsequent face-to-face discussions with the same participants. That is, will the sense of disinhibition and comfort that enhance CMC discussions also enhance subsequent face-to-face discussions?

Although speculative, there is good reason to believe that the benefits accrued in CMC discussions will carry over to subsequent face-to-face discussions with the
same people, assuming that the two discussions are temporally close. In CMC discussions, such as internet chat, people are trying out new identities (Turkle, 1997), fostering new relationships (Kiesler, 1997), and forming impressions of other participants (Walther, 1993, 1996). To the extent that they have success in doing these things, they are likely to have a stronger sense of their abilities, a greater sense of confidence, and a greater sense of ease in expressing their opinions. These benefits are likely to be sustained and utilized in subsequent face-to-face discussions.

3. Rationale

The purpose of the current study is to test the hypothesis that individuals who participate in CMC will have subsequent face-to-face discussions which are perceived to be better (e.g. more comfortable, offer a greater diversity of perspectives) than face-to-face discussions not preceded by CMC. Participants in the current study were asked to engage in an internet discussion board or internet chat, while participants in the control condition did not have a computer-mediated discussion. Then, participants were asked to have a face-to-face discussion on the same topic with the same members of their CMC (or control) group. After the discussion, participants in both groups were given a questionnaire designed to assess their perceptions of the activities. Participants were asked to evaluate their face-to-face discussions by ranking (on a seven point scale) amount of leaning, enjoyment, liveliness, quality, self-contribution, others’ contribution, desire to repeat activity, confidence, different perspectives offered, and comfort.

It is hypothesized that the psychological and behavioral benefits of participating in a CMC will “carry over” and lead to better subsequent face-to-face discussions. It is also hypothesized that participants who participate in an internet chat will have better subsequent face-to-face chats than either the internet discussion board group or the control condition. This hypothesis is based on the observation that synchronous communication tends to be more dynamic, faster, and more arousing than asynchronous forms of communication (Reid, 1991).

4. Method

4.1. Participants

Participants were 56 (18 males, 38 females) undergraduate students enrolled in an introductory computer science course at a medium-sized, midwestern university. The data was collected from five different sections of the course on three different campuses of the same university during a single 75-min class session. The class was a non-majors liberal education course and therefore students from a variety of disciplines and academic backgrounds were represented. Most of the students participating were freshman or sophomores, however two campuses are commuter
campuses and have a large number of non-traditional students. Most of the students (70%) did not have internet chat or newsgroup experience.

4.2. Procedure

Participants were informed by their instructor that they would be participating in an exercise designed to examine the use of CMC. The topic of participants’ communication was internet censorship. This topic was used so as to be consistent with the material typically covered in this course, thus making this exercise an educational experience for the students. Students were not graded for their participation or performance on this exercise. Students in each class were randomly assigned to three different groups (internet chat, internet discussion board chat, or control) which varied in size from four to six participants. The study had two phases, as Fig. 1 indicates.

4.2.1. Phase one

During phase one of the investigation, participants in the virtual chat groups read a short article (Joseph, 2000) about internet censorship and then participated in an internet chat about the article. Participants used Blackboard’s Courseinfo virtual chat feature to engage in this discussion. They were not given any specific guidelines about how to structure their chats. Participants in the internet discussion board groups read the article and then participated in an internet discussion board chat (using Blackboard’s Courseinfo discussion board feature) about the article. They were also not given any guidelines about how to structure their discussion. Participants in the control group were asked to read the article. Participants in this condition were not asked to complete any other task because we were interested in investigating the effects of prior internet chat versus no activity on subsequent face-to-face discussions.

4.2.2. Phase two

During the second phase of the investigation, participants in each group were asked to engage in a face-to-face discussion of the article. They were given a set of questions (e.g. “Should on-line service providers be able to ‘watch’ or ‘listen’ to online chats, e-mails, or newsgroups?”) designed to guide their discussions. Although

<table>
<thead>
<tr>
<th>Group</th>
<th>Phase I</th>
<th>Phase II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet chat group (Synchronous)</td>
<td>Read article, engage in online chat</td>
<td>Face-to-face discussion</td>
</tr>
<tr>
<td>Internet discussion group (Asynchronous)</td>
<td>Read article, engage in newsgroup discussion</td>
<td>Face-to-face discussion</td>
</tr>
<tr>
<td>Control</td>
<td>Read article</td>
<td>Face-to-face discussion</td>
</tr>
</tbody>
</table>

Fig. 1. Experimental design.
there were no time limits for their discussions, they were constrained by the time limit of the class (75 min). Each group spent approximately 60–75 min completing all phases of the investigation.

