

Developing Strategies for Success in a Cross-Disciplinary Global Virtual Team Project: Collaboration among Student Writers and Translators

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Abstract

This article reports on a qualitative study of strategies and competencies used by technical communication and translation students to address challenges inherent in global virtual team collaboration. The study involved students from three universities collaborating in virtual teams to write and translate instructional documents. Qualitative content analysis of students' reflective blogs and team transcripts was used to examine their experiences while collaborating.

Students faced challenges related to communication, leadership, and technology, and developed various strategies to address those challenges. Although the students did not face cultural challenges, they reported increased awareness of cultural issues. Students also reported that the project helped them better understand the workplace and define career goals.

Keywords: global virtual teams; cross-disciplinary; collaboration; technical communicators; translators; documentation; students.

Introduction

In the global workplace, technical communicators are frequently required to write documentation that will be translated and to work with colleagues who are translators. It is important that technical communication students are prepared for the challenges of working with translators, and it is equally important that students studying to become translators are well equipped to work with professional writers.

Faculty members in many disciplines recognize the importance of preparing students to participate in cross-disciplinary virtual teams. This article describes a global virtual team collaboration among students at three universities—teams of technical communication students from University A and University B and translation students from University C—who worked together to write and translate instructional documents. This article examines the challenges the students encountered, the strategies and competencies they used to address those challenges, and how satisfied they were with their team’s collaboration. Following a review of relevant literature on the challenges associated with virtual collaboration generally and on the key competencies needed by writers and translators working in global virtual teams, we describe the methodology used to gather and analyze data during two iterations of the documentation and translation project. We then present our findings, drawing on evidence from students’ reflective blog entries and team transcripts. Finally, we offer conclusions, outline other possible applications of this study, discuss the limitations of the study, and make recommendations for future research.

Literature Review

The body of literature on student virtual teams is extensive. Researchers have examined many aspects of virtual collaboration among student teams:

- **communication strategies**
- **the formation of trust**
- **leadership**
- **technology selection and use**
- **the role of culture**

Robey, Khoo, and Powers (2000) stated that the challenges faced by virtual teams can be divided into four broad categories: communication challenges, technology challenges, leadership challenges, and cultural challenges. Using those four categories to organize our review, we examined recent research on student virtual teams to determine the strategies students can use to address the challenges they face. Then we narrowed our focus to the unique challenges inherent in collaboration among student writers and translators.

Communication and Trust

Research on communication within student virtual teams has demonstrated the need for teams to engage in both task-oriented and social communication early in the life of the project (Cogliser et al., 2013; **Brewer, Mitchell, Sanders, Wallace, & Wood, 2015**). Socioemotional communication plays an important role in the success of virtual collaborations (Connelly & Turel, 2016; Flammia, Cleary, & Slattery, 2010). Predictable communication involving substantive responses is positively correlated with the development of trust within virtual teams. Student teams face many of the same challenges as teams in the workplace, one of which is the need to develop swift trust in order to complete a project in a compressed time frame. Williams notes that members of virtual teams in the workplace form swift trust by “focusing on tasks and actions rather than relationships” (Williams, 2010, p. 102).

Many researchers have linked the development of swift trust with the success of global teams (Iacono & Weisband, 1997; Jarvenpaa, Knoll, & Leidner, 1998; Robert, Denis, & Hung, 2009; Walther & Bunz, 2005). Crisp and Jarvenpaa (2013) examined the role of swift trust in the performance of 68 student teams with culturally diverse members and noted that the formation of swift trust helped the teams “engage in normative actions that in turn [made] trusting beliefs resilient and positively impact[ed] final performance” (p. 54).

Effective communication is essential to the success of student virtual teams. **In a study of cross-disciplinary student virtual teams, Brewer et al. (2015) found that communication among group members helped the students gain a better understanding of their project. Students are more likely to share knowledge with and value the opinions of teammates who have established credibility. St.Amant (2002a) states that individuals can create an online ethos by responding to postings in a timely manner and by using humor. The development of a positive online presence can foster greater trust and enhance the success of student collaborations.** Killingsworth, Xue, and Liu (2016) discovered a relationship between the development of trust and the degree of knowledge sharing within student teams. They found that trust, enjoyment, and the perception of reciprocal benefits all fostered a positive attitude toward knowledge sharing among team members.

Leadership

Several studies have focused on the role of leadership in student virtual teams with a focus on the characteristics of those students who emerge as leaders and the leadership styles that prove most effective. Emergent leaders have superior communication skills and are perceived as good listeners by their teammates (Kayworth & Leidner, 2002; Ziek & Smulowitz, 2014). They are distinguished by the amount of knowledge they transfer and the significant contributions they make to the team project (Sarker & Schneider, 2009). The personal characteristics of leaders have also been examined including their cognitive ability, self-efficacy, and extraversion (Serban, 2015). In a study of MBA students, Lisak and Erez (2015) found the students who emerged as leaders possessed higher levels of cultural intelligence, global identity, and openness to cultural diversity than their teammates.

Studies comparing the transactional and transformational leadership styles have reported that the transformational style can inspire team members, enhance their creativity, and facilitate their engagement with the project (Chang & Lee, 2013; Fan, Chen, Wang, & Chen, 2014; Huang, Kahai, & Jestice, 2010; Purvanova & Bono, 2009; Whitford & Moss, 2009). Researchers have also examined the behavior of team leaders in terms of the frequency of their communication with the team and the tone of their messages; leaders who use empathetic language and who praise teammates enhance the creative performance of team members (Fan et al., 2014). Other studies have investigated the role of shared leadership in teams and its impact on member satisfaction and team effectiveness (Robert & You, 2013; Shuffler, Wiese, Salas, & Burke, 2010).

Technology

One important consideration when investigating students' use of technology in virtual collaborations is media richness. Although rich media may not always be necessary for effective communication among team members (Walvoord, Redden, Elliott, & Coover, 2008), it is important that students learn to choose the most appropriate media for various types of communication (Williams, 2010). Lean media like email are best suited to routine tasks, in situations where contextual cues might prove distracting, or in situations when unpleasant information must be conveyed (Berry, 2011; Lea, Spears, & Rogers, 2003). Rich media like video chats, on the other hand, are a better choice for complex tasks (Williams, 2010) or for relationship building.

Allowing students to select their own virtual communication tools is one factor that contributes to successful collaboration (Zaugg & Davies, 2013). The performance of student teams may also be affected by

- **bandwidth**
- **internet availability**
- **lack of training using the tools**
- **lack of technical support**

Weimann, Pollock, Scott, and Brown (2013) discovered “that restrictions in internet access of even a single member within a team limited the team’s technological choices, which affected the team’s performance” (p. 332).

