Virtual teams in higher education: challenges and rewards for teachers and students.
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Abstract
As virtual teams become more common in the workplace, a growing body of research has examined the factors critical to their success. Many studies have focused on practitioners or on students in business programs. This paper examines virtual team collaboration among technical communication students at the University of Limerick (UL) and at the University of Central Florida (UCF) in Orlando, Florida, USA. The paper describes the projects we have run, the technologies we have used, and the challenges and rewards of the experience for both students and teachers.

1.0 Introduction
Over the past two decades, advances in technology and the rise of technology-driven work practices have led to changes in traditional corporate structures. Many corporations now organise work “virtually”, independent of time, space, and organisational boundary constraints (Robey, Khoo, and Powers, 2000). In global virtual teams, members work on temporary projects with a shared purpose using communication technologies (Lipnack & Stamps, 2000; Robey, Khoo, and Powers, 2000; Suchan & Hayzak, 2001). Virtual teams facilitate information sharing and knowledge creation (Townsend et al, 1998). Moreover, because of their diversity, virtual teams tend to be more dynamic than traditional teams (Peters, 2003).

Many students who go on to work in the corporate world on graduation will at some point work in a virtual team, yet most study programmes do not prepare them for the well-recognised challenges posed by the process of virtual teaming. Referring to a collaboration between U.S. and Swedish students, Paretti, McNair, and Holloway-Attaway (2007) note that despite the technological sophistication of most students today, they are not prepared for the challenges of virtual collaboration. Students need instruction that “enables them to manage collaboration themselves” (p. 349).

Since 2006, the Technical Communication Section at the University of Limerick (UL) has run a virtual team collaboration project each academic year, enabling our students to work in teams with students of Technical Communication at the University of Central Florida (UCF). Each year, teams comprising students from each institution have worked virtually to produce content, such as web sites, brochures, and reports. They have used a variety of technologies (including videoconferencing and Virtual Learning Environments) and communication strategies, and have had to overcome the challenges of time and culture differences, and using lean communication media. Students have submitted reports or produced blogs reflecting on their experiences of the collaboration.

We have learned many lessons and received valuable reflective feedback from student participants. In this paper, we share our reflections on and experiences of setting up and running virtual team projects with an international partner institution. We begin by discussing existing relevant research on virtual teams. We then describe the projects we
have run with UCF over the past three years. The main challenges and rewards for students and teachers are discussed, and these are followed by conclusions and recommendations.

2.0 Literature Review
While virtual teamwork has significant benefits both for corporations employing virtual organisational forms and for individual teams and team members, there are well-recognised challenges faced by virtual teams. A significant portion of the research to-date has focused on understanding the process of virtual teaming and on addressing the challenges inherent in the process. Kayworth and Leidner (2000) suggest that the challenges faced by global virtual teams can be divided into four major areas: communication, culture, project management, and technology. These areas may interact with one another; for example, communication challenges may be related to cultural differences or to the use of computer-mediated communication technologies.

2.1 Communication and Culture
Aspects of communication and team process that have been studied extensively are interpersonal trust and group cohesiveness. Successful team formation is clearly related to issues of trust. Jarvenpaa, Knoll, and Leidner (1998) state that trust in virtual teams is related to members' perceptions of the ability, integrity, and benevolence of their team mates. Initial impressions of these qualities are likely to be developed during the team formation stage. Face-to-face meetings make it possible for team members to get to know each other on a personal level (Anawati and Craig, 2006). Sharing photographs and personal information on a blog also helps to develop a shared team culture (Andrews and Starke-Meyerring, 2005).

