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Connected Classrooms: Videoconferencing in TESOL Teacher Preparation

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Recent technological developments have afforded a proliferation of flexible online opportunities for teacher education (e.g., Chen, 2013). Videoconferencing (VC) is one of the most effective ways to engage students in collaborative learning (Wegner, 2015), as it makes in-class interactions more feasible (Bannan-Ritland, 2002). This descriptive study discusses the online teaching of graduate students in a TESOL program from the point of view of sociocultural theory (SCT) Lantolf and Thorne (2007) and media naturalness theory (MNT) (Kock, 2011). It analyzes the use of VC as the sole medium of instruction of future ESL teachers (N=12) who participate synchronously from different locations, including on-campus and distant classrooms. The participants' exit slips, as well as post-course anonymous surveys, are analyzed to identify elements of VC that have worked well and those that present challenges. The results provide an insight into what makes VC a compelling tool for the training of ESL teachers.

Videoconferencing (VC) equipment has become a large part of the corporate world in the United States (Weinstein & Litman, 2015), where it facilitates convenient alternatives to and promotes flexibility in the traditional work environment (Weinstein & Litman, 2015). Modern VC provides "a full collaboration experience including voice, video, and content" (Weinstein & Litman, 2015, p. 3). Within language education, private colleges and universities have used VC equipment to connect low enrolled classes through synchronous online teaching since 2011 (Tilsley, 2012). Public institutions of higher learning, however, have not, with few exceptions, been as quick to adopt this modality of course delivery.

This descriptive research study seeks to understand the strengths, weaknesses, and challenges that the VC modality offers in teaching graduate students in a Master's in TESOL program at a medium-sized state university in the Northeast United States. The paper provides a brief introduction into the institutional history of initiating a VC-based program, a discussion of the technical and pedagogical problems encountered by students and instructors, types of activities that promote the collaborative nature of TESOL teacher preparation, and students' experiences in such programs. The findings of this study are grounded in sociocultural theory (SCT) (Lantolf, 2012), which focuses on collaborative interaction as a way to co-construct knowledge, and media naturalness theory (MNT) (Kock, 2011), which helps determine how closely the electronic medium approximates face-to-face (f2f) communication. Despite a fairly specialized focus, the results of this study can be applied to other programs and models that are considering VC.

Preliminaries

Terminology. VC is a mode of instruction that involves synchronous video and audio communication via a digital network among participants who are located in different geographical areas (Dal Bello, Knowlton, & Chaffin, 2007). VC provides students and instructors with live interaction that is similar to a f2f classroom setup, including real time small group activities, classroom presentations, and whole class discussions. Studies that focus on VC for teacher education point out the increased motivation that a variety of delivery methods bring to K-16 students (Cole, Ray, & Zanetis, 2004), the efficiencies of VC in overcoming obstacles of distance in teacher education programs (Morgan, Forbush, & Nelson, 2004), and the improved effectiveness of teacher preparation courses due to the removal of "barriers of time, logistics, and distance in creating meaningful field-based 'anchors' in the form of (a) observations of pupils in classroom environment, and (b) live, point-to-point interactions between teacher education students, pupils, their teachers, their parents, and school administrators" (Knowlton, Israel, & Griswold, 2007, p. 3621). In addition, Gleason and Schmitt (2018) have accentuated the importance of VC use for teacher candidates so that they have opportunities to develop technological literacies.

One of the key features of VC is its synchronous nature. Synchronous instruction assumes that all the participants are present online at the same time and participate through textual, audio-visual, or multimodal communication tools. Asynchronous instruction does not require the simultaneous presence of the participants by allowing them to access materials and make contributions via textual, recorded audio-visual, or multimodal communication tools at designated periods of time. As a result, asynchronous instruction is valued for its flexible scheduling and the ample time participants may use for self-paced learning (Bannan-Ritland, 2002; Wegner, 2015). Schrum (1998) points out that both synchronous and asynchronous modes of instruction can provide opportunities for group work and other types of

collaboration that students and instructors have come to rely on in an on-ground classroom. However, only synchronous instruction allows for a truly student-centered classroom (Weigel, 2002; Wegner, 2015).

A subset of synchronous online instruction is referred to as telecollaboration, defined as "the practice of engaging classes of geographically dispersed learners in online intercultural exchange using Internet communication tools for the development of language and/or intercultural competence" (Helm, 2015, p. 197). Telecollaboration allows for the textual as well as video presence of students in various locations. Telecollaborative modes of instruction have been largely applied to foreign language teaching in European and North American markets (Fuchs, Hauck & Müller-Hartmann, 2012). Since telecollaboration differs from VC in that it is used primarily as a short-term, task-based instructional venue rather than the sole medium of instruction, it will not be the focus of this study.