On an individual level, technology may enhance the participation of some students while it may restrict the engagement of others. It is sometimes noted that students who are shy in face-to-face encounters may be more comfortable, and therefore, more outgoing, in computer-mediated collaboration (Berry, 2011). However, those students who experience computer-mediated communication anxiety may participate less and send fewer task-oriented messages; as a result their performance is likely to be rated poorly by their teammates (Fuller, Vician, & Brown, 2016). Cultural differences may also have an impact on the ways team members use technology to communicate with their peers.

Culture

A significant portion of the literature on student virtual teams has examined the challenges and benefits associated with cross-cultural collaboration. Such collaborations can help students develop the skills and abilities associated with global competence. For example, Erez et al. (2013) found that management students' cultural intelligence and global identity increased significantly as a result of participating in a four-week global virtual team collaboration, and the effect lasted for six months after the project ended.

Studies have also investigated the development of trust within culturally diverse virtual teams. Their findings, like earlier studies on trust (Cogburn & Levinson, 2003; Jarvenpaa et al., 1998), emphasize the importance of both social and task-oriented communication in establishing trusting relationships among diverse team members (Cheng, Nolan, & Macaulay, 2013; Flammia et al., 2010; Zaugg & Davies, 2013). Team members from collective cultures may be more comfortable and trusting in team settings than their colleagues from individualist cultures (Mockaitis, Rose, & Zetting, 2012).

Like professionals working in global virtual teams, students from diverse cultures may have different approaches to communication with teammates and with the team leader (Klitmøller & Luring, 2013; Lee, 2000; **St.Amant, 2002b**; Symonds & Stenzel, 2007), to knowledge sharing (**Brewer, 2015**; Rosen, Furst, & Blackburn, 2007), and to conflict resolution (Gallenkamp, Assmann, Drescher, Picot, & Welp, 2010) based on their cultural beliefs. They may also have different ideas about the appropriate way to establish a virtual presence. As **St.Amant (2002a)** has pointed out, "attempts to use humor, wit, and ostentatious behavior to create online-ethos may conflict with the communication expectations or the values of individuals from other cultures" (p. 204).

Cultural differences have the potential to interfere with the smooth functioning of the team and the successful completion of the team's project. They may also have an effect on team member satisfaction. For example, in a study of 141 students in 39 teams, Pazos (2012) found a complex relationship between conflict management, team goals, and team member satisfaction. Because the teams in the study were composed of students from diverse cultures, some team members preferred a direct approach to conflict management while others did not want to deal with conflict in such a straightforward manner. These differences influenced the team members' satisfaction with the experience.

Collaboration among Student Writers and Translators

Compared to the extensive literature on student virtual teams, there is a relatively smaller body of literature on collaboration among student writers and translators. Some studies have already provided valuable data on the benefits of collaborative projects that encompass students in both fields (Flammia, 2005; Flammia, 2012; Melton, 2008; Moustén, Maylath, Vandepitte, & Humbley, 2010; Starke-Meyerring & Andrews, 2006).

One challenge noted in collaborations among writers and translators is the tendency of students to wait until the draft of a document is complete before beginning to

communicate (Arnó Macià et al., 2013). Students must recognize the fact that writing and translation are no longer viewed as two separate processes (Melton, 2008). Writers and translators need to work together throughout the entire process from document creation to localization, and translation must be integrated in “the global information process” (Gnecchi, Maylath, Moustén, Scarpa, & Vandepitte, 2011). Faculty members in both technical communication and translation must help students develop the competencies they will need in order to play their roles in the global information process. Some studies of cross-disciplinary collaboration among documentation writers and translators demonstrate the fact that writers and translators need many of the same competencies and abilities in order to succeed. These competencies include cultural awareness and sensitivity (Mateeva, 2008; Wang, 2013; Yu, 2012), an understanding of contexts (cultural, professional, collaborative) (Melton, 2008), interpersonal communication skills, and the ability to bring both logical and creative approaches to the activity of text production (Dam-Jensen & Heine, 2013).

Key Competencies Needed by Writers and Translators

Intercultural knowledge is essential for both the creation and the translation of technical documentation; such knowledge is crucial because documentation “must take into account the cultural frame” of the audience (Ping, 2012, p. 20). Moustén et al. (2010) conducted a virtual team project in which technical communication students collaborated with translation students; they stated that “one of the main goals of the TransAtlantic Project [was] to heighten students’ awareness of cultural differences, starting with their own” (p. 406).

In addition to understanding the cultural context for documentation, both writers and translators need to be aware of the professional, social, and collaborative contexts surrounding the documents they are writing and translating. As part of the localization process, writers and translators may find themselves working with a team whose goal is to adapt an information product not only to a particular language and culture, but also to a particular disciplinary, social, or professional context. While the documentation they write and translate may be used to share information, it may also be used in the context of relationship building or training. Well-developed communication and collaboration skills are essential competencies for writers and translators working in global virtual teams. European projects such as the European Master’s in Translation (see European Commission (nd)) and the TecCOMFrame project (see TecCOMFrame (2016)) have identified competencies for translators and technical communicators.

To be successful, writers and translators must be able to build harmonious and effective working relationships with diverse others. Often these relationships must be established in a virtual setting and across national and disciplinary boundaries. Interpersonal communication skills are vital to the success of such collaborations. For example, Moustén et al. (2010) describe a collaboration between translation and technical communication students in which the students’ ability to gain the information they needed to carry out the project depended on “teamwork, trust, and personal relationships” (p. 407).

Several studies have demonstrated the benefits of collaboration among technical communicators and translators (Cleary, Flammia, Minacori, & Slattery, 2015; Gneccchi et al., 2011; Mousten et al., 2010). The current study builds upon this research to further develop our understanding of the challenges inherent in such collaboration. The study also explores the strategies and competencies that students employ when they encounter such challenges.

The research questions we examined are:

1. Which challenges did technical communication and translation students encounter when collaborating in virtual teams?
2. Which strategies and competencies did technical communication and translation students employ to address these challenges?

Research Methodology

We begin this section by outlining the project and its participants, and offering an overview of the phases of the project. We then describe how the data were gathered and analyzed.

