Blended Instruction: Student Perceptions of Communications Technology in Face-to-Face Courses

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1. Introduction

Blended instruction is becoming more commonplace in higher education. Students not only attend classes, meeting face-to-face with each other and their instructors, but they also can communicate electronically outside of class meetings using course management tools such as WebCT, BlackBoard, Angel, and the like. There has been a considerable amount of research on human interaction and communication in online distance learning. However, there is a paucity of research on computer-mediated communication (CMC) in face-to-face courses. While there are many distance education studies of student satisfaction or perceptions of CMC, studies on residential student perceptions of CMC are rare.

In this study we explored residential student perceptions of CMC in face-to-face courses with respect to their preferences, experiences, opinions, needs, and problems. We focused on asynchronous CMC, such as e-mail communication or threaded discussion, not on synchronous CMC (e.g., real-time chat). Furthermore, we examined whether their experiences and perceptions are consistent with existing studies, focusing mainly on the fit between media and tasks.

2. Past Research on CMC and the Fit between Media and Tasks

2.1 Computer-Mediated Communication

A number of different communication media are used in education as well as in our daily life, and they differ in richness. In terms of richness, face-to-face communication is considered as being the richest, while other media are thought to be leaner since they have fewer contextual cues and slower feedback compared to face-to-face (Daft & Lengel, 1986). With the advent of the Internet, CMC has been one of the most widely used communication modes, both synchronous and asynchronous. In educational settings, asynchronous communication remains dominant.

In comparison to the face-to-face mode of communication, a major disadvantage of text-based CMC is the lack of visual and audible cues (Vrasidas & McIsaac, 2000). Body language or gestures can often convey important meanings. During class, an observant instructor can notice whether students understand or not from their facial expressions. CMC lacks such contextual cues.

The lack of richness of communication also seems to affect the time taken to complete communications or tasks in CMC. Bordia (1992) found that CMC groups took longer than face-to-face groups to complete the same tasks, through a meta-analysis of eighteen CMC versus face-to-face studies. Walther (1996) also noted that the main difference between face-to-face communication and CMC is communication speed. Moreover, text-based asynchronous CMC can be overwhelming to students who are expected to read and/or respond to large numbers of messages (Wooley, 1998).

On the other hand, CMC has a number of advantages. First, CMC is place and time independent (Harasim, 1990). In CMC, students do not have to gather in the same place at the same time. They can work in convenient places with a flexible schedule. Second, CMC provides more time to think. In other words, it allows students to have more time to analyze and reflect on the content and to compose thoughtful responses (Althaus, 1996). Third, CMC appears to enhance interaction between instructor and students (Kearsley, 2000). Sutton (1999) further claims that CMC in online learning has caused the shift from correspondence learning to social learning, increasing interaction with other students as well as with the instructor. Berge (1995) contends that the goal of online discussion is to maximize interactions between and among instructors, students, contents, and interface, as well as to facilitate constructive thinking. Fourth, CMC enables students to take control of their learning and build knowledge through interaction in a more decentralized and constructivist environment where the role of instructor becomes a

coach rather than a main source of information (Vrasidas & McIsaac, 2000). In addition, CMC allows for self-paced learning (Vrasidas & McIsaac, 2000). Finally, CMC can provide a more comfortable environment and discussion opportunities for students who do not perform well in spontaneous face-to-face discussion because they are shy or because their native language is not English (Berge & Collins, 1993; Harasim, 1990; Leasure et al., 2000)

2.2 The Fit between Media and Tasks

Many researchers have investigated the "fit" between communication media and task characteristics. While the fit between media and tasks has been studied mostly in business settings in order to improve work performance, it lacks empirical support in educational contexts.

According to Media Richness Theory, *richer* media are more effective for equivocal tasks, and *leaner* media are better for unequivocal tasks (Daft & Lengel, 1986). Equivocal tasks refer to ambiguous situations where there are multiple possible interpretations and solutions. Similarly, Rice (1992) suggested use of rich media for non-routine, difficult tasks and lean media for routine, simple tasks. On the other hand, Dennis and Kinney (1998) have argued that media *per se* do not affect outcomes, including decision quality and satisfaction, at least for new media, such as computers. They reported that richer media enable faster decision making regardless of task equivocality, and concluded that matching media richness and task equivocality does not improve performance. Despite conflicting findings, it appears to be worthwhile to explore the fit between media richness and task characteristics in an educational context.

