STUDENTS' USE OF FACE-TO-FACE AND COMPUTER-MEDIATED COMMUNICATION IN GROUP ASSIGNMENTS: A "U-SHAPED" MODEL

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ABSTRACT

The focus of this study is how students use both face-to-face (FTF) and computer-mediated communication (CMC) to complete group projects for class. Specifically, our research question is: *How do students use FTF and CMC throughout the process of completing group projects as course assignments?* We conducted two focus group interviews to answer this question. All students came from a mid-sized private, mainly commuter Midwestern university who had experience mainly with on-ground courses, and some blended and online coursework. We found that students: are more satisfied with FTF interactions; believe that they perform better in FTF situations; prefer FTF meetings; use technology for efficient and task-oriented activities; and, generally follow a "U-shaped" curve when combining FTF and CMC interactions during group projects, i.e., more FTF at the beginning and end of a group project with an increased usage of CMC in the middle, after trust is developed. Faculty should be aware of this information when making group project assignments in their courses.

Keywords: Group projects, Face-to-face interaction, Computer-mediated communication

INTRODUCTION

George did not look forward to working with other students on his group term project. It took him over an hour to get to school and he did not like the thought of having to come to campus to have face-to-face sessions with his teammates. He hoped to minimize the number of face-to-face sessions and complete most of the project using computer-mediated communication. Donna also lived off campus and used computer-mediated communication when necessary during the semester, but preferred to work on this group project mainly in face-to-face meetings. This not uncommon incident shows how both face-to-face (FTF) and computer-mediated communication (CMC) interaction can play an important role for students in completing group assignments in their on-ground courses.

A confluence of events shows the changing landscape of social and work interaction: the use of social media is dramatically increasing; work is completed by teams more than ever; class projects within a business school setting on both the graduate and undergraduate levels are assigned to groups; technology has made the digital devices much more accessible; and, virtual teams and telecommuting are on the rise. This suggests that interaction is changing from mainly FTF exchanges to more frequent communications carried out electronically. In addition, course material is provided less by instructors in front of a classroom than ever before. Indeed, even exchanges

between students and faculty outside the classroom tend to be more CMC as emails and text messages have become the preferred method of interaction rather than meeting during office hours. These now common circumstances led us to develop our research question: *How do students use FTF and CMC throughout the process of completing group projects as course assignments?*

In this paper we: investigate the role students perceive technology and FTF communication play in developing and improving interpersonal trust; delineate when each communication process is efficient and effective in project completion; discuss perceptions of the impact of FTF and CMC on the final stages of project completion; reveal students' preferences for and uses of CMC and FTF when working on group course assignments; conclude that effective use of both CMC and FTF in completion of on-ground group projects follow a "U-shaped" curve; and, include recommendations for faculty to consider when assigning group projects during on-ground classes.

LITERATURE REVIEW

Recent research has discussed the opportunities associated with the use of CMC tools in the classroom (Cronin, 2009; Granitz & Koernig, 2011; Huang & Behara, 2007; Kaplan, Piskin, & Bol, 2010; Lowe & Laffey, 2011; Rinaldo, Laverie, Tapp, & Humphrey, 2013; Sendall, Ceccucci, & Peslak, 2008), but has not examined the perceptions and experiences of students with CMC in their group interactions.

Given the proliferation of new communication technologies and the increased usage of work teams, it is not surprising that many researchers have been investigating the impact of digital communication on higher education. Most researchers investigating CMC have taken the educator's perspective while presupposing the students' preferences, experiences, and real usage in the educational environment (Demirbilek, 2015; Muñoz & Wood, 2015; Stratton & Julien, 2014; Warner, 2016). Here, we probe what our students think about different communication methods they use for group project interactions.

Team projects in classes are used more often today than ever before. This is true in a business school, which tries to prepare graduates directly for the work environment they will soon be entering, if they are not already employed (Grzeda, Haq, & LeBrasseur, 2008; Hunsaker, Pavett & Hunsaker, 2011; Lee, Smith, & Sergueeva, 2016). In addition, the use of CMC and virtual teams due to an increase in the use and availability of technology suggests more of these group projects are being completed virtually rather than by FTF.

