# Team conflict in ICT-rich environments: Roles of technologies in conflict management

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## Abstract

This study looks at how an information and communication technologies (ICT)-rich environment impacts team conflict and conflict management strategies. A case study research method was used. Three teams, part of a graduate class in instructional design, participated in the study. Data were collected through observations of team meetings, interviews with individual members, plus analysis of electronic documents exchanged among team members. Findings indicate that all teams experienced conflict at some level and that conflict management strategies evolved over time. ICT played a dual role in the conflict management of teams. These technologies seemed to facilitate conflict management by offering a formal means of communication, by making communication more effective with minimal waste or unnecessary effort, and by creating opportunities for more thoughtful reactions, with chances for reflection on the content. However, ICT also aggravated conflict, specifically when strategies for use were imposed, when team members became blunt and forthright, and when misinterpretations occurred because of differing senses of urgency in replying to emails.

## Introduction

Working in teams is an instructional practice used widely in formal and informal educational and training settings, especially in this era of globalisation and technological advances. Particularly at the university and graduate level, people from a wide variety of nationalities and cultures bring diverse sets of working experiences and backgrounds to team-based work. As McLoughlin and Luca (2002) explained, employers expect universities to prepare professionals with 'not only a strong knowledge base, but also diversified social, communication, and cooperation skills, flexibility to work in different contexts and the capacity to manage information and self and others' (p. 572). In addition, cooperative learning methods have many benefits compared to working

independently; for example, teamwork: (1) increases student achievement and productivity; (2) allows for more supportive and committed relationships; and (3) boosts psychological health, social competence and self-esteem (Johnson, Johnson & Stanne, 2000).

## Background and significance of the study

Members of a team bring a multitude of knowledge, experiences and perspectives, creating a unique learning environment where conflict is often referred to as the norm (Iles & Hayers, 1997). Knowing how to deal with conflict when it occurs is fundamental to the well-being of any team. Moreover, controversy and debate can be used to facilitate learning (Johnson & Johnson, 1985).

Groups in general and small teams in particular have been objects of extensive study because of their intrinsic complexity. Many of these studies, however, are along the lines of experimental research and take place in controlled situations in noneducational settings (Johnson *et al*, 2000; McGrath, Arrow & Berdahl, 2000). Furthermore, research on how small groups operate has been conducted predominantly in the fields of organisational behaviour, information sciences, communication studies, and clinical and educational psychology (McGrath *et al*, 2000), and less in the area of educational technology. Studying team conflict from this perspective has potential to improve information and communication technologies (ICT)-supported teamwork as an instructional strategy.

The use of ICT to support teamwork adds more complexity to the group phenomenon. By offering flexibility, convenience and low-cost communication, networked technologies are used to support collaborative efforts as a complement to face-to-face interaction or as the major means for communication when teams are geographically dispersed. But there has been little educational research aimed at investigating computer-mediated teams. Kerr (1996) emphasised the need for studies of the sociology of groups and the relationships between groups and technologies. Only a subset of research on small groups has looked at the role of ICT in managing team conflict and improving communication among team members. Findings were, however, ambiguous. On one hand, it seems that technologies can contribute to managing conflict in teamwork (Hsu, 1999; Rockart & Short, 1991). On the other hand, they can create dissatisfaction and lower confidence in group outcomes (McGrath & Hollingshead, 1994), and can make achieving consensus more difficult (Andriessen, 2003).

Because conflict is a continuing mediator of performance, investigating its dynamics is a serious matter for educators and teams. Additionally, when mediated by technologies conflict management practices change (Poole, Holmes & Desanctis, 1991; Riopelle *et al*, 2003), and this also needs to be investigated.

## Research issues addressed

The goal of this study is to understand the role of an ICT-rich environment in team conflict and conflict management strategies in a higher education setting. The research study seeks to address the following issues:

- What are the main sources of conflict experienced by teams?
- What conflict management styles do teams use?
- What types of technologies do teams use to support teamwork? How do they use these technologies to support their work?
- What is the role of ICT-rich settings in managing team conflict?

Although the concept of an ICT-rich environment is broad, it is defined here as any learning environment that makes available to learners networked computers, software, and web-based resources that complement face-to-face interactions, such as email, discussion forums, instant messaging, shared group calendars, listservs, cellphones and fax. Teams can use these resources to support their work. 'Support' here does not imply that the computer systems replace collaborative work. It means that 'there is a human-computer system assisting the work itself and/or the coordination' of work processes (Egger, 1996, p. 42).