In Spring 2015 and Spring 2016, we coordinated collaborative documentation and translation projects. In each project iteration, student writers at University A and University B developed short instructional documents in English and student translators at University C translated those documents into (language). **During each iteration of the project, students maintained individual blogs reflecting on their learning experiences. Each team also had a project site (available only to team members and all the instructors), which was hosted on the University B Virtual Learning Environment (VLE), Sakai (known as PlatformName in University B). We encouraged teams to use this project site, or another tool of their choice, to collaborate with their teammates. We analyzed two types of qualitative data: students' individual blogs, and transcripts of all online communication among team members. The project received IRB approval at each institution.**

The blog posts represent the qualitative experiences of individual students. In their blog posts, students discussed:

- **Communication strategies and the tools they selected**
- **Leadership structure and the roles chosen by team members**
- **Challenges faced by the team members and the ways they addressed those challenges**
- **Their perceptions of what they learned from the experience**
- **What they would do differently in future virtual team projects**

The team transcripts outlined the strategies undertaken by team members to complete the project, the competencies that individuals within teams exploited and developed in order to complete the tasks they were assigned, and the solutions team members generated to respond to challenges.

Both data sources address the research questions and contribute to a fuller understanding of the challenges of this and similar projects, and the strategies and competencies that individuals and teams exploited to overcome the challenges.

Participants

Students worked in small virtual teams comprised of University A and University B technical writers and University C translators. In Spring 2015, a total of 62 students participated in 9 teams, comprising 38 technical communicators and 24 translators. Table 1 shows team compositions.

---insert Table 1 here---

In Spring 2016, a total of 54 students participated in seven teams, comprising 38 technical communicators and 16 translators. Table 2 shows team compositions.

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The University A students were senior-level undergraduates studying technical communication and very few had experience working in virtual teams. The University B students were all at the Master's level, studying technical communication and e-learning. Most had no knowledge or experience of these fields prior to commencing their program, and only a few had worked in virtual teams previously. The University C students were in a translation class, in the first year of a Master's degree. These students took mainly translation courses but also took a course in technical writing. The Applied Languages department at University C has two Master's degrees: one in translation and one in technical writing.

Students at Universities A and B received instruction on intercultural communication and virtual teamwork, while students at University C received instruction on intercultural communication only. There was no formal, standardized instruction for all students.

Project Phases

Each iteration of the project spanned approximately seven weeks and comprised two phases: a writing-for-translation phase and a translation phase.

The writing-for-translation phase

During the writing-for-translation phase, each team of University A and University B writers wrote a short set of instructions in English to help a non-technical audience to perform a simple task using a collaborative technology. The writers (at University A and University B) and translators (at University C) were required to collaborate from the start of the project, when they brainstormed to choose a topic to document. Teams could either choose an original topic or select one from a list of examples, such as the following:

- How to create a Facebook account and modify profile or privacy settings
- How to use the Sakai wiki to collaborate on a document

- How to use Google Drive/Docs to collaborate on a document
- How to set-up email on a smart phone

Writers received writing guidelines, including the following:

- Write original instructions, which should be between 600 and 900 words in length.
- Write in the imperative, in short simple sentences.
- Use simple language.
- Write and design the instructions as though they will appear online.
- Define unfamiliar terms as needed within the body of the text.
- Format the instructions following accepted principles of document design, to make the instructional material usable and effective (including graphics, where appropriate).

We encouraged the writers to contact the translators throughout the writing process for advice about translation issues, such as terminology choices, localization of graphics, and writing style.

The translation phase

The translation phase of the project mirrored how the translation process should happen in professional environments. Once the University C students received the instructional document from the writers, they embarked on the process of translating it into (language). They had to organize their translation work within their own teams in one of the following ways:

- Each student translated the full document, and then all translators collaborated to revise it (students were advised to adopt this strategy, since the document was not very long).
- Each student translated part of the document, and then all translators collaborated to revise the document.
- Some students translated, and others revised, the document.

During the translation phase, translators could contact writers with queries regarding the source text. After the translation was completed, the writers and translators were encouraged to revise both the source and target texts based on what they learned from their collaboration.

Data Collection and Analysis

The research paradigm used for this project is an unobtrusive ex-post facto content analysis of two data sources: individual reflective blogs and team transcripts. **These sources enabled us to explore the challenges, strategies, and competencies that technical communication and translation students encountered. The instructional documents that students wrote and translated in teams were not used as data sources, because they did not include reflective components or discuss qualitative experiences, and therefore did not address the research questions. All students**

maintained individual reflective blogs or journals. Students were required to reflect on their experiences through blogs, because reflection is an important part of the learning process. For the reflective blog, students could use whichever blogging tool they preferred. Students had to post at least two entries every week for the duration of the project.

Each team had its own Sakai project site, accessible to team members and instructors. Each project site comprised tools such as a discussion forum, chat room, and file sharing repository. Although teams could also use alternate tools for collaboration (e.g. Skype for videoconferencing, Google Docs for sharing files, or Facebook for updates), they were required to document each tool they used and to grant the faculty members access to those tools or to provide a transcript of their collaboration. Teams used these tools to collaborate on all aspects of the project. Therefore, the type of information collected in each team transcript varied from team to team.

The approach to content analysis was first piloted in 2006 and has been validated annually since then. The blogs and transcripts constitute the qualitative dataset for the study. Therefore, the data and their treatment follow the norms for qualitative inquiry. Qualitative data gathering and analysis is commonplace in studies of global virtual teams (see Cleary et al., 2015; Flammia et al., 2010; Klitmøller & Lauring, 2013; Weimann et al., 2013, for example).

At the end of each project, the faculty member at each institution saved a record of the individual reflective blog postings and team transcripts, for the students in her institution. We then agreed on research questions that formed the basis for analysis. Next, we agreed on categories to analyze; categories included challenges, solutions, collaboration, satisfaction, culture, technology, communication, leadership, strategies, and lessons learned. These categories were derived from the literature and the research questions. We analyzed the data initially through immersion in the dataset. The four authors coded data from the individual blogs and team transcripts. Two of the four authors reviewed the coded content. The four authors then reviewed the final categories, and, through an iterative process, organized the data according to the research questions. For each research question, four main themes were analyzed: communication, culture, technology, and leadership. Other than data regarding team composition at each university, we did not collect quantitative data.

In the next section, we present the findings of our analysis, using direct quotes from transcripts and blogs to illustrate patterns in the data. Quotes are included from University A, University B, and University C students. We have used a coding system to protect the anonymity of individuals (e.g. A1, B1 and C1). Quotes are coded and included from students in each university to increase trustworthiness and validity of the data (Hughes & Hayhoe, 2008).

Results and Discussion

This section presents the findings from two iterations of the virtual team project among students at the three universities. This section organizes qualitative data about students' perceptions of their experiences according to the research questions for the study.