Despite the potential of VC technology for teacher education and professional development, there is surprisingly limited research of its utility and effectiveness in teacher education literature (e.g., Knowlton et al., 2007). Therefore, the goal of this study is to illuminate the benefits of synchronous online teacher preparation at the graduate level and to provide the reader with an analysis of interactive activities that have worked well for a cohort of TESOL graduate students.

The setting for VC-mediated TESOL teacher training. The university that is the site of this study is a medium sized (about 10,000 students) state institution that attracts a large population of commuter students at both the undergraduate and graduate levels thanks to its numerous undergraduate and graduate programs. Moreover, the university is known across the region for its teacher preparation programs. In recent years, Bilingual Education and TESOL were designated as licensure shortage areas in the state, and this shortage has prompted the university and its Master's in TESOL program faculty to seek alternatives to traditional classroom instruction, thereby allowing teacher candidates from geographically distant areas to complete their Master's degree and meet teacher certification requirements.

The TESOL faculty agreed that VC could present an attractive solution to the state's needs by offering instructional options that incorporate synchronous video and audio inputs and vast opportunities for collaborative learning for both on- and off-campus cohorts of students. For fully functional virtual classroom observation and participation, the university installed the Cisco Sx80 TelePresence system, using two Precision 60 cameras and three Clear One Pendant microphones, as well as three 70" HD monitors, a TouchPanel room controller, and a wireless Lavelier microphone for the instructor. The classroom uses a Session Initiation Protocol (SIP) gateway to receive telepresence phone calls and also has the ability to use the subscription service BlueJeans, a cloud-based VC platform that connects participants across locations and through a variety of devices. Additionally, it also provides the ability to record sessions thanks to its unlimited cloud storage capabilities.

Our partner site, a K-12 institution approximately 50 miles away, uses an older Polycom ViewStation. The camera is connected via an RCA cable to a television monitor and plugged into an Internet port. The distant classroom does not have interactive screens or transmitting capabilities. It utilizes one screen that allows those students to view either the interactive screen transmitted from the on-campus classroom or the participants in the on-campus cohort, but not both simultaneously.

Pre-semester training. To ensure that faculty teaching through VC are familiar with the equipment and are prepared to teach both on-ground and online cohorts of graduate students, the researchers received a small grant to cover the expenses of a two-day workshop led by VC experts. The goals of the training were as follows:

- Instructors and administrative support staff will be familiar with the basic functions of the VC equipment and will be able to operate the equipment seamlessly to facilitate communicative classroom activities;
- Instructors will understand the logistical and pedagogical challenges posed by synchronous distance instruction for teaching;
- Instructors will learn best practices for managing these challenges, such as administering tests and homework remotely, conducting pair and group work activities during class time, and working around conflicting institutional academic calendars; and
- Instructors and the Director of the Language Lab will learn to troubleshoot problems collaboratively if they occur during instructional time.

During the training, faculty members learned basic operational elements of VC, including camera control (via the remote/touchscreen interface), SmartBoard and pen use, and best practices for instructor placement to manage the exchanges between the on-campus and distant cohorts. The participants were also alerted to the conversational dynamic over VC, including body language/eye contact/participant feedback channels. As for web-based tools and platforms, participants discussed the uses of PowerPoint presentations within the VC framework, as well as different types of virtual whiteboards. There was a demonstration of small group

and pair work use during VC instruction where consultants advised faculty on how to select VC appropriate media. Finally, faculty participated in a hands-on teaching session of a brief lesson over VC.

The Study

This research showcases a descriptive pilot study of a teacher preparation class in a Master's of TESOL program that employed VC as an exclusive medium of instruction. The goal was to understand students' success and challenges with this modality and improve the TESOL program beyond this pilot stage. The researchers collected data on the following program attributes: a) student and faculty perceptions of the challenges of online education for graduate students in a synchronous VC environment, b) student and faculty perceptions of the benefits of VC classes, c) the nature of collaboration in VC courses, d) types of collaborative activities, and e) student and faculty attitudes toward a technologically-rich classroom. The data were collected through surveys, questionnaires, and exit slips, and they were analyzed and discussed within the specific context of the TESOL program.

Theoretical Framework

The analysis of the collected data relies on two theoretical frameworks: sociocultural theory (SCT) (Lantolf & Thorne, 2006) and media naturalness theory (MNT) (Kock, 2004; Simon, 2006).

Sociocultural Theory. SCT frames the approach to teaching and learning from the constructivist perspective with a major focus on interaction. Lantolf and Thorne (2007), following Vygotsky (1987), have shown that interaction opportunities are important for content learning at any level of study. Supporters of the SCT of language acquisition have maintained that collaborative assistance between an expert and a novice, or among peers, can create opportunities for better conceptual processing (Lantolf & Thorne, 2007; Mitchell & Myles, 2004). This means that regardless of the teaching mode (online or on-ground), it is essential that students engage in interaction and negotiation of meaning.