DeSanctis and Monge (1999) claimed that computer-mediated communication is more effective than face-to-face communication for divergent tasks such as idea generation, while face-to-face communication is more effective for convergent tasks such as decision making that requires interdependence on others. Archee (1993) found that face-to-face groups are better at decision making than CMC groups because they can more easily reach a consensus at the same time using immediate verbal and non-verbal feedback, while CMC groups are slower due to the lack of non-verbal feedback and to more uncertainty of others' reaction to their opinions. Straus and McGrath (1994) also contended that face-to-face communication is superior to CMC, especially for highly interdependent tasks.

2.3 Research Hypotheses

Based on previous studies discussed above and Media Richness Theory, we formed six hypotheses. Students were expected to prefer:

1. Face-to-face discussion for equivocal tasks,
2. CMC for unequivocal tasks,
3. Face-to-face discussion for complex or difficult tasks,
4. CMC for simple tasks,
5. Face-to-face discussion for convergent or decision-making tasks, and
6. CMC for divergent or idea generating tasks.

3. Research Method

3.1 Participants

We recruited 105 residential students from a large Midwestern university, both undergraduate and graduate, who had experience with computer-mediated discussion in face-to-face courses. This was a convenience sample, since students participated voluntarily when they were at one of the campus libraries. Demographic information on the sample is presented in Tables 1.1. to 1.3.

Tables 1.1 – 1.3. Student Demographic Information

1.1 Gender	
Female	41.9%
Male	58.1%

1.2 Age	
18-20	19.0%
21-23	34.3%
24-26	17.1%
27-29	8.6%
30-32	9.5%
>33	11.5%

1.3 Year in School	
Freshman	4.8%
Sophomore	7.6%
Junior	14.3%
Senior	26.7%
Graduate	41.9%
Missing data	4.8%

Based on known demographics for this campus, the sample we obtained somewhat underrepresented females and younger students.

3.2 Instrument

We developed a semi-structured questionnaire that included four demographic questions, 15 five-point Likert scale questions, five multiple choice questions, eight dichotomous questions that include open-ended questions, and 10 open-ended questions. Students were asked about their: 1) perceptions of themselves as learners, 2) attitudes toward technology and CMC, 3) experiences with CMC, 4) media preference for different learning tasks, and 5) opinions and beliefs about CMC in face-to-face courses. Students took approximately 15- 20 minutes to complete the questionnaire.

3.3 Data Collection and Analysis

The researcher and an assistant distributed the questionnaires to students who were willing to participate in the study. A total of 106 completed questionnaires were collected; and one was discarded because it indicated that the student had no experience with CMC. We used SPSS to analyze quantitative data generated by dichotomous, multiple choice and five-point Likert-scale questions. We conducted a content analysis of the qualitative data in open-ended questions.

4. Results

4.1 General Perceptions

Results from the Likert-scale items are presented in Table 2. Most of the students (79%) appeared to be comfortable with computer technology (agreed or strongly agreed with question 6), and 78% had convenient access to the Internet at home and 88.5% at school. Nevertheless, only 55.2% of the students stated that they were comfortable with participating in computer-mediated discussion, and about 20% reported that they were uncomfortable with CMC.

We conducted a factor analysis (image method with varimax rotation) to see how responses to items were clustered. We found that comfort with computer technology, experience with CMC, comfort with CMC, perceived usefulness of CMC in learning, and convenient access to the Internet were correlated and loaded on one strong factor. There were significant positive correlations between perceived comfort with computer technology and perceived comfort with CMC (r= .500, p<.01), as well as between experience with CMC and perceived comfort with CMC (r= .482, p<.01). Students, who were comfortable with computer technology and had more experience with CMC, tended to feel more comfortable with CMC.