Advances in information technology have created new challenges for team processes. Building trust within a team is recognized as a key ingredient for team success (Davis, Schoorman, Mayer, & Tan, 2000; De Jong & Elfring, 2010). For example, Breuer, Huffmeier, and Hertel (2016) suggest that trust facilitates specific risk-taking behaviors such as reducing defensive control, open discussion of conflicts and mistakes, mutual feedback, and sharing of confidential information, which in turn should lead to more efficient coordination of team members' resources (time, effort, knowledge, etc.).

Trust has traditionally been seen as the result of individual judgments of past behavior (Lewicki & Bunker, 1996; Mayer, Davis, & Schoorman, 1995), what others call cognitive (Kramer & Tyler,

1996) or knowledge-based (see, for example, Mayer et al., 1995) trust. This traditional view of trust would predict low levels of initial trust in virtual teams when team members have little past history and use CMC exclusively which can limit direct personal observations that allow members to perform effective cognitive trust assessment (Robert, Dennis, & Hung, 2009). For instance, team members cannot observe the amount of effort others are expending or overhear what team members say when they are interacting with others. Even though swift trust, a presumptive form of trust, seems to exist in virtual teams (Jarvenpaa, Knoll, & Leidner, 1998; Jarvenpaa & Leidner, 1998), past studies found that swift trust appears to be fragile and often wildly inaccurate (Crisp & Jarvenpaa, 2013; Lewicki & Bunker, 1996; McKnight, Cummings, & Chervany, 1998; Meyerson, Weick, & Kramer, 1996). This represents a critical paradox for virtual group work (Wilson, Straus, & McEvily, 2006).

Breuer et al., (2016) concluded in their meta-analysis that when virtual interaction is more frequent, team trust is more important for effectiveness. When social context cues are missing, increased depersonalization, lower cohesiveness, and less social conformity often result (Szeto & Cheng, 2016; Lu, Fan, & Zhou, 2016). Consistent with this, empirical studies have found that interaction in computer-mediated groups is more task-oriented and less personal than interaction in FTF groups (Richardson, Maeda, Lv, & Caskurlu, 2017; Weidlich & Bastiaens, 2017). Computer-mediated teams were also found to struggle with their intra-team processes (Brahm & Kunze, 2012; Indiramma & Anandakumar, 2009; Staples & Zhao, 2006).

On the other hand, FTF is so rich since it enables not only the spoken language and other verbal cues but also body language (Lantz, 2001). This gives the communicating parties a better basis for understanding each other compared to purely CMC (Lantz, 2001). Researchers found that students were significantly more satisfied with FTF collaboration than computer-mediated learning (Ocker & Yaverbaum, 1999; Summers, Waigandt, & Whittaker, 2005). In this regard, much of the literature concludes that FTF interaction at the beginning of a group project enhances the level of trust. Hambley, O'Neill, and Kline (2007), Horwitz and Horwitz (2007) and Lantz (2001) advise project teams to have at least an initial FTF meeting before following up with virtual team interactions. For instance, Kennedy, Vozdolska, and McComb (2010) found in their behavioral simulation study that mixed-media teams (i.e., first as FTF and second as computer-mediated) had improved participative decision making over only CMC teams. Teams with few opportunities to meet FTF have been known to be highly vulnerable to process losses and performance problems (Gibson & Cohen, 2003; Lipnack & Stamps, 2000).