Knowledge sharing and other communication issues can be complicated by cultural differences among team members. National culture has been found to affect interaction in virtual teams (Tan et al., 1998; Maznevski and Chudoba, 2000; Robey, Khoo, and Powers, 2000). Vogel et al. (2001) found that those student teams who were particularly attuned and accommodating to aspects of national and professional culture had the most successful outcomes. However, diversity in virtual teams is not limited to differences in national culture. While some early studies found that status effects were reduced in virtual team interactions (Sproull and Kiesler, 1986; Dubrovsky, Kiesler, and Sethna, 1991), other more recent studies have found that virtual groups recreated social hierarchies in an attempt to preserve status differences (Owens, Neale, and Sutton, 2000; Cramton, 2001). Gender differences also have a bearing on virtual team interactions. Both Savicki et al. (1996) and Lind (1999) found that women were more satisfied with their experiences in virtual teams than were men in the same teams.

2.2 Project Management
Other research has examined leadership in virtual teams. Hambley, O’Neill, and Kline (2007) conducted comprehensive interviews with nine virtual team leaders and members from six different organisations. The findings from their study suggest that “leadership is critical in virtual teams”. Leaders must finds ways to create group cohesiveness which is linked to a number of positive outcomes in virtual teams including enhanced motivation,
more open sharing of information, and increased member satisfaction (Bouas and Arrow, 1996; Warkentin and Beranek, 1999). Chase (1999) notes that to establish positive team relationships, leaders must be vigilant in order to catch early signs of problems within the team since communication breakdowns may go unnoticed for a longer period of time in a virtual environment. Another important consideration when studying virtual team interactions is that relational intimacy may take longer to develop in virtual settings than in face-to-face collaboration (Chidambaram, 1996). Therefore, team leaders must find ways to structure interactions and motivate supportive team member relations from the inception of the collaboration.

Another aspect of leadership that has been examined is the role leaders play in selecting and using communication media. It is important for leaders to recognise the abilities and limitations of various technologies when selecting media (Larbi and Springfield, 2004). Rich media communication technologies are not always available to team members and even if they are, they might not possess the necessary skills to use those technologies successfully.

2.3 Technology
Most virtual teams use a combination of technologies to communicate with one another, make decisions, exchange data, and engage in social interaction (Sivunen and Valo, 2006). Typically they will use both synchronous (e.g. videoconferences, conference calls, and chat) and asynchronous (e.g. email and group support software) communication media. Baskerville and Nandhakumar (2007) state that long-term, or perpetual, virtual teams also need to “assemble geographically for establishment or reinvigoration of personal trust” (p. 20).

Those technologies that allow for immediate feedback, nonverbal cues, and personalisation are categorised as rich media. Videoconferencing is often used for team kickoff meetings when it is not possible to arrange a face-to-face meeting of team members. However, the quality of videoconferencing systems can make them little better than conference calls for conveying a real feeling of social presence (Anawati and Craig, 2006; Grosse, 2002). Conference calls give team members the ability to participate from virtually any location via mobile phones. Although there are no visual cues, conference calls do give the participants the ability to hear vocal cues such as tone of voice.

Although it is not a rich media technology, email is frequently the communication medium of choice for virtual teams. Grosse (2002) reports that the global executives she surveyed used email for approximately 75 to 80 percent of their communication. Email has several advantages for communication, particularly in international teams. When communicating via email, team members have more time to edit their messages, and therefore, it is easier for individuals who are not using their native languages to communicate clearly with one another (Warkentin, Sayeed, and Hightower, 1997). Further, the lack of nonverbal cues and the resulting social distance may be desirable when handling negative feedback from a leader to a team member because it allows them both to take time to consider how best to express themselves (Sivunen and Valo, 2006). Sole and Edmondson (2002) have argued that rich media are not necessary for the
exchange of social information. They state that teams can develop social relationships and exchange information just as effectively using lean media, but that such social relationships will take more time to develop than they would using rich media.

Our study examines virtual team collaboration among technical communication students at the University of Limerick (UL) and at the University of Central Florida (UCF) in Orlando, Florida, USA. The paper describes the projects we have run, the technologies we have used, and the challenges and rewards of the experience for both students and teachers.