## Conflict in teamwork

Every team experiences conflict at some level. As Lauzon (1999) pointed out, conflict within communities of practice seems to result from 'contradictions embedded in self-definitions' (p. 267). Although small groups are distinct from communities of practice, many forms of disagreement still originate in tensions between explicit and implicit beliefs, values and practices. Conflict is defined in this study as any statement of disagreement that creates discomfort and disaffection among people in a team (Hobman, Bordia, Irmer & Chang, 2002).

Types of conflict at the task and relationship levels of have been described frequently in the literature (Levi, 2001; Rahim, 2001; Stewart, Manz & Sims, 1999). Task-related conflict occurs when team members disagree about the tasks themselves, how those tasks should be performed and/or completed (Stewart *et al*, 1999), and how well they should be performed (excelling vs. meeting minimum requirements). Relationship-related conflict is centred on relationships, psychological and social constructs, when team members experience interpersonal incompatibility.

Both relational and task-based conflict can have positive and negative effects on teams. These kinds of conflict often occur together. When members disagree about an issue, the debate sometimes can turn relational. What seems to be a 'legitimate' and therefore an impersonal conflict can easily turn into a relational, personal conflict (Forsyth, 1999). Conflict is more frequent in heterogeneous teams than in homogeneous ones (Levi, 2001). Group heterogeneity in this study was a result of different nationalities, social classes, races, age groups, gender, economic status, religions, affective orientations, ethnicities, lifestyles and expertise.

Conflict is a fundamental aspect of teamwork (Forsyth, 1999; Levi, 2001; Putnam, 1986). Whitworth (2005) claimed that 'conflict within organizations is inevitable, but without conflict there would be no creativity, and hence no innovation' (p. 690). In an early phase of conflict research, theorists argued that conflict was detrimental to team-

work and that it impacts organisations negatively (Jehn, 1995). Conflict was perceived as destructive and ineffective, as a problem that needs to be minimised and controlled. In that earlier view, conflict represents a danger to effective teamwork by taking time, by being irrelevant to the tasks, and by disrupting the relationships among team members (Smith & Berg, 1987). More recent research, however, has shown that conflict can be beneficial to teamwork (Forsyth, 1999; Johnson & Johnson, 2003; Levi, 2001; Tjosvold, 1992; Tjosvold & Tjosvold, 1991; Worchel, Coutant-Sassic & Wong, 1993).

In terms of conflict management, this study follows Thomas' model, which is organised around two dimensions: (1) cooperativeness as an attempt to satisfy the other's concerns, and (2) assertiveness as an attempt to satisfy one's own concerns (Thomas, 1992). Combinations of these dimensions lead to five modes of handling conflict:

1. *Avoidance* corresponds to evasiveness and failure to confront. It is low in both assertiveness and cooperativeness.
2. *Accommodation* consists of an attempt to achieve others' goals at the expense of one's own. It is low in assertiveness and high in cooperativeness.
3. *Competition* entails the use of power as one member tries to force her view on others. It is high in assertiveness and low in cooperativeness.
4. *Compromise* requires that each side of a dispute makes concessions. It is intermediate in assertiveness and cooperativeness.
5. *Collaboration* attempts to identify and achieve outcomes that satisfy the interests of all members involved. It is high in both assertiveness and cooperativeness.

### Conflict in ICT-rich settings

ICT are frequently described in the literature as tools to facilitate teamwork. For instance, McLoughlin and Luca (2002) emphasised the advantages technological tools offer to 'foster team skills, process knowledge and personal knowledge' (p. 577). In addition, the role played by ICT in conflict management is described as either detrimental to teamwork, beneficial to teamwork or both (Andriessen, 2003; Grudin, 1994; Hiltz & Turoff, 1993).

(Hiltz & Turoff, 1993) suggested that computers in particular allow for more equal participation among team members, because team members are less influenced by differences in status. In computer-mediated communication, the technologies act as an equaliser. On the same premise, computer-mediated decision making is more dependent on information and facts and less on social pressures. Turoff *et al* (2006) found that computer-mediated tools (eg, Delphi-like software systems) can effectively support online discussions among members of large groups on complex issues.