According to "Average daily media use in the United States from 2012 to 2018, by device (in minutes)" (Statista, 2017), in 2015, an average American spent 177 minutes on Smartphones each day, which was up from 88 minutes a day in 2012. Some people spend more time and others unlock their phones hundreds of times a day to quickly check texts, Facebook or email (Hall, 2014). In particular, Millennials are spending over four hours per day checking social networks and using email, text, and messaging apps (McCarthy, 2014). Those aged 18 to 29 have always been the most likely users of social media and 90% of young adults use social media, compared with 77% of those aged 30 to 49 (Perrin, 2015). However, the frequent and prevalent use of the newest communication technology does not always mean a preference for virtual interaction. Kvavik's (2005) survey of 4,374 college students found that they were frequent users of various virtual communication media but that high levels of use did not necessarily translate into preferences for

use of technology in the classroom. More recent studies found that despite the popularity of technology, students expressed a preference for FTF communication (Robinson & Stubberud, 2012) and reported challenges they experienced in virtual communication, such as greater difficulty when using it (Granitz & Koerning, 2011), and frustration with ever-changing technologies (Gikas & Grant, 2013). Faculty, however, have not paid enough attention to students' experiences with new communication technology even while increasing the use of more digital elements in courses (Neier & Zayer, 2015).

This literature review identifies some gaps in our knowledge regarding students' use of both CMC and FTF interactions when working in group situations for purposes of completing class assignments and projects. This study helps to fill in the gaps.

METHODOLOGY

To investigate our research question, we applied a qualitative research methodology using two focus group interviews. We analyzed our data using QSR International's (2012) NVivo qualitative data analysis software (Version 11) as described below.

Data Collection

Krueger and Casey (2008) suggest focus groups should include between five and ten participants, as smaller groups show greater potential to have the opportunity to share insights and yet provide a diversity of perceptions. Our study is based on two focus groups that had nine and seven participants, respectively, and all of the interview participants (n=16) were undergraduate students at a mid-sized private, mainly commuter university in an urban center of the Midwest United States. Their academic majors included business administration, political science, social work, nursing, and undecided. While all focus group participants were exposed to both blended and online courses, their programs consisted mainly of on-ground coursework, and their experiences reflected this reality.

Focus group 1. The first group consisted of nine people. Eight of these participants were members of a student advisory board from the business school. All advisory board members were on the Dean's List. The ninth person was a nursing student who attended in place of her business roommate. This group was very homogeneous. All upper-class undergraduates, they were excellent students with high grade point averages. Comments made during the focus group interview suggested they were highly motivated and committed to gain as much knowledge and experience as their college careers could provide. They generally knew each other, had been in several classes together and felt very comfortable in their interactions.

Focus group 2. The second focus group was comprised of seven sophomore level students. Their academic majors included business administration, political science, and social work. While they were all from the same class, they had not previously worked with each other in small groups, nor had they much group-related class work experience. Their comments throughout the interview made it clear that motivation, commitment and performance levels were much more diverse and reflected the broader distribution of grades found throughout the student body. Unlike the responses from the first group, for example, their comments often wandered off topic.

Each focus group interview was conducted in a one-hour FTF meeting. The same moderator initiated the focus group discussion by providing an overview of the research area, introducing the other researchers, and allowing each participant to introduce him/herself briefly. The moderator, a faculty member teaching the sophomore class from which the second focus group was recruited, introduced each topic area and insured each person had the opportunity to fully answer and respond to both the question and each of the other responses before going on to the next area of interest. He further encouraged our participants to include any kind of communication tools that provided quick accessibility in any description of technology-based communication.

All the participants in the focus groups were asked to share their experiences and thoughts about their use of technology in team projects. While the research question acted as an overall framework, a patterned interview guide was created to insure both focus groups covered the same questions. The interviews were sufficiently flexible, however, to allow for the emergent nature of the interview conversation. Both of the focus group interviews were recorded by using a digital voice recorder and transcribed later. Additionally, notes about student statements were written down by each of the researchers to assist in making connections between the interviews and the research question.

The first focus group provided excellent information on all areas of interest. Yet we believed that this group was very homogeneous. And while focus group selection can be based on ability to provide information to the interviewer (the notion of applicability—Rabiee, 2004; Richardson & Rabiee, 2001), and could, perhaps should, be homogeneous along one or more criteria relevant to the research (Krueger & Casey, 2008), we wanted to make sure that we included a second focus group to provide additional information that might be outside the perspective of the initial focus group members. The second focus group, with a broader, less homogeneous background, did indeed provide additional information.