3.0 Our Projects
We began our collaboration following a meeting with Professor Madelyn Flammia, a UCF technical writing professor, in 2005 at the International Professional Communication Conference in Limerick. Before running our first virtual team project, we spent a year communicating by email and on online telephony. During this time, we shared journal articles and other resources on virtual teams, and planned how we could schedule and run a project which would be appropriate for the learning outcomes and content of all our modules.

3.1 Project Descriptions
Our first project ran over an eight-week period in the autumn semester of 2006. Seven teams of three to four students, each comprising students from UL and UCF, designed web sites about aspects of intercultural communication. The 16 UL students were postgraduates, taking either a Graduate Diploma in Technical Communication or an MA in E-Learning Design and Development. The ten UCF students were senior-level undergraduates majoring in English/Technical Writing. Although the UL students were at postgraduate level, they came from a variety of interdisciplinary backgrounds, and did not have advanced expertise in Technical Communication. In this and all subsequent iterations of the project, to the greatest degree possible, we tried to ensure a balance of gender and location in each team. The virtual team project accounted for 50% of the total available marks for the module. In addition to the web sites (worth 15%), teams also had to produce an initial project proposal (10%), and in the third week a progress report (5%). Students also produced an individual wrap-up report (15%), describing personal experiences of and contributions to the project, and reflections on virtual teamwork. On the final day of the project, each team had to give a videoconference presentation (5%).

Our second project, in the autumn semester of 2007, was more ambitious: we organised a client-based virtual collaboration, over 10 weeks, involving 18 students (six from UL and twelve from UCF), worth 70% of the total available marks for the module. The brief was to produce a web site and three programme brochures for the University of Limerick’s graduate programs in Technical Communication and E-Learning. The large team of eighteen students was divided into four sub-teams, to design top- and programme-level web site content and brochures. One team was responsible for design, editorial work, and project management. Again, each team comprised both UL and UCF students. In addition to the final content (worth 25%), students were graded on an initial project proposal (10%), participation in and records of meetings (10%), professionalism and
participation in videoconferences (10%), a documentation project log (5%), and an individual wrap-up report (10%).

In the third project, which ran in the spring semester of 2009, we scaled back the requirements significantly, because the previous year’s expansion had proved extremely complex and difficult to manage for both the teachers and students. For this project, each team wrote a research report about collaborative technologies they had used. We graded students on the content (10%), and presentation (5%) of the report, and on their professionalism and participation in videoconferences (5%). Although students did not produce an individual report this time, the Irish students wrote about their experiences in a reflective blog, which they were required to produce for another assignment on the same module.

### 3.2 Technological Support

In the first and second iterations of the projects, students used the Sakai Virtual Learning Environment (VLE) to manage their teamwork. Within this VLE, we created team worksites, and a worksite for the whole group. Worksites function in a similar way to course or module sites in any VLE: each team had a set of tools (including tools for discussion, chat, and file sharing) in their worksite, which only the team and the instructors could access. Students participated in regular online discussions in Sakai during and outside of scheduled class hours.

Although the VLE was intended as a primary means of communication within the teams, students did have access to some rich media communication technologies. We organised for all students to attend two videoconferences, one at the start and one at the end of each project. The first videoconference gave teams an opportunity to "meet", put faces to names, and find out about each other. We set "ice-breaker" questions about experience of teamwork and collaboration, which all teams had to address during the first videoconference. During the second videoconference, teams presented their websites/brochures to other teams and their instructors. Additionally, students were encouraged to use online telephony software, such as Skype. While we hoped that students would use the VLE for most verbal communication so that we would have a record of their collaborative strategies, many teams also used email extensively. Grosse (2002) notes that email is the communication tool of choice in many virtual teams.

In the third project, students were free to use any collaborative technologies they chose, and since they were researching collaborative technologies, we encouraged them to explore the myriad options available. We also created a Sakai team worksite for any team that requested one. In addition, we organised three videoconferences. In the first videoconference, we introduced ourselves and the project, while students introduced themselves and met their team members in the second. In the third, students reflected individually on their learning experiences in front of their peers.
4.0 Challenges and Rewards for Students

Over the past three years, students have reacted positively overall to these projects. In individual and group reports, as well as in oral presentations, many of them commented on how invaluable the experience was.