In spite of the clear benefits noted earlier, some authors (Andriessen, 2003; Grudin, 1994) pointed to some limitations inherent in the use of ICT. They argued that the success of technologies' use depends more on the user than on the technologies themselves. The adoption, use and success or failure of these technologies relies on three

factors: (1) if it is appropriate for the tasks the user needs to perform, (2) if it supports the social context, and (3) if it is flexible enough to change according to evolving demands (Andriessen, 2003). Grudin (1994) added that the benefits of technologies developed to support teamwork are dependent on the preferences, prior experience, roles and assignments of every team member. What is helpful to one team member might not be helpful to others.

## The research study

*Context and participants*

This research study took place within the scope of a graduate programme in instructional technology at a large research university in the Midwestern USA. The course in which data were collected is one of the first classes that students take when they begin a graduate programme in instructional technology. The teaching approach is team-based. Teams were required to develop a 15-week-long instructional design project. The project consisted of designing, developing and evaluating a 2- to 3-hour lesson on time management. The project deliverables included a learner, task and teaching environment analysis report; an instructional design plan; instructional materials; and a final report. In addition to these deliverables, each team had to present its project twice during the semester for critique by the class.

A case study was used as the research method. As Stake (1995, p. 133) defined it, the case is the unique object under study; 'it is something that we do not sufficiently understand and want to'.

Because heterogeneous teams seem to be more prone to conflict than homogeneous ones, a balance of the following criteria was used to select teams: (1) students from the USA and from other parts of the world; (2) female and male genders; (3) age groups; (4) different backgrounds; (5) much and little/no previous professional experience; and (6) extensive and little/no experience with teamwork. Three different teams (case), totalling 11 students, participated in this study. Pseudonyms were used for the 11 participants in this study: Eugene, Hannah, Eli, Amber, Daisy, Italia, Luke, Joanna, Thomas, Debra and Charles. A short description of each team is as follows:

- Team *Capella* had two females and two males ranging from 27 to 34-years old. Eugene was the only student from the USA. Hannah, the youngest member of the team, was from South Korea. Eli was from Japan, and Amber was from France. As a team, they had knowledge of six different languages other than English: French, Korean, Japanese, German, Spanish and Latin.
- Team *Sun* consisted of two females and one male. The three members had very distinct backgrounds, life experiences and native languages. Daisy was a White American female in her mid-20s. Italia was a Singaporean of Chinese descent in her early 40s and Luke was a 26-year-old male from Turkey.
- Four members ranging from 23 to 37 years old made up team *Vega*. Two were female and two were male. Joanna and Thomas were both from outside the USA (Egypt and

South Korea respectively), while Debra was African American and Charles White American. Once again, a wide variety of life experiences, working styles and subcultures came together in this team.

All students were highly proficient in using ICT.

*Data collection methods*
The data collection took place from September 1 to December 22, 2003. Data were collected through (1) semistructured interviews, (2) observations and (3) document analysis.

Two rounds of semistructured interviews were conducted with individual team members, one at the beginning of the project and another at the end. The purpose was to capture the changes occurring throughout the project in relation to sources of identified conflict and modes used for handling conflict. A total of 24 interviews were conducted. Each interview lasted 60 minutes on average. The interviews were audiotaped and transcribed.

Seven team meetings with an average duration of 60 minutes each were observed. The major agenda topics of these team meetings were: (1) project scope definition; (2) instructional strategy selection; (3) collaborative writing and/or editing of reports; (4) analysis of the instructors' feedback; (5) decision making on design, development and production of the instructional materials; and (6) preparation for critique sessions. Additionally, a total of nine classes that dealt with team issues and teams' critique sessions were observed. Each class lasted 3 hours. The course syllabus and class handouts were also analysed.

*Data management and analysis*
For data management, the following were done:

1. Interviews were transcribed and the transcriptions were sanitised. Microsoft Word was used to organise the qualitative data into documents corresponding to each team. For each team's sets of interviews a cross-analysis table was created to allow for data comparison and subsequent coding.
2. Observational notes were organised by team, date and time in a research journal and later typed into Microsoft Word.
3. A total of 831 emails were exchanged among members of each of the three teams, imported into a Microsoft Word document and sanitised. After that, sequences of emails for each team were selected based on their relevance to the research questions. Relevant email sequences were considered an episode. Each episode was transposed into Microsoft Word, cleaned and organised chronologically to illustrate a sequential experience.
4. Documents attached to the discussion forum were printed and organised chronologically per team into a catalogue of online documents.