Interview Guide

Based on our experiences and literature review, we created a patterned interview form comprised of three basic questions: what role does technology play in how you interact with members of your group; what are your experiences with FTF and CMC meetings (what impact did each play in developing trust and creating satisfaction, and what types of interactions, project or non-project related, did you have; and, how would you describe a really good group, a really good experience, and then compare that to a not so good group to help us understand the differences. We expanded upon each question based on participants' responses.

Data Analysis

The process of qualitative analysis aims to bring meaning to a situation rather than the search for truth, which is the focus of quantitative research (Rabiee, 2004). Although the spoken language is recorded, it is recommended that a reflective diary should be kept by the facilitator or moderator (Krueger & Casey, 2008). During the focus group interviews, the researchers individually reflected on discussions and interactions as they occurred so that we could begin to make sense of the data that were being generated. Debriefing sessions after the interviews provided an opportunity for the researchers to discuss general impressions and initial

observations of the focus groups. Our research assistant then transcribed the audio files of the focus group interviews and used QSR International's (2012) NVivo qualitative data analysis software (Version 11) to import them for analysis. Three basic themes were identified by the NVivo analysis and our debriefing sessions and followed closely the three general questions of our patterned interview form. Our overall research question: *How do students use FTF and CMC throughout the process of completing group projects as course assignments?*

RESULTS

Both focus groups were interested in and excited to talk about the topic of our research question. Since they were directly involved in group project assignments in their coursework and performance issues are critical to students, the issue how to best complete a major part of course grades was dear to their hearts. All students participating in these two focus groups are in primarily on-ground-based programs at a moderate-sized Midwest private, commuter university. Therefore, these comments reflect the students' experiences mainly with on-ground coursework and some blended and online courses.

All of the participants in both focus groups indicated that FTF meetings were both critical (necessary) and desirable in initially creating a level of trust that could then be applied throughout the semester for group projects and assignments. As one member stated: "the FTF builds the relationship, but the social media enhances the relationship." Also, “first we need a FTF meeting to get to know each other, then technology to expand the trust. Technology first is not as trust-building.” Likewise, they stressed the notion that while both CMC and FTF interactions had positive contributions and drawbacks, CMC meetings were more effective after initial FTF meetings took place so trust, collaboration and greater comfort in future interaction could first be developed.

In addition, most of the members in both focus groups noted how FTF interaction not only improved initial interpersonal relations, it also provided a framework for enhancing subsequent CMC effectiveness. One participant, for example, indicated: "once you do meet a person, you’re more comfortable to ask them questions…or text them, but at least you’re open to how their personality is, and knowing that 'ok, they’re going to answer me, and answer my question if I need help.'" And while FTF meetings are much less efficient, and also lead to more off-topic interactions, these focus groups agreed that off-topic discussions were actually a positive aspect of group work since they enhanced the development of both relationships and trust between group members. As one student stated: “I also think another advantage for meeting FTF as opposed to doing it all social media is that when you meet FTF, you create a relationship and it brings open-mindedness or openness between the people.” Another comment dealt with the ease with which ideas could be communicated within the group. The best group experiences occurred when “things just flow more naturally. As he was saying, feeling comfortable with bouncing ideas off each other, and knowing ‘hey maybe this idea won’t be accepted,’ but because I feel comfortable with the people I’m with, I can at least throw it out there.”

Most participants indicated that early FTF meetings rather than CMC made the class project “way better.” For example, one person stated: "you should, first, get to know them, so [when] you do meet up so you know how these people are, like a standard, know what kind of work they do."

Another student indicated "I would definitely establish more FTF meetings to establish trust, get to know who that person is. Test their skills, stuff like that, so we can work together to the best of our advantage." Furthermore, "Because I feel more comfortable with them to begin with, I know we can do better work." In addition, "when we can get everybody's input and feel comfortable with it, it works better." "Everyone pitches ideas to each other and everyone can collaborate like that. When you go through social media...[I]t's just not an ongoing conversation or an ongoing thing to stimulate ideas."