4.3. Measures

When participants completed their face-to-face discussions, they were asked to complete a questionnaire designed to assess their perceptions of the activities they engaged in during each phase of the study. The first part of the questionnaire (contained four questions for the Control Group and seven questions for the CMC groups) assessed their perceptions of the activities they engaged in during the first phase of the study. Participants were asked how much they learned about internet censorship, how much they enjoyed the activities they engaged in, how much effort they put into the activities, and if the activities met the goal of opening their eyes to the issues surrounding internet censorship, using seven-point scales with 1 = “not very much” to 7 = “very much”. Additionally, participants who engaged in CMC were asked how confident they were sharing their views during their virtual discussion, how much the discussion helped them see different perspectives, and how comfortable they were, using seven-point scales with 1 = “not very much” to 7 = “very much”.

The second part of the questionnaire (included 10 questions) assessed participants’ views about their face-to-face discussions. Participants were asked to evaluate the amount of learning, enjoyment, liveliness, quality, self-contribution, others’ contribution, desire to repeat the activity, confidence, different perspectives offered, and comfort, using seven-point scales with 1 = “not very much” to 7 = “very much”. To facilitate data reduction, a principle components factor analysis using varimax rotation was performed on these variables. The factor analysis produced three factors, accounting for 71% of the variance. The items comprising each of the three factors were combined to form scales by summing all of the individual variable scores comprising each factor. The factor scores and Cronbach’s alpha for each scale (confidence, enjoyment, and different perspectives) are displayed in Table 1.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Factor 1</th>
<th>Factor 2</th>
<th>Factor 3</th>
<th>Cronbach’s alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Confidence</td>
<td>0.85</td>
<td>0.11</td>
<td>0.17</td>
<td></td>
</tr>
<tr>
<td>Comfort</td>
<td>0.80</td>
<td>0.16</td>
<td>0.28</td>
<td></td>
</tr>
<tr>
<td>Self-contribution</td>
<td>0.72</td>
<td>0.44</td>
<td>0.03</td>
<td></td>
</tr>
<tr>
<td>Others’ contribution</td>
<td>0.71</td>
<td>0.32</td>
<td>0.09</td>
<td>0.85</td>
</tr>
<tr>
<td>Enjoy</td>
<td>0.13</td>
<td>0.82</td>
<td>0.21</td>
<td></td>
</tr>
<tr>
<td>Repeat</td>
<td>0.17</td>
<td>0.79</td>
<td>0.02</td>
<td></td>
</tr>
<tr>
<td>Quality</td>
<td>0.32</td>
<td>0.75</td>
<td>0.34</td>
<td></td>
</tr>
<tr>
<td>Lively</td>
<td>0.37</td>
<td>0.65</td>
<td>0.14</td>
<td>0.81</td>
</tr>
<tr>
<td>Different perspectives</td>
<td>0.11</td>
<td>0.13</td>
<td>0.86</td>
<td></td>
</tr>
<tr>
<td>Learn</td>
<td>0.23</td>
<td>0.25</td>
<td>0.78</td>
<td>0.68</td>
</tr>
</tbody>
</table>
The items comprising the confidence scale include confidence, comfort, self-contribution, and others’ contribution. The items comprising the enjoyment scale include enjoyment, repeatability, quality, and liveliness of the discussion. The items comprising the different-perspectives scale include different perspectives and amount of learning.

The third part of the questionnaire included a seven-item quiz about the article that each participant read during the first phase of the study. The quiz contained factual statements (e.g., “AOL does not terminate people because of language that is threatening or foul”) which participants were asked to indicate whether each was true or false. Each quiz was scored for the total number of correct responses.

Finally, participants were asked to provide demographic (gender) and internet and classroom participation information. Specifically, participants were asked how often they engage in internet chats (more than 10 times per week, 5–9 times per week, 1–4 times per week, and <1 time per week), and how often they participated in class discussions (usually contribute more than my classmates, usually contribute the same as other people in the class, rarely contribute to class discussions, and never contribute to class discussions). Participants were also asked, in an open-ended question, how useful it was to have a discussion board or on-line chat prior to face-to-face discussions.