Some aspects of the projects that students found particularly rewarding were:

- Working in teams with colleagues located in geographically-dispersed locations. As mentioned previously, some of the students were undergraduates, so their work experiences to-date were limited. However, even those who had extensive work experience did not necessarily have any experience working with colleagues in remote locations. By the end of the project, they were all acutely aware that they would probably have to work in virtual teams in future and that this experience would stand to them when seeking employment.

- Working with various new technologies. Many of the students commented that they found the videoconferences, in particular, quite intimidating at first, especially as they had to cope with using the technology for the first time, seeing themselves on a large screen, and meeting new teammates. However, by the end of the project they said they would be less intimidated in future. Also, even though many of them already used synchronous technologies such as online chat for social networking purposes, they realised that chat can be used effectively for work-related purposes also.

- Working remotely to produce so many deliverables in a relatively short timeframe. Many students were intimidated at first by the project deliverables but all expressed delight on completion of the projects, particularly within such a short timeframe and whilst undertaking other modules at the same time.

- Successful work relationships and friendships which formed due to socio-emotional communication. Teams which used humour and social, non-task communication from the outset tended to have more rewarding and satisfying experiences than teams who only focused on the tasks at hand.

Students also encountered many challenges, such as:

- Uncooperative and non-participating team members. Whilst the majority of students became actively involved from the outset, one or two students dropped out each year. Because the groups typically only had three or four members, losing even one team member had a significant impact on the teams involved, especially if it resulted in only one member on one side of the Atlantic with two or more on the other side. However, the teachers adjusted the workload accordingly to ensure the teams concerned did not suffer because they had fewer members. Some teams also encountered problems with domineering team members, who assumed leadership roles and created unpleasant experiences for some of the other team members. Such personality clashes can, of course, be a feature of both face-to-face and virtual teams.

- Life and work experience gaps. Even though the Irish students were postgraduates, most of them had little or no experience of web design, technical communication, or virtual team collaboration. We made it clear from the outset that all the students had broadly similar skill sets to achieve the project deliverables, but nonetheless, some of the US students said they felt a little intimidated by the older, more experienced Irish students.
• Technology issues. Students encountered numerous problems with the technologies, such as delays in synchronous conversations (online chat was cumbersome at times), dropped Skype connections, software incompatibilities when sending drafts of deliverables from one to another, and so on.

• Time differences. We scheduled weekly classes to ensure the US and Irish students had dedicated class-time to work on assignments, but the students also needed to collaborate outside of class time. The five-hour time difference meant that the Irish students often had to work late at night to facilitate the US students, many of whom also held part-time jobs in the evening.

• Cultural and socio-emotional communication differences. Whilst there were no major cultural differences between the Irish and US students, it did take students a while to get used to subtle cultural differences, such as the Irish sense of humour. Also, there were subtle differences in terms of attitude to work, which some students found frustrating; it seems that the age and experience gaps were the main causes of these problems.

5.0 Challenges and Rewards for Teachers

These projects have been very rewarding for us as teachers. We have been able to use exciting and innovative new technologies in real-world contexts. We have used videoconferences, VLEs, blogs, wikis, and online telephony software. We have also learned first-hand, and given our students first-hand experience of, the differences between lean and rich communication media. The project has cemented students’ understanding of many theories of new media communication. In addition, the project has enabled us and our students to explore the differences and similarities between US and Irish cultures. Some of these differences, such as time zones and orthography, are relatively simple to negotiate; others, such as work ethic, are subtle and require more thought. Finally, we have also learned a great deal from our collaborator, Professor Flammia. She has been especially helpful as a research mentor, enabling us to more actively gather and publish data about our pedagogical endeavours.