CMC interaction, on the other hand, is viewed as being much more structured, which makes it more efficient – you can ask a question and get a quick response. All participants indicated that FTF meetings were often a hassle, particularly because group members had a diversity of schedules and life commitments that interfered with group meetings. This inefficiency of FTF meetings underscored the critical role of CMC interaction during the interim phases of group projects. It allows getting back to work and completing the task without having to take the time to set up an FTF meeting, travel back and forth, and then get back to working on the task. Consistent with many comments, one participant said "when you're working on so many different schedules, it's nice to be able to log in, edit what you need to, and then get out, and then utilizing the text messages as well, you can say 'hey I did something to the document, let me know what you think.'" Group members supported the statement:

> I think there are also instances where it's easier to use instant communication through technology because you could send each other links, you could send each other the document. And I feel like, in those situations, it's better to use that group chat, to all have the information.

Several students discussed that one benefit to the use of CMC is the ease of gathering and sharing information for group projects. Likewise, "social media is good for a division of labor. You can tell others what you are looking into so nobody else is looking at the same thing." CMC also provides a record of what was said and what information is available: "If you happen to forget something, you have that 'paper trail' where you're able to go back and look to see what everybody was doing and what your job specifically was." They also agreed with this comment, however:

> When you go through social media, it's not an ongoing conversation. I'm going to send a text message or an email, and then maybe 20 minutes later you're answering like "oh why didn't they answer me" and you're thinking they didn't think about some of the things you were thinking about.

Toward the end of the semester, as group projects are being completed, FTF communication provides more than just the opportunity to socially interact. Several students in each of the focus groups found meeting with their group members to be more effective in understanding the contributions from each other. For example,

> I'd say the best part of FTF too is not really the interaction, getting your point across…It's also the accountability. When someone shows up, they are like "oh yeah, I'm doing it, I got it, I got it" and then if they show up and they don't have anything they can't hide that at all, so it's physical, it's in front of you. That's one of the main benefits of FTF, everyone

> stays on task and they have to have something by the time they show up or else they'll be ousted from the group. (Laughs)

Several responses indicated that CMC interaction near the end of a group project was often less effective. Four students indicated that CMC, while being more efficient, often provided an excuse to NOT meet, to NOT practice a presentation, even to t/8urn in materials late. One response:

> One of the downfalls...is students can use it as an easy out if they say "I had trouble transferring it from a word doc or something." It's an easy way out, you can tell your teacher you had trouble with the Google drive doc, or someone didn't give it to me first, or my Word wasn't updated.

Another student indicated "I've been in many presentations where we do everything on the Google drive, and then we use it as an excuse. 'Oh, let's practice the presentation on our own...and then we'll just meet up together and do the presentation.'"

FTF meetings also led to much higher impact after project completion on individuals' willingness to work with group members on future group projects. For example, they indicated that what they called "group dynamics" was the major determinant in the desire to work with these people in the future. While both focus groups came to this same conclusion, it was all the more remarkable for the first focus group, a highly motivated, grade-oriented set of students, to identify a non-performance criterion for determining who they would want to work with on a group project. When pressed, they indicated that the quality of social interaction was the most important determinant regarding whether to work together in the future, much more so than even the success of or grade on group projects. The moderator asked directly: "Would you work with that person again, the next time?" The response was: "If there was a good group dynamic." Members from both groups supported this notion. One observation reflected this view: "[if you] meet FTF, you actually become friends with the person in your group...you're more likely to say you've had a better experience...you're more likely to stay friends and talk to each other past the group..."

DISCUSSION

Many researchers investigate and produce articles discussing how to use CMC in enhancing and improving the classroom experience from a teaching perspective (Demirbilek, 2015; Muñoz & Wood, 2015; Stratton & Julien, 2014; Warner, 2016). Rather, we are asking what the role of CMC might be in how students fulfill their group assignment responsibilities. Our results, discussion, and conclusions are based on students' observations when they have the option of how to complete group projects, that is, these situations could not occur in online courses since there would be no opportunity for students to participate in FTF sessions with their classmates.