5. Results

5.1. Phase one

Participants were asked to indicate their perceptions of the activities they engaged in during phase one (read an article and engage in virtual chat, read an article and engage in virtual discussion board, or read an article). The means and standard deviations for each of the variables corresponding to phase one are presented in Table 2. The results of an analysis of variance indicated that there were no significant differences between the internet chat, internet discussion board chat, and

<table>
<thead>
<tr>
<th>Variable</th>
<th>Condition</th>
<th>Virtual chat</th>
<th>Virtual discussion board</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Learning</td>
<td>5.17 (1.15)</td>
<td>5.00 (1.35)</td>
<td>4.36 (0.93)</td>
<td></td>
</tr>
<tr>
<td>Enjoyment</td>
<td>4.89 (1.81)</td>
<td>4.96 (1.46)</td>
<td>4.57 (1.02)</td>
<td></td>
</tr>
<tr>
<td>Effort</td>
<td>5.50 (1.25)</td>
<td>5.71 (0.75)</td>
<td>5.43 (1.29)</td>
<td></td>
</tr>
<tr>
<td>Met goal</td>
<td>5.83 (1.10)</td>
<td>6.00 (1.06)</td>
<td>5.57 (1.02)</td>
<td></td>
</tr>
<tr>
<td>Confidence</td>
<td>5.72 (1.36)</td>
<td>6.25 (0.85)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Different perspectives</td>
<td>5.00 (1.37)</td>
<td>4.88 (1.23)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Comfort</td>
<td>5.33 (1.61)</td>
<td>6.04 (1.00)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table entries include means and (standard deviations).
control condition on any of the variables. The results of an independent-samples t-test indicated that there were no significant differences between the internet chat and internet discussion board chat on any of the items asked exclusively of these two groups.

5.2. Phase two

Participants were also asked to indicate their perceptions of the face-to-face discussions. The means and standard deviations for each of the variables corresponding to phase two are presented in Table 3. To examine the perceptions of the face-to-face discussions, a multivariate analysis of variance was conducted on the three scales from the phase two variables (confidence, enjoyment, different perspectives). The results indicated that the effect of prior communication (internet chat, internet discussion board, control) significantly affected the perceived amount of confidence, enjoyment, and different perspectives, $F(6,100) = 2.22, P < 0.05$. Univariate tests examining the effects of type of prior communication on confidence in face-to-face discussions indicated no significant differences, $F(2,53) = 1.33, P = 0.27$. Participants who engaged in internet chat ($M = 24.67$, S.D. = 2.03) reported similar levels of confidence in their face-to-face discussions to those participating in internet discussion board chats ($M = 24.00$, S.D. = 2.21) and those in the control group ($M = 22.79$, S.D. = 5.40).

The effect of type of prior communication on enjoyment of face-to-face discussions was significant, $F(2, 53) = 5.54, P < 0.01$. These results are displayed in Fig. 2. Post hoc (Tukey HSD) tests revealed that participants in the internet chat groups and internet discussion groups perceived greater enjoyment in their subsequent face-to-face chats than those in the control group, $P < 0.05$.

The effect of type of prior communication on the amount of different perspectives offered in face-to-face discussions was significant, $F(2,53) = 5.54, P < 0.01$. These results are displayed in Fig. 3. Post hoc (Tukey HSD) tests revealed that participants

<table>
<thead>
<tr>
<th>Table 3</th>
<th>Perceptions of phase two activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variable</td>
<td>Condition</td>
</tr>
<tr>
<td>Confidence</td>
<td>Virtual chat</td>
</tr>
<tr>
<td>Comfort</td>
<td>Virtual discussion board</td>
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<tr>
<td>Self-contribution</td>
<td>Control</td>
</tr>
<tr>
<td>Others’ contributions</td>
<td>Virtual chat</td>
</tr>
<tr>
<td>Enjoy</td>
<td>Virtual discussion board</td>
</tr>
<tr>
<td>Repeat</td>
<td>Control</td>
</tr>
<tr>
<td>Quality</td>
<td>Virtual chat</td>
</tr>
<tr>
<td>Lively</td>
<td>Virtual discussion board</td>
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<tr>
<td>Different perspectives</td>
<td>Control</td>
</tr>
<tr>
<td>Learn</td>
<td>Virtual chat</td>
</tr>
</tbody>
</table>

Table entries include means and (standard deviations).
in the internet chat groups and internet discussion groups perceived a greater amount of different perspectives offered in their subsequent face-to-face chats than those in the control group, \( P < 0.05 \).

To examine if there were differences between each of the three groups on the quiz, analysis of variance was conducted. The results showed that all three groups performed equivalently (internet chat: \( M = 6.50 \), S.D. = 0.70; internet discussion board chat: \( M = 6.46 \), S.D. = 0.78; control: \( M = 6.14 \), S.D. = 0.86), \( F (2,53) = 0.97 \), \( P = 0.38 \).