RQ1: Which challenges did technical communication and translation students encounter when collaborating in virtual teams?

Virtual teams frequently report challenges that map to four themes, as summarized in the literature review: communication, leadership, technology and culture (Robey et al., 2000). The literature on collaboration among technical communicators and translators points to further challenges, specifically regarding the need to understand contexts (cultural, social, professional and collaborative). In addition, technical communication and translation students working in collaborative projects need very strong interpersonal skills (Mousten et al., 2010). This section discusses the challenges reported by our students.

Communication

At the beginning of the project, the teams frequently experienced challenges related to communication. The following quotes indicate communication challenges experienced in the early stages of the assignment:

It has been difficult getting our team members to contribute to the forum and to offer suggestions. I see one of our team mates has posted their opinions, but other than that, it feels like one way traffic. (B5)

The technical writers have met some trouble while trying to define a working schedule. Because of the time zones and everyone's daily tasks (lessons, work, internships...), it's been hard to carry fluent and rapid conversations until now. They're now spending much energy to set a regular time slot that could suit everyone. (C1)

These communication challenges interact with technology challenges, since part of the issue for some teams was deciding, and agreeing, upon which tool(s) to use to communicate.

Similar to findings by Gilson, Maynard, and Bergiel (2013), many students in our projects did not foresee communication challenges, as evinced in the following quote:

This collaborating with students on different time zones is harder than I thought it was going to be! so do we still push ahead with Instagram or do we wait until we can get talking to XX and everyone else again? (B7)

Leadership

Much research indicates that teams with strong leaders perform better and are more cohesive than teams without leaders (Flammia et al., 2016). We did not require teams to assign leaders for these projects. While leaders emerged in some teams, other teams noted that they did not have a leader, and faced consequent challenges:

For one, a team leader should be selected at the beginning of the project. I felt we lost time being polite and shy to begin with and that attitude got us nowhere with deciding a topic for the project. . . . But I do think an assigned team leader to finalise decisions would have been a great addition into the running of the project. (B7)

Without a team leader, we struggled for a topic, to come up with roles, and to abide by deadlines. (B10)

In a previous iteration of this project (see [Retracted]), we found that teams with leaders performed better than teams with no assigned or emergent leader. For future similar projects, particularly where students are based in three locations and grappling with time and cultural differences, we will encourage all teams to assign a leader in the first week of the project. An alternate approach, recommended in the literature (Robert & You, 2013; Shuffler et al., 2010), is to encourage shared leadership in teams.

Technology

In these projects, each team had an option to use either a Sakai team site (accessible to the team and instructors), or alternative collaboration tools. One of the objectives of the project was to develop students' ability to use collaborative tools, because such tools are commonly used in virtual teams in the workplace (Flammia, Cleary, & Slattery, 2016) and to help them develop confidence when choosing appropriate technologies. However, the variety of options for collaboration may have been overwhelming for some teams, as exemplified in the following comment:

. . . . our group had minor issues with [one] team member [not] communicating on the same platform. It didn't hinder our progress, but we wanted to be inclusive and make sure everyone was able to give their input and be involved. As for organizational skills, our entire group had issues with revising and saving versions of the document in Google Docs. . . . (A6)

Furthermore, as English language proficiency varied among team members, some students may have been more comfortable using asynchronous technology (e.g. email) rather than synchronous technology (Riopelle et al., 2003) but may have been reluctant to say so.

Culture

Students did not report challenges related to culture in either blogs or team transcripts, possibly because they had received training in intercultural communication and virtual teamwork. The first language of the writers in University A and University B was English. University B students were also very familiar with [Retracted] cultural references, from television, cinema and social media, a factor that may have lessened cultural tensions.

University C students made an effort to adapt their communication style to match the style of students with whom they were working, particularly the professional writing

style used by English speakers. For example, they adapted greetings and used common abbreviations in messages and emails to ensure they were understood.

A further challenge, also documented in the literature (Arnó Macià et al., 2013; Melton, 2008), was that some students saw writing and translation as two separate processes. We emphasized the importance of collaborating from the outset. An important objective was to develop translators' understanding of the writing process and writers' understanding of the translation process. The great majority of University C students appreciated being involved from the beginning:

I also liked very much to be involved in the project from the very beginning, since we all chose a topic that technical communicators were going to document and we would have to translate. It was a very good idea and we, translators loved it. (C4)

However, some teams did not collaborate effectively in the early stages:

The University C students didn't come into the mix until we were finished with the English version, but when they did, they were eager to ask questions and make sure they were doing everything correctly. (A2)

For future projects, we will explore ways to facilitate greater communication throughout the project.

RQ2: Which strategies and competencies did technical communication and translation students employ to address these challenges?

Our second research question explores the strategies and competencies employed by students. The project was designed to engage students in activities that would replicate a workplace project, as recommended by Savery (2006). Moustén et al. (2010) highlight the importance of interpersonal communication skills for teamwork involving writers and translators. During the projects, students developed several of these skills, and an understanding of their importance. We were interested in exploring competencies and strategies examined in previous studies, but also competencies not discussed in the literature.

Communication

In some teams, writers and translators collaborated from the very start of the project, as recommended by Gneccchi et al. (2011). The following quotes describe the nature of this collaboration:

Our communication with the translators was from our first week. We discussed [the] format and [the] subject for our project.... We listened to their suggestions and we agreed that they would feel comfortable with the project subject, creating a WordPress blog. As the project progressed we checked in with the translating team each week to ensure that what we were producing was staying within the realm of what they felt comfortable translating. (A1)

After introductions, all technical writers got started with the stage 1 of their task: defining the object of the work, the schedule, the tools they'll use to share and coordinate the writing. Our University C team has actively taken part in the decisional process to define the object. (C1)

Once writers and translators started collaborating actively, they recognized the value of effective communication:

It was interesting to get feedback from the University C students which made our original instructions clearer and easier to translate. It was also good to have other people to bounce your ideas off when constructing the instructions and deciding what was necessary within the document, and what was not. (B1)

It is extremely interesting to be able to follow the inception and development of the document, since it helps give an insight on the writer's work, and we translators were aware of the ongoing project. We could then prepare ourselves much better for the translation phase. We could also ask questions on the ongoing document. (C2)

Several students commented on the value of teamwork:

I have learnt so much working with smart, interesting people. It makes the work so much better than if you did it on your own. With all the tools provided by technology, working in a virtual team is not harder than working in a non-virtual team. I would go further and say that we waste less time when we work in a virtual team: we go straight to the point. (C3)