Table 2. Percent of respondents who strongly disagreed (SD), disagreed (D), were undecided (U), agreed (A), and strongly agreed (SA) with Likert-scale items on the survey

	SD	D	U	A	SA
Q6. I am comfortable with computer technology.	1.9	6.7	12.4	35.2	43.8
Q7. I am experienced with computer-mediated discussion.	7.6	22.9	11.4	35.2	22.9
Q8. I am shy when I speak in front of class.	11.4	30.5	26.7	21.9	9.5
Q9. I learn a great deal from discussion with classmates.	7.6	9.5	34.3	40.0	8.6
Q10. I prefer working with others to working alone.	18.1	25.7	27.6	17.1	11.4
Q11. I feel comfortable with participating in computer-mediated discussion.	2.9	17.1	24.8	35.2	20.0
Q12. I have convenient access to the Internet at home.	11.4	6.7	3.8	19.0	59.0
Q13. I have convenient access to the Internet at school.	1.9	1.0	8.6	15.2	73.3
Q14. I feel that computer-mediated discussion is very useful for learning.	1.0	11.4	41.0	35.2	11.4
Q15. From my experiences, students who dominate face-to-face discussion also dominate computer-mediated discussion.	2.9	19.0	50.5	20.0	5.7
Q16. Computer-mediated discussion is more effective when the instructor participates in the discussion.	2.9	14.3	39.0	30.5	13.3
Q17. Computer-mediated discussion is more effective when the instructor provides feedback on the discussion by making	1.0	10.5	21.9	41.9	23.8

comments or correcting some information.					
Q18. I participate in computer-mediated discussion more actively when the instructor sets some rules such as "Post your opinions at least five times each week."	5.7	10.5	34.3	29.5	17.1
Q19. I participate in computer-mediated discussion more actively when other students are active.	5.7	11.4	22.9	42.9	15.2

Table 3. Student Preferences of Face-to-Face (F2F) vs. Computer-Mediated Communication (CMC) (%)

	F2F	CMC	Both	None
Q20. I am more comfortable in:	65.7	34.3		
Q21. I am more active in:	63.8	35.2		1.0

While 55.2% of the students strongly agreed or agreed that they were comfortable with participating in computer-mediated discussion (Q11), when compared to face-to-face discussion, only 34.3% appeared to be more comfortable in CMC than face-to-face discussion (Q20, Table 3), and only 35.2% state that they are more active in CMC than face-to-face discussion (Q21, Table 3).

4.2 The Fit between Communication Media and Tasks

Table 4. Student perception of the fit between tasks and media (%)

	F2F	CMC	Both	None
Q22. If I engage in brainstorming to generate a number or ideas for a project, I would prefer:	73.3	25.7	1.0	
Q23. If I need to make a decision with my group members, I would prefer:	81.9	15.2	1.9	1.0
Q24. If I work on a clearly defined learning task, I would prefer:	58.1	38.1	2.9	1.0
Q25. If I work on an ambiguous learning task, which has no right answer, I would prefer:	74.3	24.8	1.0	
Q26. If I discuss complex or very difficult content, I would prefer:	82.9	14.3	1.9	1.0
Q27. If I discuss simple content, I would prefer:	40.0	59.0		1.0

- *For an **ambiguous** learning task (Q25), 74.3% preferred **face-to-face** discussion to computer-mediated discussion (supporting Hypothesis 1).*

In accordance with Media Richness Theory (Daft & Lengel, 1986), a majority of the students appeared to believe that richer media (face-to-face discussion) is better for equivocal tasks. They commented that they preferred face-to-face discussion for ambiguous tasks mainly because it is easier to clarify things through immediate questions and answers. Many students also pointed out that it is faster and convenient because they do not have to type all questions and opinions that might be of a considerable amount in the case of ambiguous tasks. They also noted that direct interaction and instant feedback helped make them think better.

- *For a clearly defined or **unequivocal** learning task (Q24), 58.1% preferred **face-to-face** discussion to co mputer-mediated discussion (not supporting Hypothesis 2).*

According to Media Richness Theory, leaner media would be expected to be perceived as more effective for unequivocal tasks (Daft & Lengel, 1986). Our results did not support this prediction. More than half of the students appeared to believe that face-to-face discussion (richer media) is faster, easier and more convenient for clearly defined learning tasks (or problems/projects). It seems that efficiency and convenience of communication is perceived as more important for unequivocal tasks, while directness and immediacy of communication is valued for equivocal tasks. On the other hand, the 38.1% of students who preferred computer-mediated discussion for an unequivocal learning task suggested different reasons. They stated that they can save time and energy because they do not need to meet. They also believed that CMC is better because it allows them to work with a flexible schedule and to have more time to think or reflect. We noted that some students perceived face-to-face discussion as more efficient and convenient while others thought CMC is more efficient and convenient.