Meskill (2013) applied the principles of SCT to technologically-rich classrooms to emphasize the saliency of learning and learners despite the overwhelming presence of technology. Specifically, agency is assigned to learners, whereas technology is viewed as a tool (p. 4); online environments are considered within larger social, cultural, and institutional contexts of the learners and their activities (p. 5); assistance from more capable peers essential for development takes on new forms within online education (p. 5); online modality provides opportunities for all learners to articulate their thoughts orally and in writing, which in turn creates ideal conditions for "internalization via verbalization" (p. 6); and language is assigned the role of a mediator in online communication, which aligns with its role as the primary mediating tool in human development (p. 8). The data analysis in this study seeks evidence for the principles of learners' agency, internalization via verbalization, and language as a mediation tool.

Media Naturalness Theory (MNT). It is assumed that f2f communication is the most natural communication that humans have developed. F2f communication involves three key constructs: cognitive effort, communication ambiguity, and physiological arousal. Kock (2011) maintains that f2f communication is built on co-location of the participants, synchronicity of communication, conveyance of facial expressions, body language, and speech. MNT considers the effectiveness of a communication medium based on the presence of these elements and the effect that it has on cognitive effort, communication ambiguity, and physiological arousal. That is, the more natural an e-communication medium is, the less it will increase the participants' cognitive effort, the less it will increase communication ambiguity, and the more it will increase physiological arousal (Kock, 2011). Two assumptions of the MNT are a) the presence of one of the media naturalness elements (synchronicity, co-location, body language, etc.) "will have a higher degree of naturalness than another e-communication medium that does not incorporate that element" (Kock, 2011, p. 390), and b) incorporation of one of the elements to a larger degree than others provides the e-tool with a higher degree of naturalness.

Thus, MNT allows researchers to evaluate and predict the effectiveness of the electronic medium selected *a priori* and to infuse it with additional elements when necessary to make it approximate f2f communication.

Method

This research relies on the form of a descriptive study that helps provide information about the naturally occurring behavior, attitudes, or other characteristics of a particular group (Shields & Rangarjan, 2013) in which the behavior of participants is not manipulated (Yin, 2003). Furthermore, this research considers details of the contextual conditions that otherwise would be ignored (Baxter & Jack, 2008). Thus, the study seeks to determine the value of an online synchronous VC class for participants' acquisition of knowledge, formation of learning communities, and participation in collaborative work.

TESOL participants. The group of graduate students (N=12) in this study consists of a distant cohort (N=6) and an on-campus cohort (N=6). The distant cohort of students, who are all certified teachers in the same school district, has stayed together throughout their coursework (10 classes). These students went through a competition to be accepted

into the VC modality of the Master's program in TESOL, where they were evaluated on their commitment to the program, their professional needs, and their level of interest and comfort with VC. The on-campus group consists of students who signed up for this section of the class either not knowing that it would be enhanced by VC or because there were no seats left in the on-ground section of the class.

Prior to the start of the course all students received an e-mail message from the instructor alerting them to the fact that this was a new format of instruction that would require their utmost dedication, patience, cooperation, and a very high level of preparation for each class in order to succeed. The distant cohort of students also received a 30-minute training session on how to use the technology in the classroom at their location.

Procedure. Students gathered weekly for 2.5 hours in their respective locations. All distant students convened at their designated VC location within their school district, while all on-ground students and the instructor came to the VC room on the instructor's home campus.

Each class started with greetings and housekeeping questions where the instructor directed cameras toward the on-campus group so that the distant cohort could see them, since the distant classroom only had one screen and could see either the on-campus cohort or the instructor and the screen with the PowerPoint presentation on it. After the initial five-minute exchange, the instructor switched the camera to a PowerPoint presentation. These presentations framed most classes and included links to videos, interactive small group activities, and discussions. In other words, the PowerPoint presentations were not strictly instructor-centered lectures, but incorporated the materials and guided all the in-class activities.

Depending on the topic at hand, each class included several small group activities, discussions, debates, collaborative problem solving, or other type of work that was aimed at building a learning community in the process of acquiring new knowledge. Each class period ended with a five-minute exit slips activity focused on two questions:

1. What helped you best understand the content and be involved in today's class?
2. What would you like to see done differently in today's class?

The instructor spent about 15 minutes after each class writing a free form reflection on the challenges and successes of the class from the technological and learning perspectives.