These results strongly paint a picture describing when each of FTF and CMC interactions contributes most effectively to successful completion of group-based classroom assignments. Hence, our focus group members advocated the use of FTF meetings early in the group formation process for working on group projects. They stressed that CMC interaction at this stage of the semester would actually be less effective in the overall performance of the group. The most positive role of CMC interactions was identified as directly working on and completing the

technical part of any group assignment, and that CMC was much more efficient and effective than FTF meetings in this facet of the assignment. Finally, both focus groups supported the more effective use of FTF meetings near the end of the project completion process due to greater accountability and overall performance enhancement impact. From the perspective of the focus groups, then, the effectiveness and preference for the usage of FTF sessions during project completion follows a "U-shaped" curve - higher at the beginning, lower in the middle, and higher at the end.

At the beginning of this "U-shaped" curve, corresponding to the beginning phases of group development, both focus groups agreed that FTF interaction led to significantly more trust. Moreover, the focus groups indicated that FTF meetings were essential before they could confidently interact with those group members with whom they had no previous experience in group projects. These focus groups indicated that CMC meetings could not create the same amount of trust as FTF sessions, regardless of how many CMC meetings they had. Thus, under any circumstance, trust is best formed and maintained through the use of FTF sessions rather than CMC interactions exclusively. Furthermore, as trust was developed through their FTF interactions, they felt more comfortable exchanging new ideas, even when their ideas might be rejected, which increased collaboration and had a positive impact on overall performance. Hence, FTF interactions early on in a group's development, when brainstorming often takes place, resulted not only in more effective trust building, they led to a greater inclusion of and interaction between all group members.

In the middle sections of group project processes, forming the bottom of the "U-shaped" curve, our students found CMC interactions to be more useful and effective. In spite of positive experiences and preferences regarding the benefits of FTF interactions, the students found CMC meetings to be more efficient since virtual meetings were more task-oriented; they had less off-task interaction; questions were more directly answered; and, no additional travel time was required. Once the group assignment definition had been agreed to by the group members and each person's role had been determined, CMC interaction was the preferred method of communicating with group members, especially those who favored less personal contact with others or were more introverted. For people who choose not to have to interact with someone with whom they do not trust, CMC provides an option that allows people to work with others when such interaction might not happen otherwise. Participants suggested that CMC was an excellent way of dividing responsibilities and letting other group members know what work was being accomplished to avoid redundancy. In addition, CMC provides a record of what has been discussed and accomplished, which is often difficult to maintain in FTF sessions unless complete minutes are taken and distributed.

And shaping the third portion of this "U-shaped" curve (near the end of a group project), the two focus groups strongly agreed that the value of FTF meetings was greater compared to CMC interaction. In fact, they indicated that the use of CMC could often be used as an excuse to be less prepared, even unprepared, for group presentations and final group papers. FTF meetings resulted in greater accountability and ultimately in higher performance. Both groups noted how people could fake their output while meeting virtually but could not hide what they did not produce when physically meeting with their group members. In addition, participants strongly suggested that FTF meetings provided much more complete information as body language, innuendo and nuance were

all included in the communication. Focus group members indicated how this additional skill development was a value-added for a business degree.

Our focus groups indicated that FTF interaction was much more satisfying, and this satisfaction had further positive effects in other areas. For example, satisfaction had the most influence in determining whether they were willing to work with a person in future group project situations. Since satisfaction also helped determine the degree of openness that developed in a group, collaboration and overall performance were also positively impacted.

CONCLUSIONS AND IMPLICATIONS

Our study recognizes both types of communications can enhance performance in group project settings, though our findings suggest that the most effective use follows a "U-shaped" curve - that is, more FTF at the beginning and end of a group project with an increased usage of CMC in the middle after trust is developed. Both focus groups were strongly in support of the role of FTF meetings early in any group project assignment. They disagreed with the findings of Wilson et al. (2006) that CMC interaction can create a level of trust consistent with the trust created in FTF teams. Without this personal interaction, trust did not, perhaps could not, develop sufficiently to lead to higher team performance. Yet CMC played a positive and necessary role in accomplishing important group tasks during project assignments. Project completion, however, was best done through FTF interactions, to maintain accountability and a higher level of team member performance. This "U-shaped" curve not only reflects experiences of these participants in enhancing personal and group output for group projects, it also represents their preferences in using FTF and CMC meetings.