For data analysis, an iterative and inductive process of analysis was used to formulate a set of qualitative accounts. Through a careful analysis of the data, trends and discrepancies were found and emergent categories were organised by topics across the three teams. The following steps adapted from McMillan and Schumacher (2001) were used for data analysis:

1. Get a sense of the whole. Observation notes, interview transcriptions, feedback reports, and physical copies of email sequences and electronic documents were looked through together to generate preliminary ideas about the data.
2. Generate topics from the data. An initial coding schema was established by looking at the data and coding it by hand. Different categories were established by searching patterns, identifying different meanings, and looking for contradictions across multiple data sources.
3. Redefine the organising system. The categories identified in the previous step were reanalysed and compared to see if they were relevant to the research questions and if they were redundant or repetitive.

Using Microsoft Word, data chunks were copied and pasted from the observation notes, interview transcriptions, feedback reports, email sequences and electronic documents into a matrix of categories generated during a preliminary analysis. Finally, each data chunk was transformed into a coding system. Through this process codes were refined (merged into broader sections or broken into less inclusive codes) and redundancy was eliminated. If necessary, new categories were created.

*Support for rigor of the findings*
Prolonged engagement and persistent observation were two of the activities used to support the credibility of this study. Other activities were:

• Triangulation, by analysing different sources of data (observations, interviews, and document analysis) at different times in the project;
• Peer debriefing, by obtaining input on the data collection methods, analysis techniques, and findings from other researchers doing similar work;
• Member checking, by inviting the participants to review the interview transcriptions for content accuracy. Participants were asked to correct misstatements, insert clarifications and delete anything they did not want to see published.

**Findings and discussion**
The applicability of the findings of this study is linked to the contextuality of the case studied. However, in addition to the major findings, the following paragraphs report the lessons learned by teams working in similar circumstances.

As mentioned previously, two rounds of interviews were conducted, one in the early phases of the project (first 4-week period) and another when the project was completed (after the 15-week period). Thus, given that the data captured the changes in the use of ICT, throughout the data analysis, references to these two distinct data collection

periods are made. The participants' contributions are reproduced as is, with spelling and language use kept intact. The following themes were identified as part of the data analysis:

*Main sources of conflict shifted from people-related to project-based*
In the first 4 weeks of the instructional design project, teams frequently cited relational-based sources of conflict. Language issues, communication styles, personality traits, lack of experience in teamwork, and different priorities and motivations were described as the main causes of disagreement. For instance, Capella's team member, Hannah was at first very uncomfortable with her inability to express her ideas in correct English. She was making a tremendous effort to improve her English, but remained concerned that her words could cause misunderstandings and confusion among team members. Her teammate, Eugene, feared a personality clash between him and Amber. Charles from team Vega pointed out lack of motivation as a possible source of conflict. He explained that the team lacked motivation to go deeper and focus on the core of the project. The team members definitely did not have a realistic idea of what they delivered versus what they were supposed to do. Italia from team Sun found her teammate Luke hard to understand. It was not so much because of English language proficiency, but more because of his communication style. Italia went further by explaining that Luke did not use linking statements and jumped directly into the contents without introductory statements. His style of communication was very distressing to Italia, as he was not as straightforward as she was used to (or as she wanted him to be). She believed that this was a major source of tension during team meetings. Italia was unsure whether gender was an issue, as well. She expressed her concern that Luke could feel overpowered by two women who knew each other well and who took other courses together. Luke, on the contrary, would not agree. He stated feeling comfortable with Italia 'running the show'. But he also agreed that if he had had time the situation would have been different because he would try 'to take the control in [his] hand'. Here is an example of what he meant by 'taking the control':

When we meet there is an agenda… . So I didn't try to dominate the agenda but if I come to the group meetings much more prepared… , that's when you have more opportunity to intervene. So since I didn't do that, I mean if you don't do that you don't have any right to guide the project any way you want… . it's how much time you spend and effort you put on some of the things… and then if you explain the rationale to the other people in the meetings… you are kind of directing the project in your way. So I didn't do that because I wanted to finish this project as soon as possible and if it was a decent thing I was fine with that. The other thing is because it wasn't related with science education. Things would be different if the project was in my field of expertise [*sic*].

As the project evolved, a shift from people-oriented to mainly project-related sources of conflict occurred. Different sources of conflict were identified: (1) project deadlines, (2) expectations about the final product, (3) criteria regarding the quality of project deliverables, (4) instructional design elements, (5) instructional theory selection and (6) technologies usage.