A number of different qualitative analyses were performed on the transcripts of the internet chat and internet discussion board, as well as on an open-ended question assessing the perceived effectiveness of virtual discussions preceded by face-to-face ones. Analysis of the discussions show that for the most part the on-line discussions were meaningful, relevant, and all students participated (rather than a few dominating the entire discussion). An interesting and somewhat surprising observation of the on-line discussions is that students in the chat room and discussion board did an excellent job of staying on task (despite the complete lack of instructor involvement), and when someone did wander off topic, at least one student made an (usually successful) effort to pull the discussion back on the assigned topic. In one particular chat, a student began by making four separate inappropriate comments that had nothing to do with the discussion of censorship. Other students
in this chat group simply ignored those comments and the student’s fifth comment was on-track and relevant to the discussion at hand.

It is interesting to note that while there were no statistically significant differences between students in the internet chat and the internet discussion board group, there were some qualitative differences between the two groups. For instance, the discussion board entries were typically longer (often a short paragraph), while the chat entries were only a sentence or two. Students were more careful in their posting on the discussion board: they used correct English, there were fewer spelling errors, and their prose was grammatically correct. Student’s responses in the chat group were often partial sentences and even one-word phrases. During the activity, the instructors noted that students involved in the discussion board spent much more time creating their own responses rather than reading others’. On the other hand, students in the chat group spent most of their time reading others’ responses.

In an open-ended question which asked students to “discuss how useful it is to have a newsgroup discussion or on-line chat prior to a face-to-face discussions”, students overwhelmingly responded that the on-line discussions were helpful. Students felt that the on-line discussions helped “see views openly” and kept them from “holding back”. Others thought it was useful because it “removed fears and makes
you confident to post your opinion”. One student commented that the different views helped her prepare for discussion. An even more interesting observation is that subsequent (usually 2 days later) face-to-face class discussions still seemed to be enhanced (e.g. more students spoke, students seemed more free to express their opinions, and the discussions seemed “livelier”).

6. Discussion

The purpose of this study was to examine whether synchronous or asynchronous CMC would lead to face-to-face discussions which were perceived to be better than face-to-face discussions not preceded by CMC. If individuals participating in a computer-mediated discussion feel less inhibited and less constrained, then they are likely to feel more comfortable and confident in expressing their thoughts, ideas, and opinions. To test this hypothesis, participants were randomly assigned to one of three groups (internet chat, internet discussion board, or control) and asked to engage in an internet discussion about internet censorship. They were then asked to discuss internet censorship face-to-face. The results of the study showed that participants in all of the groups similarly evaluated the activities they engaged in during the first phase of the study. That is, they reported that they learned from these activities, found them to be enjoyable, put a good deal of effort into completing them, and felt that they met the goals of opening their eyes to internet censorship. The lack of difference between the three prior communication groups (internet chat, internet discussion board, control) is interesting and suggests that participants may be unaware of the benefits accrued during their prior computer-mediated communication. On the other hand, the fact that participants were asked to evaluate their experiences in phase one at the end of the entire study (i.e. after their face-to-face discussions) may have affected the results. Future research should consider assessing perceptions of prior communication before subsequent face-to-face discussions.

Additionally, internet chat and internet discussion board participants reported feeling a high level of confidence and comfort during their computer-mediated discussions, and found that both facilitated the expression of different perspectives. Most important to this study and consistent with our hypothesis, face-to-face discussions preceded by CMC were perceived to be more enjoyable and offer a greater diversity of perspectives than face-to-face discussions not preceded by CMC. Apparently, whatever benefits that were acquired during computer-mediated discussions “carried over” and positively affected subsequent face-to-face discussions. This is consistent with student comments as well as our observations.

To measure participants’ actual learning of internet censorship, they were asked to take a seven-item quiz which included factual information about the article they read. The results of our analysis revealed no significant differences between any of the groups. In fact, most of the participants obtained a score of six (out of seven), suggesting that all participants “learned” a great deal from the article. As discussed later, it is likely that this objective measure did not accurately capture the type or amount of learning that occurred.
6.1. Implications

There are a number of implications of these results. First, these results suggest a new technique for improving face-to-face discussions. Efforts to improve discussions are not new. Researchers have identified a multitude of techniques and tactics for improving both the quality and quantity of discussions. Some of these include establishing ground rules to encourage all students to participate (Kramer & Korn, 1999), starting discussions with a common experience or controversy (McKeachie, 1999), clarifying the roles of the instructor and the students (Kramer & Korn, 1999), and training students to be good listeners (Kramer & Korn, 1999). The results of the current study suggest that if students participate in some form of CMC prior to a discussion, then those discussions are likely to be enhanced. Presumably, this technique could be relevant to any kind of discussion: classroom discussions, programming team discussions, project planning discussions, or strategic planning discussions.