I suppose that is the pretty cool thing about being part of a team; although you may not have particular skills, such as a language, collaboration means that you can create something you never could have created on your own. (B10)

Last, but not least, it has been interesting to see how their document gradually implemented little changes, based on our suggestions. They did have a beautiful and well written document at the beginning, but their final document had gained in consistency and coherence. It is nice for translators to have their say about the source text, yet I am afraid this rarely happens in the professional work. (C2)

Some students reported that they developed teamwork and communication skills:

My teamwork skills have definitely developed since completing this assignment. It was a new way of working in a team and it was something that I had never done before. My communication skills also improved. Using online forums such as [PlatformName] for a group chat with group members from University C and University A helped to improve my communication skills. (B11)

Leadership

Some teams did not appoint leaders at the outset, but leaders emerged during the project. Zigurs (2003) discusses how alternative leadership structures can be effective, provided

one or more team members possess the necessary skills. One team's initial leadership structure did not work out, but they reorganized effectively and leaders emerged in each local site:

Our early leadership plan (appointing one person as the project manager) fell through quickly, but again, it didn't hinder our progress. Over the course of the project we naturally had one person from each college take charge of their own team. It was effective and didn't cause problems, but if this happened again in a different virtual team project I would rather have appointed team leaders in the beginning stages. That way no one feels burdened by the work and team members know their responsibilities from the beginning. (A6)

This quote also provides evidence of student reflection on how such projects could be better managed in future.

Another team had a challenge related to leadership that was resolved through the efforts of an emergent leader:

The leadership structure of the group was faulty. A true group leader was never discussed, although someone did assume the role. I would consider XX the group leader as she maintained a high level of enthusiasm for deadlines and took the initiative to create a time line. The remainder of the group supported her decisions and met the deadlines she created. In the end, all of these efforts were effective. (A7)

In fact, in this team the emergent leader became a source of inspiration for the other team members:

Thanks to her, everything went smoothly. From the very beginning, she suggested a subject for the project, organized the project plan and decided that we should have a Monday Weekly Meeting. She made sure that everyone knew what they were supposed to do, she put in contact everyone and she sometimes sent us emails to check in. It was such a pleasure to work with her. (C3)

Some students reported that they developed project management skills, and recognized the value of project management:

A skill which I feel I developed during this assignment is project management. I enjoyed encouraging the team to meet certain deadlines, and delegating responsibility for different parts of the project to the team members. Although we didn't have any hierarchical structure within the group, I feel as if I often acted as a focal point whom the rest of the team could contact if they had a query. (B8)

The most valuable thing I learned from the project is that planning is essential and that a virtual team does need a good team leader. A team leader can help to create clear guidelines and goals so that everybody is clear on what they are expected to do and when. But there needs to be agreement on all of this, and that can be difficult to obtain when some

team members are reticent or slow to respond. Being a team leader is difficult and time-consuming, and has a huge amount of responsibility. Therefore, it is not a role that everyone would wish to take on. (B9)

I see from talking to other classmates that they had set up a weekly meeting for updates and this is something else we could have done to ensure smooth communication. (B2)

These experiences of project management and leadership are mirrored in the literature, particularly in studies of how emergent leaders play an important role in virtual teams (see Kayworth & Leidner, 2002; Ziek & Smulowitz, 2014).

The challenges of managing projects in different time zones is highlighted in the following quote:

Working simultaneously with other people in different time zones is the skill that comes to mind first. It sounds simple, but when one person needs to pick up their kids from school and I'm just waking up, there's an unwritten schedule that you need to master quickly to be able to catch people at reasonable times. (A9)

Technology

Teams made strategic choices about technology, based on their communication preferences and the availability of tools. Some tools were available to students through team sites in the VLE, but teams were free to select alternative collaboration technologies.

Table 3 indicates the technologies used by teams in 2015 and 2016. As indicated by this table, none of the teams exploited the range of tools afforded by the VLE—for example, the announcements, calendar, and wiki tools were not used. The chat room was the most popular VLE tool, likely due to the instant communication afforded.

---insert Table 3 here---

Many teams relied on the VLE project sites because each team had its own site, comprising collaboration and file sharing options, as noted in the following comment:

I think using a singular platform like we did with [PlatformName] was an incredibly efficient way to communicate, and I'm glad that was decided before we got to the project. Sometimes leaving things open to group choice can just create too much chaos, too many options to choose from. I'm glad we had [PlatformName], with chat rooms and discussion boards, to keep communication in one area, and allow all of us access to it. It was also really interesting to get to see what the University B's online platform looked like. It was helpful that it is the same basic format as other online learning platforms that I've used in the past. (A4)

The proliferation of Web 2.0 collaboration tools available resulted in some teams selecting alternatives to the VLE. Dropbox™ was an option used by several teams for file sharing:

We've used Dropbox™ as a collaborative tool, and this is quite easy to use and helpful for any collaboration. It is very easy to upload your files and a great way of making sure everyone is using the same files. (B3)

While the majority of students already had prior experience with email and social media tools such as Facebook, students also developed competencies in other collaborative tools. Some teams found Google Drive applications to be particularly valuable for collaboration:

Google Docs was also another excellent resource we had during the project, without it our project communica[tion] would have struggled, the most valuable thing about Google Docs is the ability to see what your team is typing real time, and it also has the built in tools for direct chats, group chats, and little side notes on the document itself much like you can [find] in Microsoft Word except all of it happens in front of you in real time. Both Facebook and Google Docs were used to communicate with translators and collaborate with team members. (A3)

The chosen tool for documentation sharing is the Google drive hosting application. We thought this is the easiest way to share our own work keeping the whole team constantly updated. The shared folder on Google has already been created by one of our international partner[s]. (C1)

Other teams relied heavily on Facebook and email, having first tried other tools:

We attempted to use many platforms for collaboration at the beginning of the project, for example, Whatsapp, [PlatformName], Facebook, and email. We eventually used Facebook and our school [email] exclusively. On Facebook we made a group page and on that page we picked the group topic and our individual writing assignments. We created a group email where we emailed our completed topics in a Word doc and merged everyone's part into one document. (A5)

As the [PlatformName] platform doesn't provide an alert service, we've chosen Facebook as the most efficient support for communication. A group has been created and members are joining in. (C1)

The range of tools used is indicative of students' technological dexterity; many teams used several tools simultaneously and selected different tools for distinct aspects of collaboration (e.g. Facebook for discussions and Dropbox for file-sharing). Flammia, Cleary, and Slattery (2007) found that "effective technology use facilitates information sharing and knowledge creation" (p. 2).