According to Charles from team Vega, the team definitely had less conflict by the end of the project. In his interview he explained that in the beginning they were overloaded with the amount of work they were expected to do and were very conscious about the differences among them, but as the project evolved their focus shifted to the project itself. For his teammate, Debra, 'trying to come up with one unified ideal of how the project should go' was the main source of conflict. In her opinion, it was very hard to take four different people and try to make them all think in one way. She believed that bringing things together into a coherent project was the hardest part of working in team Vega. The challenge was defining exactly what to do using a single model with which everyone would agree instead of having to deal with four different points of view. She mentioned that a task as simple as choosing the font type and letter size would lead the team to endless discussions. Thomas referred to similar project-related issues. For him, the main source of conflict was the choice of which instructional approach to follow when designing the instruction. The team was torn between a step-by-step approach and a more loosely structured one, and they had a hard time making a final decision. Tasks at hand and decisions related to the project were certainly team Vega's main sources of conflict as the project progressed.

Close to the project's completion, Eugene observed that most of the disagreement in team Capella was generated by conflicting views of what the final product should look like. He gave this example:

Amber wanted an indestructible workbook and I wanted a readable one. So our conflict basically boils down to almost exclusively to when two competing criteria get in the way. It either has to be durable or it has to be cheap.

Amber, from team Capella, also admitted that some tension in the team was created when deadlines were near and fear of missing them would take over.

Surprisingly, gender, age group, life experiences, ethnicity, language and national culture differences were not overtly reported to be sources of conflict throughout the entire length of the project. It was assumed that these would have been important causes of persistent disagreement as a result of the heterogeneity of the sample. It seems that as work progressed on the project, teams became more focused on the project itself, and thus were less conscious of their personal differences. At this point the differences themselves were not enough to cause conflict.

An important lesson learned was the emergent need for the teams to learn how to work together. When interviewed, Eugene from team Capella was the first to mention how important the practice of 'teamness' was to his team's success. For Debra, from team Vega, knowing what she could expect from everyone on the team was crucial. The only way to achieve that objective was by working together as much as possible. By doing so they would learn each other's strengths and weaknesses and better manage the group's resources. She strongly believed that only by 'working together' would they be able to overcome their biggest challenge, which was to 'sit down and come up with just one

route on how to carry out this project that we all feel comfortable with, instead of four different routes'. Daisy shared Debra's desire that team Sun would have developed a stronger sense of 'teamness'.

By providing in-class time for working on projects, instructors can demonstrate how much they value not only the accomplishment of the class goals, but also the importance of the teams' development and practice of 'teamness'. Particularly when learning how to work in teams is a course objective, instructors can create additional opportunities for social interaction. For instance, some activities on team building conducted during class time could benefit teams by offering additional occasions to get to know each other.

*Conflict management strategies evolved as the project moved ahead*
Team Capella's strategies of handling conflict evolved over time, shifting from accommodation and compromise to compromise only. Eugene, Amber, Hannah and Eli strived to find a middle ground where everyone was comfortable when dealing with disagreement. Even though accommodation was Hannah's first mode of managing conflict, she became more assertive towards the end of the project and was able to get her points across. In spite of her frequent silence during group meetings, Hannah was prolific in email. She was always the first to reply and to send out updates on the team's progress. She used a very amiable tone, her discourse was friendly and she often used symbols with her words (eg, ^_^) in an attempt to communicate more meaning.

A totally different situation characterised team Sun. Although Italia's prior work experience has not been reported by her team members as a major cause for conflict, since the first meeting, Italia stood out as the team leader because of her personality and experience. An ongoing tension between Italia and Luke was a reality throughout the project. Teammate, Daisy acted as mediator by bringing compromise as an alternative form of handling conflict. Nevertheless, Italia's dominance and Luke's avoidance and accommodation persisted. By seeming to agree, Luke would at the same time exhibit passive-aggressive behaviours towards Italia. As Murnighan and Conlon (1991) explain, avoidance invites 'the side effects of repressed conflict' (p. 170). Luke felt somewhat deprived of his influence and his contributions to the project and so he surreptitiously resisted Italia's style by adding confusion. Luke's accommodation to Italia's ideas was not a result of his trying to satisfy her concerns, but more a way to quickly avoid overt confrontation with her.