- *For **complex or very difficult** learning content (Q26), 82.9% preferred **face-to-face** discussion to comput er-mediated discussion (supporting Hypothesis 3).*

As expected, most of the students appeared to perceive that face-to-face discussion is better than text-based computer-mediated discussion when they work on complex learning content. Students commented that they preferred face-to-face discussion for complex content because they can ask questions instantly and get immediate

feedback and also because they can explain better and faster orally and get a clearer explanations and examples for the complex content. They also mentioned that they can figure out difficult points with their instructors nearby and discuss with other students efficiently face-to-face. It was also noted that non-verbal cues help understand content better and reduce misunderstanding. As observed before, many students perceived face-to-face to be faster, easier, and more convenient for complex content.

- *For **simple** learning content (Q27), 59% preferred **computer-mediated** discussion to face-to-face discussion (supporting Hypothesis 4).*

More than half of the students preferred computer-mediated discussion for simple learning content mainly because they do not need to coordinate schedules to meet face-to-face and because they can work wherever convenient. They appeared to believe that computer-mediated discussion saves time and energy when the content is so simple that they do not need to directly interact among themselves to understand it or do the required assignments or tasks. The 40 percent of the students who preferred face-to-face discussion for simple content, on the other hand, contended that it is faster and easier for oral discussion. Some students also pointed out that it is more interesting to discuss face-to-face.

- *For **decision-making** tasks (Q23), 82.9% preferred **face-to-face** discussion to computer-mediated discussion (supporting Hypothesis 5).*

In accordance with DeSanctis and Monge (1999), most of residential students thought that face-to-face communication is more effective than CMC for convergent tasks, such as decision making. The students who preferred face-to-face discussion for decision-making tasks commented that it is faster, simpler, and more convenient to make a decision face-to-face, since they are all "on the same page." In addition, they also noted that direct interaction and verbal and non-verbal cues reduce misunderstanding. For decision-making tasks that involve integrating different opinions, rich media with direct and immediate feedback appeared to be preferred and was believed to be more effective.

- *For **idea generating** tasks such as brainstorming (Q22), 73.3% preferred **face-to-face** discussion to computer-mediated discussion (not supporting Hypothesis 6).*

DeSanctis and Monge (1999) contend that CMC is more effective than face-to-face one when working on divergent tasks, such as idea generating. Our findings did not support this prediction with respect to student preferences. Inconsistent with DeSanctis and Monge, a majority of residential students appeared to believe that face-to-face discussion is better for divergent tasks. The students who preferred face-to-face discussion contended that immediate feedback or responses, and non-verbal cues, such as body language and facial expression, stimulate new ideas and help them develop partial or incomplete ideas. Since face-to-face brainstorming allows thinking out loud, they said, even incomplete ideas that people present can be useful in building new ideas, while they are not available in CMC. They also mentioned that spontaneous collaborative thinking happens face-to-face and that they can generate more ideas through collaboration. Many of the students who preferred face-to-face discussion also stated that it is faster, easier, and more convenient. Some mentioned that they can engage in idea generating tasks more actively and dynamically in face-to-face discussion.

4.3 Satisfactory and Frustrating Factors of CMC

Student responses indicated that CMC is perceived as being useful mainly because it saves time and energy that might be spent in face-to-face meetings and it provides more time to reflect or develop their ideas. Students also commented that CMC allows a flexible work schedule, out-of-class cooperation, outside research, and seeing diverse ideas in writing. In addition, some people noted that CMC enables people who are shy in face-to-face discussion or are not fluent in English to more actively engage in discussion.

On the other hand, students appeared to be frustrated with CMC because it takes too much time to type and complete a discussion and to follow long threads, which are sometimes overwhelming. In addition, some of them reported that they are not comfortable with CMC and are hindered by technology problems. Others mentioned that CMC often becomes extra work where there is lack of participation by other students. The impersonal nature of CMC and lack of non-verbal language were also noted.