Culture

Increased cultural awareness and cultural intelligence were outcomes of virtual teamwork for several teams.

I think the best thing about this project was working with students in other countries. We had to account for time differences, and even European English [versus] American English.... [I] grew up in Canada and had written in European English all my life, but...I had to adapt after moving

to the United States. Knowing these kinds of cultural differences will make for a better relationship with [international] partners I might work with in the future. (A2)

For some students, communication and cultural awareness worked hand-in-hand:

The most valuable thing I gained from this assignment was developing my communication skills. As the team consisted of different cultures, I had to be conscious of how I phrased my emails and chat messages with the University A and University C team members. This communication skill is an important one to continuously hone considering how teams in the workplace are becoming more 'international'. (B6)

In one team, the writers gained a better understanding of the translation process:

When putting together the instructions, we decided to send our draft to the University C translators without including the screenshots. We chose to do this because we thought it might add confusion or make translating the words more difficult. Just yesterday, one of the translators actually messaged us and asked if we plan to include any screenshots, explaining that other groups were...[and telling] us that it would be best to send them to him now so he can make sure they go with the translation and they can make sure they don't make any mistakes with a visual aid. I found this to be interesting, because we thought we were making their lives easier, when really having screenshots would help them translate better. This proved to me just how important screenshots, graphics, and images are...to a lot of instructions. Especially when working with another language.... (A2)

Additional Strategies and Competencies

As well as developing students' competencies in communication, technology, leadership and culture, the project also had value for students' career goals. One translation student reflected on how the project confirmed her interest in pursuing a technical writing career:

I have learned that it is totally manageable to work in a team of 9 people. I thought it was going to be really hard, organization wise. But almost everything went smoothly. Doing this project also confirmed my interest for technical writing. (C3)

The integration of reflective blogging into the deliverables for the global translation projects facilitates the development of additional competencies in reflection and articulation of those reflections. Reflection is evident in the comments in student writers' and translators' blogs regarding how their understanding of the complex processes of writing and translating technical documentation developed during the course of the project. An understanding of these processes is essential for successful collaboration among writers and translators in the workplace. The reflective blogging component afforded students time to think about their learning experiences and how those experiences enabled them to develop new competencies that they could apply in the workplace.

Conclusions

This study examined the challenges student writers and translators experienced when participating in a global virtual team collaboration. By reviewing the students' individual reflective blogs and team transcripts, we identified the challenges that the students faced in relation to communication, leadership, and technology and the strategies and competencies the students employed to address those challenges. We found that the collaborative project was successful in fostering students' development of the knowledge and competencies they will need to function effectively as writers and translators of technical documentation. Further, we identified the development of competencies not previously addressed in the literature on writers collaborating with translators. Our qualitative study both reinforces the findings of previous research and expands it by adding a reflection component to the students' learning experience in a global translation project.

The current study demonstrates the value of cross-disciplinary collaborative projects for fostering the development of the knowledge and competencies needed by professional writers and translators. In their reflective blogs, student writers discussed an increased understanding of the challenges of the translation process just as student translators discussed a new awareness of the challenges faced by the writers whose work they were translating. Both writing and translation students reported on the development of their project management, communication, and teamwork skills. Such skills are vital to the success of virtual collaborations (Flammia et al., 2016).

Students also reflected in meaningful ways on the challenges they encountered and the solutions they developed to address those challenges. For example, many teams encountered the shortcomings of various technologies and experimented with several until they found one that worked for their team. As their reflections reveal, the students realized that the issue was not finding one perfect tool, but selecting a technology that would meet the needs of their particular team in this specific project. This learning can be transferred to future projects both in college and in the workplace. Indeed, many of the skills students learn in virtual collaborations are directly transferable to the workplace. These skills include professional communication with peers. Students had to learn how to collaborate through the online medium, within cross-disciplinary teams (writers and translators), and across cultures. The experience of writers collaborating with translators leads to a better understanding of the implications of writing decisions, and writers and translators develop appreciation for one another's roles.

Applications of this Study

This article will be helpful for teachers of technical communication and translation, as it explains one method for structuring virtual team projects involving technical communicators and translators. The article also provides qualitative evidence of knowledge and competencies developed by students participating in global documentation projects. Many of the competencies that students develop as a

result of this project are important learning outcomes for technical communicators and translators.

This article will also be of interest to practitioners because the process of preparing documentation for translation and of carrying out the translations will flow much more smoothly when professionals on both sides of the process understand one another's jobs and are aware of the competencies entailed in crafting technical documents and in translating them (Gnecchi et al., 2011; Maylath et al., 2013; Melton, 2008).

Limitations and Future Research Directions

One limitation of this study is the separation of the writing and translation phases of the project. Such a distinct division between the two processes may not encourage collaboration throughout the project. Gnecchi et al. (2011) recommend assimilating translation into all the stages of the writing process. We may need to consider structuring the task to encourage more interaction and minimize the possibility of students only participating during one phase. In addition, the study involved a relatively small number of students collaborating over a short period of time.

A further limitation of this study is that our research project aims to replicate a real-world setting where writers and translators collaborate. However, the participants in the study were students and were constrained by the assignment specifications. Therefore, their experiences may not directly map to the experiences of practitioners. Moreover, because the data reported in this article are primarily qualitative, the findings are not generalizable.

Finally, students at the three universities were not given consistent preparation. Providing online modules with instruction on virtual teamwork and on intercultural communication to all the participants would give the students uniform preparation for the project. It would be worthwhile to conduct a quantitative study on the impact of such training on the students' learning and on their satisfaction with the experience of participating in the project.

Future studies could gather data on the number of different tools students try, the length of time they use them, and the frequency of their communication using each tool. It would also be useful to gather data on how many years relevant work experience students had and how many of them had participated in virtual teams, prior to the collaborative project. Such findings could add a richness to the qualitative data by explaining why some students encountered challenges that were not encountered by others.