In contrast, Team Vega's members started out handling conflict by using predominantly uncooperative strategies (avoidance and competition), but close to the middle of the project, disagreement began to be managed by integrating every team member's wants and needs into a unified solution. As Joanna explained, it took 'a lot of energy, a lot of perseverance'. She saw the value of the shift, however, explaining:

It was an important exercise to go through so that the team would learn how to listen to each other, look for pros and the cons, and see how things relate to other parts of the project. And at

the end we somehow reach a decision somewhere in the middle. We keep on shaping it until everyone has kind of a share. We negotiated everything in cycles.

Charles' perspective on managing conflict also evolved from this experience. He showed more willingness to listen and understand what others had to say. It was clear that his views on managing conflict began to change. He no longer believed that 'pounding heads' and refusing to work around difficulties were acceptable options for handling conflict. Joanna added that at this stage of the team's existence everyone was willing to 'negotiate until they found something that would satisfy all'. As the group transformed into a cohesive and balanced team and reached maturity, their conflict management strategies also changed to more collaborative ones. Time helped team members become more tolerant towards each other's views.

Given the characteristics of the sample used in this study, more uncooperative strategies were expected throughout the entire project, for instance: (1) avoidance, especially from students from outside the United States who might be more evasive of conflict, seeing as they were working in an unfamiliar environment; and (2) competition/dominating involving national cultural preferences, especially between students from the USA and from other parts of the world. However, even though teams started out using more uncooperative approaches to conflict management, teams Capella and Vega were able to go beyond the contemplation of their differences and focus on what was really important, completing a high-quality project.

Resisting the postponement of problems and instead clarifying any misunderstandings as soon as they set in was a common recommendation across all teams. Additionally, doing so face-to-face seemed more successful than leaving conflict to be dealt with via email. Whenever disagreement occurs in class, instructors can use these situations to model conflict management and act immediately on any argument.

*ICT used to support teamwork*
When Forcheri, Molfino and Quarati (2000) tested distance-collaboration tools in tertiary learners, they found that differences in the users' level of experience created obstacles to collaboration, as not all users were at ease with the use of these technologies. This seems not to be the case in this study. It was expected that, because all team members were highly proficient in using technologies, they would use technologies extensively. Surprisingly, the teams used email systems almost exclusively (with most of the teams using the discussion forum required for the course) to support teamwork, as opposed to instant messaging, shared group calendars or listservs. This situation might be a consequence of students' having gone through a rich, cross-cultural initiating experience, which caused a persistent sense of 'being overwhelmed'. Most of them had recently arrived in or had been relocated within the USA, and all were functioning in an unfamiliar programme. Additionally they were forced to engage in what Murnighan and Conlon (1991, p. 165) called an 'intense group experience'. They had to work with two or three people and coexist in a team throughout an entire semester in a graduate-level class. They also had to develop an instructional design project that would comprise

60% of their grade. In such stressful circumstances, participants chose to use technologies in an uncomplicated way. The team members used the technologies they found to be most useful for their immediate needs. Previous research has indicated that when technologies are easily available, they are not used at all or are only partially used, especially if designed 'to support interaction between people' (Andriessen, 2003, p. v), because people prefer to interact face-to-face when this option is available.

Because team Sun utilised more types of technologies and met face-to-face less often, their high levels of conflict were partially a result of the team's attempts to figure out how to use appropriate technologies to achieve their goals. Italia and Daisy used email extensively, as opposed to Luke, who did not. Comparing the percentage of emails exchanged by each member of team Sun, Italia and Daisy originated 84% of the total of the emails, while Luke only initiated 16% of them. This situation fuelled conflict within team Sun. Luke explained in his interview that he did not have time to read and reply to the ever-growing flow of emails sent by Italia and Daisy. As a consequence he was partially excluded from the team's communication flow. He argued that email should be used only for relevant issues on the project and not for trivial information.

Comparable results were found in a study on the role of ICT in promoting group skills development in graduate students (Baskin, Barker & Woods, 2005). The researchers concluded that 'while these [technologies] helped to centralise decision-making processes and exchange of ideas for students, none of these... seemed to directly support convergent group work processes across the sample' (Baskin *et al*, 2005, p. 19).

Allowing for different forms of participation was another important lesson learned by the participants in this study. Eugene admitted that in different circumstances he would have interpreted Hannah and Eli's silence during Capella's meetings as lack of interest or involvement in the project. However, he recognised that they had chosen to participate in a way other than speaking out. Their participation was more written, through the use of email and postings on the discussion forum. Thomas had the same experience on team Vega. The specific advice of his teammate, Debra, on this point was:

Don't forget that there are different styles of personalities some are quieter some are more extroverted. Make sure you listen to everybody and realize that they may have something to say... you may need to actually ask them, or discuss other alternatives of participation.