Faculty, therefore, might want to consider creating FTF opportunities for students, perhaps including team building exercises in the early stages of the course (Grzeda et al., 2008; Hunsaker et al., 2011; Lee et al., 2016). These additions would allow students to get to know each other and to develop trust to enhance group processes and overall productivity. Students would also have the opportunity to determine what type, how much and when CMC interaction would take place. Finally, faculty might want to consider how to provide class time near the end of the term for students to take advantage of the greater accountability gained through FTF meetings. Project outputs then have a greater chance of higher quality. While faculty often consider the research on the use of technology in their courses, they might want to consider the results of this research in assigning group activities in their classes as well.

We draw attention to some limitations of the current study that can be leveraged to inform future research. Although we tried to enhance the generalizability of our findings by interviewing two focus groups which had relatively different levels of motivation, commitment, and performance, they still both came from the same university. In addition, the focus group moderator was a faculty member who had, and possibly could later have, some of these participants in the class, which might skew their responses. There may be limitations based on the location and size of the university and we recognize that most courses taken by students in both of the focus groups were on-ground or blended courses and, therefore, provided students with the choice of how to complete group projects. Furthermore, this university is mainly a commuter school. And while we expected

there to be a higher preference for CMC to make their group interactions more efficient and less burdensome, this was not the case for these students. It is an area that should be tested further.

Additional research is needed to determine when CMC interaction helps people who might otherwise not contribute directly to group discussions, as students suggested when someone might not trust another person or are too inhibited to contribute to ongoing discussions. In addition, this may be the case when English is a second language. Moreover, CMC interaction may help when providing a written record of a meeting is more effective than trying to replicate an FTF meeting. This might reflect a situation where students have different learning styles or come from different backgrounds (del Carmen Triana, Kirkman, and Wagstaff [2012], where they discuss ethnic differences not interfering with interactions in CMC meetings). Finally, this study included only undergraduate students and it is possible that graduate student experiences, particularly given different life circumstances, could result in different outcomes. We also believe replication is necessary to provide more compelling information for faculty members to make the use of group project assignments more effective.

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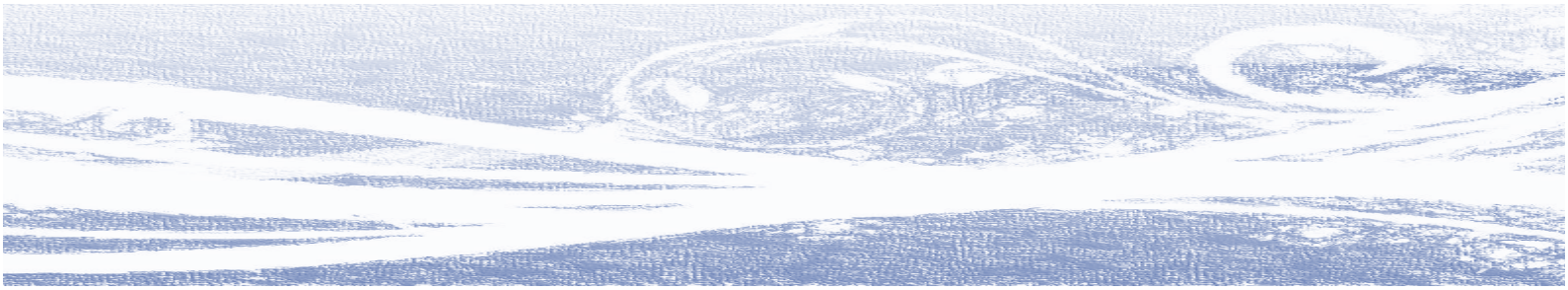

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