References

- Arnó Macià, E., Isohella, S., Maylath, B., Schell, T., Verzella, M., Minacori, P.,... Vandepitte, S. (2014). Enhancing students' skills in technical writing and LSP translation through tele-collaboration projects: Teaching students in seven nations to manage complexity in multilateral international collaboration. In *Proceedings of the 19th European Symposium on Languages for Special Purposes* (pp. 249-259). University of Vienna.
- Berry, G. R. (2011). Enhancing effectiveness on virtual teams: Understanding why traditional team skills are insufficient. *Journal of Business Communication*, 48(2), 186–206.
- Brewer, P. E. (2015). *International virtual teams: Engineering global success*. Hoboken, NJ: Wiley-IEEE Press.
- Brewer, P. E., Mitchell, A., Sanders, R., Wallace, P., & Wood, D. D. (2015). Teaching and learning in cross-disciplinary virtual teams. *IEEE Transactions on Professional Communication*, 58(2), 208-229.
- Chang, W. L., & Lee, C. Y. (2013). Virtual team e-leadership: The effects of leadership style and conflict management mode on the online learning performance of students in a business-planning course. *British Journal of Educational Technology*, 44(6), 986–999.
- Cheng, X., Nolan, T., & Macaulay, L. (2013). Don't give up the community: A viewpoint of trust development in online collaboration. *Information Technology & People*, 26(3), 298–318.
- Cleary, Y., Flammia, M., Minacori, P., & Slattery, D. M. (2015). Global virtual teams create and translate technical documentation: Communication strategies, challenges and recommendations. In *Proceedings of the IEEE International Professional Communication Conference* (pp. 1-10). IEEE.

- Cogburn, D. L., & Levinson, N. S. (2003). US–Africa virtual collaboration in globalization studies: Success factors for complex, cross-national learning teams. *International Studies Perspectives*, 4(1), 34–51.
- Cogliser, C. C., Gardner, W., Trank, C. Q., Gavin, M., Halbesleben, J., & Seers, A. (2013). Not all group exchange structures are created equal: Effects of forms and levels of exchange on work outcomes in virtual teams. *Journal of Leadership & Organizational Studies*, 20(2), 242–251.
- Connelly, C. E., & Turel, O. (2016). Effects of team emotional authenticity on virtual team performance. *Frontiers in Psychology*, 7, 1–13.
- Crisp, C. B. & Jarvenpaa, S. L. (2013). Swift trust in global virtual teams: Trusting beliefs and normative actions. *Journal of Personnel Psychology*, 12(1), 45–56.
- Dam-Jensen, H., & Heine, C., (2013). Writing and translation process research: Bridging the gap. *Journal of Writing Research*, 5(1), 89–101.
- Erez, M., Lisak, A., Harush, R., Glikson, E., Nouri, R., & Shokef, E. (2013). Going global: Developing management students' cultural intelligence and global identity in culturally diverse virtual teams. *Academy of Management Learning & Education*, 12(3), 330–355.
- European Commission. (nd). *European Master's in Translation (EMT)* Retrieved from https://ec.europa.eu/info/european-masters-translation-emt_en
- Fan, K. T., Chen, Y. H., Wang, C. W., & Chen, M. (2014). E-leadership effectiveness in virtual teams: Motivating language perspective. *Industrial Management & Data Systems*, 114(3), 421–437.
- Flammia, M. (2005). Preparing technical communication students to play a role on the translation team. *IEEE Transactions on Professional Communication*, 48(4), 401–412.

- Flammia, M. (2012). Using the cultural challenges of virtual team projects to prepare students for global citizenship. In K. St.Amant and S. Kelsey (Eds.), *Computer-mediated communication across cultures: International interactions in online environments* (pp.328-343). Hershey, PA: IGI Global.
- Flammia, M., Cleary, Y., & Slattery, D. M. (2007). Technology use and communication strategies of Irish and US students in virtual teams. In *Proceedings of the IEEE International Professional Communication Conference* (pp.1-8). IEEE.
- Flammia, M., Cleary, Y., & Slattery, D. M. (2010). Leadership roles, socioemotional communication strategies, and technology use of Irish and US students in virtual teams. *IEEE Transactions on Professional Communication*, 53(2), 89–101.
- Flammia, M., Cleary, Y., & Slattery, D. M. (2016). *Virtual teams in higher education: A handbook for students and teachers*. Charlotte, NC: Information Age Publishing.
- Fuller, R. M., Vician, C. M., & Brown, S. A. (2016). Longitudinal effects of computer-mediated communication anxiety on interaction in teams. *IEEE Transactions on Professional Communication*, 59(3), 166–185.
- Gallenkamp, J. V., Assmann, J. J., Drescher, M. A., Picot, A., & Welpe, I. M. (2010). Conflict, culture, and performance in virtual teams: Results from a cross-cultural study. In *Proceedings of the 43rd Annual Hawaii International Conference on System Sciences* (pp. 1-10). IEEE.
- Gilson, L. L., Maynard, M. T., & Bergiel, E. B. (2013). Virtual team effectiveness: An experiential activity. *Small Group Research*, 44(4), 412–427.
- Gnecchi, M., Maylath, B., Mousten, B., Scarpa, F., & Vandepitte, S. (2011). Field convergence between technical writers and technical translators: Consequences for training institutions. *IEEE Transactions on Professional Communication*, 52(2), 168-184.

- Huang, R., Kahai, S., & Jestic, R. (2010). The contingent effects of leadership on team collaboration in virtual teams. *Computers in Human Behavior*, *26*, 1098–1110.
- Hughes, M. A., & Hayhoe, G. F. (2008). *A research primer for technical communication: Methods, exemplars, and analyses*. New York, NY: Lawrence Erlbaum Associates.
- Iacono, C. S., & Weisband, S. (1997). Developing trust in virtual teams. In *Proceedings of the 1997 30th Annual Hawaii International Conference on System Sciences* (pp. 412-420). Wailea, HI: IEEE.
- Jarvenpaa, S. L., Knoll, K., & Leidner, D. E. (1998). Is anybody out there? Antecedents of trust in global virtual teams. *Journal of Management Information Systems*, *14*(4), 29–64.
- Kayworth, T. R., & Leidner, D. E. (2002). Leadership effectiveness in global virtual teams. *Journal of Management Information Systems*, *18*(3), 7–40.
- Killingsworth, B., Xue, Y., & Liu, Y. (2016). Factors influencing knowledge sharing among global virtual teams. *Team Performance Management*, *22*(5/6), 284–300.
- Klitmøller, A., & Luring, J. (2013). When global virtual teams share knowledge: Media richness, cultural difference and language commonality. *Journal of World Business*, *48*(3), 398–406.
- Lea, M., Spears, R., & Rogers, P. (2003). Social processes in electronic teamwork: The central issue of identity. In S. A. Haslam, D. van Knippenberg, M. J. Platow, & N. Ellenmers (Eds.), *Social identity at work: Developing theory of organizational practices* (pp. 99–115). New York, NY: Psychology Press.
- Lee, O. (2000). The role of cultural protocol in media choice in a Confucian virtual workplace. *IEEE Transactions on Professional Communication*, *43*(2), 196–200.
- Lisak, A., & Erez, M. (2015). Leadership emergence in multicultural teams: The power of global characteristics. *Journal of World Business*, *50*(1), 3–14.