An important related recommendation was to take advantage of the different forms of participation offered by ICT. In addition to verbal communication, team members can express their ideas and opinions using visuals, graphics and extensive writing. Attending to other teammates' needs, and thinking of ways to involve quieter team members in the conversation, would make people feel more appreciated and willing to contribute to the project. The opposite approach would make some team members feel resentful and, to some extent, like outsiders. An atmosphere of resentment and disenfranchisement would make a team prone to conflict.

A search for balance between verbal and written participation in class is encouraged. Not everyone feels comfortable voicing ideas out loud in the middle of a group of people. By supporting alternative forms of participation in class, instructors can inspire teams to provide different forms of participation for their members.

*The role of ICT-rich environments on team conflict*
Given that the teams examined in this study (and their operating contexts), worked so intensely and closely for an extensive period of time, the use of ICT definitely played a role in the teams' ways of handling conflict. However, using Smith and Berg's (1987) assertion that 'group life is inherently paradoxical' (p. 62), that role was also contra-dictory in many instances. In these authors' paradoxical framework, a number of common threads in group dynamics are contradictory, such as the dilemma of the individual who seeks to preserve an identity that remains differentiated from the team while the team seeks to maintain a coherent identity in the face of inevitable turnover in membership, or how individual members find a voice to express themselves while the team as a whole has its own voice. Along this line of reasoning, technologies played a significant role (positive or negative) in managing conflict in some situations, and in other situations, performed no role.

In team Capella, conflict surfaced most often during face-to-face meetings and had its roots in differing views of how the project should look. The use of technologies played a minimal role in managing conflict, because most of the conflict occurred face-to-face and was managed immediately during their meetings. Technologies were not used to deal with Capella's disagreements.

In contrast, team Sun suffered intense conflict resulting from the use of technologies. The conflict stemmed not from the technologies themselves, but from the strategies of use defined by the team. Most of these strategies were prescribed and imposed by Italia and were not always fully accepted or understood by her teammates. Team Sun seemed unable to reach more democratic modes of figuring out how to use technologies to support their work.

Team Vega used technologies to reach consensus on task-based issues and left the relational issues to be handled during their meetings. When asked if email had served the team in terms of handling disagreement, Joanna answered that 'when there were problems between people caused by the project email didn't help. But when there were problems about the project, the media helped'. On an email sent to the team, Joanna asked exclusively project-related questions, as follows:

I have revised part I (instructor's materials), but still have some questions that I have marked in red. I have also included objectives. Do we need objectives? Are these different from purpose? What is the function of delivery information and guiding students? They sometimes seem to overlap.

Using technologies to deal with people problems was revealed to be ineffective. An example of this is when Joanna asked Charles via email if he could write team Vega's progress report given that he had taken extensive notes in their last team meeting. Charles replied:

Sure. I have all the time in the world, I'd love to do all the work and you all can just sit back and take the credit! That just sounds wonderful. Just kidding, it doesn't really sound wonderful, but I don't see why that wouldn't work. I can work on it tomorrow night when we are done with our meeting.

Joanna did not know how to interpret Charles's reply. She explained in her interview that, through email, it was impossible to see Charles's face and determine his true feelings. She was unable to make eye contact with him or attend to his tone of voice. None of these elements was present in the communication. She added:

So it was really how you interpreted it with respect to how you felt at that moment. So you could not say if they were being sarcastic or whether it was rude, whether it was really mean or offensive as it appeared on paper, or whether it was just humorous.

Because in the beginning of the project, team Vega was more prone to conflict, this episode added tension to a situation that was already stressful. At the start of the project, team Vega held frequent face-to-face meetings, which became less frequent over time. After practicing managing conflict face-to-face, Vega increasingly relied on email to move the project forward. Face-to-face meetings were used to make critical decisions and deal with relational issues, while logistic issues and routine tasks were handled via email.

In this study, although electronic communication could be a source of disagreement and disaffection in the team, without technologies the project's logistics would have been very difficult to handle. These technologies appeared to facilitate conflict management by: (1) offering a formal means of communication; (2) making communication more effective, with minimal waste or unnecessary effort; and (3) creating opportunities for more thoughtful reactions, with chances for reflection on the content. Team members who had difficulty with expression in English found email a particularly useful alleviator of conflict, as it offered a better chance to express themselves more clearly in English and at their own pace.