Second, these results suggest that CMC is a viable alternative to face-to-face class discussions. First, participants report that their virtual chats or virtual discussion board discussions were highly enjoyable, met the learning goals, were effortful, and were valuable learning activities. Second, the qualitative analysis (reported earlier) of the transcripts from the virtual chat and discussion board suggest that participants were engaging in meaningful, intelligent discussions.

6.2. Strengths and weaknesses of the study

There are a number of strengths and weaknesses of this study that are worthy of mention. One strength of the study was the use of both synchronous and asynchronous forms of CMC. Our results are important in demonstrating that the synchronous or asynchronous nature of CMC makes little difference in terms of participants’ perceptions of the quality of the discussions or in terms of its effects on subsequent face-to-face discussions. Prior research (Kiesler et al., 1984) suggests that synchronous communication might lead to more uninhibited behavior than asynchronous communication. In their study, participants who used electronic mail to communicate were more inhibited than those who used computer conferencing. Future research should focus on examining whether the psychological and behavioral experiences of participating in synchronous or asynchronous CMC are similar.

Although there were statistically significant differences between those who engaged in CMC and those that did not, there were no differences between the two different forms of CMC, suggesting that participants must have derived similar benefits from both. Any difference there may have between the internet chat and the internet discussion board could have been masked by the controlled environment — that is, although students used a discussion board, they all sat at computer terminals and posted comments during the same 20 min.

Another strength of the study was that it captured a wide range of perceptions of the activities, from affective (comfortableness, enjoyment) to cognitive (amount of learning, diversity of perspectives) perceptions. In fact, the comprehensiveness
with which perceptions of the computer-mediated and face-to-face discussions were measured proved to be valuable. For example, participants reported no differences on the confidence factor in their face-to-face discussions, but reported marked differences on the enjoyment and different-perspectives factor.

As with any investigation, this study had its weaknesses. One weakness of this study is the fairly restricted sample that was used. Participants in this study were undergraduate students enrolled in systems analysis classes. These characteristics of the sample limit the generalizability of our findings.

Another weakness of this study was not capturing the face-to-face discussions on videotape. If these discussions were recorded, then they could have been analyzed for a variety of measures, including overall quality of the discussion, the amount of each participant’s contribution, the number of different perspectives offered, etc. Without being able to report the nature of those discussions, it is difficult to determine the manner in which they were enhanced by prior CMC. Additionally, these discussions could have been used to provide evidence for learning. It has been suggested (Connor-Greene, 2000) that assessments of factual knowledge may not accurately capture the amount or type of learning, particularly when students learn via active-learning methods.

6.3. Future directions

To the best of our knowledge, our finding that CMC leads to face-to-face discussions which are perceived to be more enjoyable and include a greater diversity of perspectives than face-to-face discussions not preceded by CMC is novel. As such, there is a plethora of research questions that are worthy of investigation. First, future research should concentrate on identifying the psychological and behavioral processes that occur during face-to-face discussions preceded by CMC. This goal can be accomplished by videotaping the face-to-face discussions and then measuring a number of aspects of the discussions (e.g. amount of each participant’s contribution, number of different perspectives offered).

Second, future research should focus on identifying potential moderators and mediators of the relationship between CMC and enhanced face-to-face discussions. Potential moderators might include the length of time between CMC and face-to-face discussions, the valence of reactions received during CMC, and personality characteristics of the participants (e.g. introvert/extravert, sociability). Potential mediators might include level of comfort, level of confidence, awareness of different perspectives, level of social identity, and level of group cohesiveness. Focusing on mediators of the relationship between CMC and enhanced face-to-face discussions will help to determine why CMC leads to face-to-face discussions which are perceived to be better than those not preceded by CMC.

Third, it may be useful to further explore the differences between the two different forms of CMC (chat and discussion). Although there were statistically significant differences between those who engaged in CMC and those that did not, there were no differences between the two different forms of CMC, suggesting that participants must have derived similar benefits from both. However, any difference there may
have been between the internet chat and the internet discussion board been could have been masked by the controlled environment — that is, although students used a discussion board, they all sat at computer terminals and posted comments during the same 20 min.

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**References**