- Mateeva, N. (2008). Teaching intercultural communication in a basic technical writing course: A survey of our current practices and methods. *Journal of Technical Writing and Communication*, 38(4), 387–410.
- Maylath, B., Vandepitte, S., Minacori, P., Isobella, S., Mousten, B., & Humbley, J. (2013). Managing complexity: A technical communication translation case study in multilateral international collaboration. *Technical Communication Quarterly*, 22, 67–84.
- Melton, J. H. (2008). Lost in translation: Professional communication competencies in global training contexts. *IEEE Transactions on Professional Communication*, 51(2), 198-214.
- Mockaitis, A. I., Rose, E. L., & Zettinig, P. (2012). The power of individual cultural values in global virtual teams. *International Journal of Cross Cultural Management*, 12(2), 193–210.
- Mousten, B., Maylath, B., Vandepitte, S., & Humbley, J. (2010). Learning localization through trans-Atlantic collaboration: Bridging the gap between professions. *IEEE Transactions on Professional Communication*, 53(4), 401–411.
- Pazos, P. (2012). Conflict management and effectiveness in virtual teams. *Team Performance Management*, 18(7/8), 401–417.
- Ping, H. (2012). Intercultural awareness in professional translators: Examples from technical and non-technical documents. *Translation Quarterly*, 64, 20–31.
- Purvanova, R. K., & Bono, J. E. (2009). Transformational leadership in context: Face-to-face and virtual teams. *The Leadership Quarterly*, 20(3), 343–357.
- Riopelle, K., Gluesing, J. C., Alcorido, T. C., Baba, M. L., Britt, D., McKether, W., & Wagner, K. H. (2003). Context, task, and the evolution of technology use in global virtual teams. In C. B. Gibson & S. G. Cohen (Eds.), *Virtual teams that work*:

Creating conditions for virtual team effectiveness (pp. 239-264). San Francisco, CA: Jossey-Bass.

Robert, L. P., Denis A. R., & Hung, Y. C. (2009). Individual swift trust and knowledge-based trust in face-to-face and virtual team members. *Journal of Management Information Systems*, 26(2), 241–279.

Robert, L., & You, S. (2013). Are you satisfied yet? Shared leadership, trust and individual satisfaction in virtual teams. In *Proceedings of iConference 2013* (pp. 461–466). Fort Worth, TX. Doi:10.9776/13255.

Robey, D., Khoo, H. M., & Powers, C. (2000). Situated learning in cross-functional virtual teams. *Technical Communication*, 47(1), 51–66.

Rosen, B., Furst, S., & Blackburn, R. (2007). Overcoming barriers to knowledge sharing in virtual teams. *Organizational Dynamics*, 36(3), 259–273.

Sarker, S., & Schneider, C. (2009). Seeing remote team members as leaders: A study of US-Scandinavian teams. *IEEE Transactions on Professional Communication*, 52(1), 75–94.

Savery, J. R. (2006). Overview of problem-based learning: Definitions and distinctions. *Interdisciplinary Journal of Problem-Based Learning*, 1(1), 9-20.
<http://dx.doi.org/10.7771/1541-5015.1002>

Serban, A. (2015). Leadership emergence in face-to-face and virtual teams: A multi-level model with agent-based simulations, quasi-experimental and experimental tests. *The Leadership Quarterly*, 26(3), 402–418.
<http://dx.doi.org/10.1016/j.leaqua.2015.02.006>

Shuffler, M. L., Wiese, C. W., Salas, E., & Burke, C. S. (2010). Leading one another across time and space: Exploring shared leadership functions in virtual teams. *Revista de Psicología del Trabajo y de las Organizaciones*, 26(1), 3-17.

- St.Amant, K. (2002a). When cultures and computers collide: Rethinking computer-mediated communication according to international and intercultural communication expectations. *Journal of Business and Technical Communication*, 16, 196-214.**
- St.Amant, K. (2002b). Integrating intercultural online learning experiences into the computer classroom. *Technical Communication Quarterly*, 11(3), 289-315.**
- Starke-Meyerring, D., & Andrews, D. (2006). Building a shared virtual learning culture: An international classroom partnership. *Business Communication Quarterly*, 69(1), 25–49.
- Symonds, J., & Stenzel, C. (2007). Virtually borderless: An examination of culture in virtual teaming. *Journal of General Management*, 32(3), 1–17.
- TecCOMFrame. (2016). *A Joint European Academic Competence Framework and Curricula for the Training of Technical Communicators* Retrieved from <http://www.teccom-frame.eu>
- Walther, J. B. & Bunz, U. (2005). The rules of virtual groups: Trust, liking, and performance in computer-mediated communication. *Journal of Communication*, 55(4), 828–846.
- Walvoord, A. A., Redden, E. R., Elliott, L. R., & Coovert, M. D. (2008). Empowering followers in virtual teams: Guiding principles from theory and practice. *Computers in Human Behavior*, 24(5), 1884–1906.
- Wang, J. (2013). Moving towards ethnorelativism: A framework for measuring and meeting students' needs in cross-cultural business and technical communication. *Journal of Technical Writing and Communication*, 43(2), 201–218.
- Weimann, P., Pollack, M., Scott, E., & Brown, I. (2013). Enhancing team performance through tool use: How critical technology-related issues influence the performance

of virtual team projects. *IEEE Transactions on Professional Communication*, 56(4), 332–353.

Whitford, T., & Moss, S. A. (2009). Transformation leadership in distributed work groups: The moderating role of follower regulatory focus and goal orientation. *Communication Research*, 36(6), 810–837.

Williams, S. D. (2010). Forming trust in virtual writing teams: Perspectives and applications. In B. L. Hewett & C. Robidoux (Eds.), *Virtual collaborative writing in the workplace: Computer-mediated communication technologies and processes* (pp. 88-110), Hershey, PA: IGI Global.

Yu, H. (2012). Intercultural competence in technical communication: A working definition and review of assessment methods. *Technical Communication Quarterly*, 21, 168–186.

Zaugg, H., & Davies, R. S. (2013). Communication skills to develop trusting relationships on global virtual engineering capstone teams. *European Journal of Engineering Education*, 38(2), 228–233.

Ziek, P., & Smulowitz, S. (2014). The impact of emergent virtual leadership competencies on team effectiveness. *Leadership & Organizational Development Journal*, 35(2), 106–120.

Zigurs, I. (2003). Leadership in virtual teams: Oxymoron or opportunity? *Organizational Dynamics*, 31(4), 339–351.