On the other hand, ICT also instigated conflict, specifically when strategies for use were imposed, when team members became blunt and forthright, and when misinterpretations occurred because immediate response was not always possible as a result of not everyone being a quick 'emailer'. For instance, email created an expectation that recipients would reply as soon as the message hit their inbox. However, this expectation was not always met, creating an opportunity for conflict. Additionally, many of the team members mentioned the lack of non-verbal and contextual cues in email as a source of misunderstandings.

A related source of frustration, particularly for team Sun, was the amount of emails sent by Italia, which decreased response from and encouraged skipping of information by her team members. Because it was easy to compose and send an instant reply, many emails were exchanged on trivial issues, which became overwhelming for team members, such as Luke, who were not so quick to respond to email. He constantly battled with feelings that he was behind and that something important was happening without his knowledge.

**Conclusions and practical implications**
This study exposes some of the limitations of ICT in supporting teamwork, especially in regard to conflict management. As Easterbrook (1995) stated, 'Many software products succeed not because they are designed to suit their users, but because the users can adapt to suit the software. The question, then, for groupware is whether collaborative work is equally adaptable' (p. 191). Even when teams had the option to meet face-to-face, they often had to deal with conflict and had to go through repeated failures and painful processes before they could settle their differences. An example of this situation is team Sun, in which under aggressive, cross-cultural leadership, dysfunctional processes were augmented by these technologies.

The following paragraphs report insights and suggest best practices that can be used by professionals working in or with teams in ICT-rich environments. These suggestions are derived from the key findings of this study and the lessons learned.

Most of the participants reported, in the studied context, that one of the lessons learned was 'to agree early on strategic uses of ICT'. Several instances of technologies usage creating conflict or adding tension to an already stressed team were identified. One example was the downloading and uploading of files on the discussion forum. The teams' specific recommendations on strategies for using technologies included:

- Be sure to upload only the latest version of the files. Create a routine with which everyone is comfortable.
- If using email attachments, keep a copy of the most recent version of any document. Also be aware that this practice will increase the flow of emails.
- Do not post files on the discussion forum and send them as email attachments as well, because it will make it difficult to locate documents when needed.
- Use bullet points in emails. Bullet points will keep email direct and to the point and will make messages easier to read.
- Keep a log of email correspondence. Careful logs can provide archives of ideas that can be used to bolster arguments if there is discussion among the team about a specific issue.

This suggests that instructors need to give students a detailed overview of the tools available to the class and share with them some guidelines (eg, 'tricks and tips') on how to use these tools. For instance, when presenting the discussion forum to the class, the instructor (as an experienced user) should have brought to the students' attention not only the potential uses of the electronic forum but also some of its limitations. This

overview could have given the students a heads-up on future problems with file management and could have saved the teams' time used in figuring out how to use it.

Another significant insight was the need to find work processes and strategies for using technologies that satisfied all members of the team. It was also important to reach consensus on these decisions and to be willing to make future adjustments. Instructors can advise teams to keep the process simple in the beginning, and add complexity later when everyone is feeling more comfortable with each another and with the project.

To look for consensus rather than to vote on important issues was another lesson learned. Unsolved issues can act as levers of conflict. If these are settled by voting, there is always an unsatisfied minority that can sabotage the project at any time. It is important to advocate consensus-reaching over voting as the major mode of decision making. Aiming for consensus prevents the recurrence of unsettled questions, and helps the team meet its goals.

Lastly, when making key decisions it was essential to use richer means of communication. If critical decisions need to be made and face-to-face meetings are not possible, richer communication tools (eg, web-based videoconference systems) can be used. These systems permit the inclusion of additional cues (eg, body language and context) that are important to communication, particularly when styles vary. After key decisions are made, the team can return to leaner media that use mainly text to communicate.

## Future research directions

By gaining a better understanding of how teams tolerate ICT and what roles these technologies play in team conflict, more effective strategies of use may be suggested. A natural line for future research is to consider more deeply how technologies can be used in collaborative situations, investigating not only the kind of technologies that are more suitable, but also the strategies of use that are more successful. Another possibility is to re-examine the role of ICT in team conflict management in the context of virtual teams, when opportunities to meet face-to-face are limited.

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