From the project we have learned many valuable lessons which we share here for the benefit of instructors interested in setting up a collaboration project with an international partner. In our experience, it is important to:

• Spend time planning the collaboration. We spent almost a year communicating with Professor Flammia, sharing resources and ideas, before we ran our first virtual team project. This lead-in time enabled us to get to know each other, to explicate our goals and to iron out any potential problems. In addition, for each subsequent iteration of the project, we spent several months planning before the projects actually commenced. This was necessary to ensure we learned from previous successes and failures.

• Select programmes and modules where learning outcomes and content are broadly similar. Also examine the calendar of the collaborating institution to ensure the project timeframe is feasible. The UL calendar changed in 2007: we now begin our semester in the second week of September. This change has enabled us to align our projects better, since our calendar is now closer to the UCF calendar. The first year,
we found that we had a limited overlapping timeframe which placed additional stress on teachers and students.

- Decide how to record data about the project, if research and publications are an objective of the pursuit. We surveyed students before each virtual team project, about their use of technologies and their experiences of working in virtual and face-to-face teams. We also gathered data from the discussion and chat forums in Sakai, and from individual reports and blogs produced by the students.

- Strive to create simple projects. Our second project was extremely complex. The two UL faculty members had to deal with the teams as a) clients, and b) teachers, which made the project very time-consuming. We had to be very specific about our requirements for the redesigned site, as well as the requirements for the project as a whole. Simpler projects run more efficiently, allow more time and scope for interaction with students, and are easier to manage.

- For large-scale projects, provide students with clear and detailed guidelines, so they know exactly what is required of them. In the first project, individual students regularly contacted the instructors for guidelines, which led to duplicated efforts and time-wasting. In the second iteration of the project, we provided students with detailed instructions on how to write a proposal, how to plan and prepare for meetings, how to record minutes, and how to behave in a professional manner. However, because the third project was much smaller in scope, we did not need to provide as many guidelines.

- Strive to allocate a roughly equal number of students from each location. In our 2007 project, there were twice as many UCF as UL students, which made the job of organising students into teams difficult. It also affected the overall dynamic of team communication, since some teams had more UCF students. Through all our projects, our most successful teams have been balanced in terms of location, gender, and levels of life experience.

- Organise teams according to the strengths and weaknesses of members, where possible. We tried to ensure that there was a balance of technological, leadership, and writing and design skills on each team. However, adequate information about the strengths and weaknesses of team members was not available in all instances.

- Schedule “face-to-face” meetings, using videoconferencing technologies for example, early in the project. As mentioned previously in the literature review, experts on virtual teamwork agree on the value of face-to-face meetings for development of strong trust and an effective team process.

- Arrange to meet the project partner(s) as the collaboration progresses. We presented work about our project with Professor Flammia at a conference in Montréal, Canada last year. Meeting Professor Flammia again (following three years of communicating virtually) gave us all the opportunity to reflect on our progress, renew our commitment to the project, and plan for the future. Baskerville and Nandhakumar (2007) state that long-term, or perpetual, virtual teams need to “assemble geographically for establishment or reinvigoration of personal trust” (p. 20).
6.0 Conclusions and Recommendations
Overall, the three iterations of the project from 2006 and 2009 were very successful. Even though the requirements of the three projects varied greatly, all the students learned how to work remotely with peers in other countries, they learned how to use new technologies, and they learned how to behave in a professional manner to produce several deliverables in a short timeframe. In addition to the many rewarding outcomes, students also encountered many challenges, such as problems with uncooperative team members, problems with technologies, and perceived life and experience gaps.

The teachers also benefited greatly from the projects. In particular, we learned how to work remotely to plan large-scale projects, we learned how socio-emotional communication and trust are critical components of successful virtual team relationships, and we learned about team dynamics. For example, we found that the teams that divided the project roles based upon the team members’ individual strengths had greater satisfaction with the team experience than those that did not. We also learned that rich media are not always necessary for success in virtual teams; lean media can be sufficient provided the other aspects such as group cohesion, trust, and member satisfaction exist.
References