4.4 Needs and Expectations

Based on the students' responses to open-ended questions, the role of instructors appeared to be most critical in improving and supporting CMC in face-to-face courses. Students reported that if their instructors a) have an enthusiastic attitude toward CMC, b) select appropriate topics, c) provide more guidance and structure for discussion, d) regularly participate in the discussion, e) provide immediate feedback, and f) give appropriate credit towards their course grade for participating in CMC, it would help them learn better from CMC. Students' own willingness and

motivation to discuss and learn, classmates' commitment and active participation, and high quality of postings were also mentioned as factors facilitating CMC. Some students suggested that they should engage in CMC during class time if it is useful, rather than doing this as extra work. Others mentioned that they would be willing to have more experience with CMC even though their instructors did not encourage it. Students also indicated a need for visual aids, not just text, and better technology that increased speed.

5. Discussion and conclusion

5.1 Face-to-Face Discussion vs. CMC

Results of this study indicated that residential students generally preferred face-to-face discussion to CMC, even though they were comfortable with computer technology, had experience with CMC, and had convenient access to the Internet. Furthermore, students reported that face-to-face communication is faster, easier, and more convenient than CMC (which allows for working at convenient places with flexible schedules). These findings suggest that potential advantages of CMC are not being well utilized in the educational context at this campus.

Although about two out of three students preferred face-to-face discussion, the proportion of students who were more comfortable with CMC (34.3%) and who were more active in CMC (35.2%) should not be neglected. Instructors should note that about one out of three students may participate more in CMC even though they are quiet in face-to-face discussion. CMC can broaden the opportunities to support different needs of different students. In particular, CMC can support students who prefer speaking in a more thoughtful way after exploring their own ideas, rather than devising quick responses or questions (Althaus, 1996).

5.2 Differences in Perceptions

Student responses to open-ended questions revealed that some students perceived that face-to-face discussion is faster, easier, and more convenient, while others perceived that CMC saves time and is more convenient. This implies that students value speed, ease of participation, and convenience in learning activities. Apparently these factors are more important to these students, rather than whether discussion is face-to-face or CMC.

5.3 Media and Tasks Fit

Media Richness Theory predicted that students would prefer face-to-face discussion for equivocal, decision making and complex tasks, and that they would prefer CMC for unequivocal, idea generating, and simple tasks. However, results from our study indicated that students primarily preferred face-to-face discussion to CMC for almost all kinds of tasks, except for simple tasks. Based on the analysis of student responses, we found that face-to-face communication was perceived to be better for tasks for which students need immediate clarification, explanation and examples. In addition, face-to-face communication appears to be preferable when students need to generate new ideas. Apparently, direct communication stimulates new ideas and helps develop partial ideas by allowing for listening to others think aloud and for spontaneous collaborative thinking.

5.4 Conclusion

Findings from of our study supported four predictions consistent with Media Richness Theory (Daft & Lengel, 1986) and other similar studies (Archee, 1993; DeSanctis & Monge, 1999; Straus & McGrath, 1994). Our findings did not, however, support two predictions from Media Richness Theory. We observed that students do not necessarily conceive of characteristics of tasks and media as they are conceived in Media Richness Theory. We observed that students in general held different values for different tasks. For example, students emphasized speed, ease and convenience for unequivocal tasks, and directness and immediacy of communication for equivocal tasks.

5.5 Limitations and Future Research

This study is based on self-reported perceptions of students, rather than direct observation of their behavior in face-to-face and computer-mediated communication settings. What students say they prefer may not correlate with what preferences might be inferred by observing their actual choices. Moreover, what students prefer does not imply learning effectiveness or efficiency. For example, Raskin (2000) points out that computer interfaces that users prefer are not necessarily those which they are best at using in terms of reduction of errors and speed in task completion. While Raskin's observation is in another field of study, it nonetheless illustrates the issue.

The obtained sample in this study underrepresented females and younger students on this particular campus. Whether the same results would be replicated in a more representative sample or at other institutions is unknown. Thus, we should be cautious about making generalizations from this study alone.

Future researchers might also consider the study of student perceptions of *synchronous* CMC, since the use of synchronous media such as MSN or AOL Messenger (instant messaging) appears to be increasing outside of formal learning settings. It would be interesting to see how students might feel about synchronous CMC using this genre of tools for more formal learning activities – or even cell phones and teleconferencing with cell phones. Many students these days walk around campus talking on their cell phones.

Second, future studies could examine actual student performance with concrete learning tasks – not perceptions or preferences – in order to see whether these are consistent with learning effectiveness. For example, researchers might explore whether students actually perform routine, simple tasks better through CMC than in face-to-face settings.

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