Upon completion of the course, all students were asked to fill out a post-course survey where they discussed the following questions:

1. How did you feel this semester using the videoconferencing technology in TSL 502?
2. Was there any experience that stands out in your mind as particularly useful?
3. In your experience, what were the most challenging aspects about the experience?
4. How does your experience in this course compare to other graduate courses, either online or on the ground? Please describe your past experiences.
5. Having had this experience, what are your concerns moving forward?
6. Is there anything that the instructor could do to make the experience more beneficial?
7. In your opinion, what would you tell future MS TESOL students about this experience? What advice would you have for them about this course and its format?
8. What activities did you find particularly useful during this course?
9. Did you feel that you were a part of a learning community during this class?
10. What helped you form a learning community in this class?
11. Please make suggestions about making this class more interactive between distant cohort and on campus students.

Results

The results of the study fall into four categories:

1. Challenges of learning through VC;
2. Benefits of learning through VC;
3. Useful activities;
4. Collaboration and learning community.

These results are discussed through the prism of SCT and MNT as appropriate.

Challenges of Learning through VC.

The challenges of learning in a synchronous online environment were identified by both the instructors and the students as depicted in Table 1.

Benefits of learning through VC.

The students and the instructor identified the following positive features of VC-based learning:

- VC modality allows students to take classes without spending hours on travel, missing work, and looking for parking;
- Reliance on classmates and forming strong connections within cohorts for the graduate TESOL class;

Table 1
Challenges of Learning Through VC

Instructor-identified challenges	Student-identified challenges through exit slips and surveys
Extremely time-consuming preparation for class, including the changing nature of web-based tools	Inability to talk in class informally (not publically)
Difficulties in digitizing materials, particularly phonetic transcriptions and syntactic trees	Inability to approach the instructor privately during class for the distant cohort
Lack of consistent classroom setup across campuses	Turn-taking issues when responding in class;
Learning curve in using on-screen interactive tools	Lack of adequate sound when videos are played from the on-campus classroom
	Noise level for on-campus group presented a problem during small group discussions unless the microphone in the distant classroom was muted.

- Meeting people from different locations;
- Learning new technologies in pedagogically and professionally beneficial ways.

Useful activities.

The instructor and all of the students of the graduate TESOL class agree that collaborative work and small group tasks through the use of a web-based platform called Padlet were useful for better comprehension of the material. The choice of Padlet as a collaborative application and virtual whiteboard was not accidental. In the traditional classroom, the instructor relies on two activities to promote collaborative writing: a popular discussion-focused activity called Progressive Brainstorm (Gibbons, 2015) where students walk in groups around the room to discuss orally and then write down their responses to a variety of questions posted on the walls (Gleason & Schmitt, 2018) and a Think-Pair-Share activity where students first individually think through a question, then discuss it with a partner, and finally share it with another small group (Usman, 2015). The principles behind this type of task are deeply rooted in SCT: active learning, a social plane before internalization of knowledge, and work with more advanced peers. In order to replicate the idea of collaborative discussion and writing, virtual whiteboard applications were tested. Padlet was found to be the only application that allowed the instructor to prepare the whiteboard in the way that largely approximated the on-ground set up for the Progressive Brainstorm activity.

Two tasks that we would like to exemplify here are fusionality of languages and morphological analysis. In the first task, students divided into groups and were given a set of sentences from different languages. They were then asked to place these languages on the fusionality scale from isolating to polysynthetic. Each group was provided with its own scale. Groups could see and compare their scales and then had to defend their language placement in an oral debate. In the task of morphological analysis, students were given a set of data from a particular language and a set of questions that guided their analysis. Together they had to discuss the questions and then record their responses. Again, each group could see what others were doing and add their comments to the other groups' postings. Both tasks share a high level of collaboration, which ensures that all the work is done by all the partners involved in the task (Lund, 2013).

Collaboration and the learning community.

Both the instructor and the students commented extensively on the importance of collaboration and creation of the learning community among students. They identified the rigor of the classes as one of the contributing factors to developing a community of learners. The frequency of small and whole group discussions and group tasks was also credited with helping to form a community of learners in these classes.

Discussion

The results presented above are discussed from the perspective of MNT and SCT, as appropriate. Many technical challenges identified by the instructor and students can be considered within the MNT framework. For example, lack of an interactive screen in the distant classroom creates difficulties for maintaining essential elements of f2f interaction (Kock, 2011). Specifically, such a setup impedes the ability to convey and observe facial expressions and body language, as well as maintain synchronicity of communication. Consider

the following citations from students' responses:

> "Some of the visual text is hard to read on the monitor" (Alice, online student).
>
> "I think it was weird that we could not all see each other at once. The [distant] cohort could only see the teacher or the class at a time, so we did not get to know each other well. It would be great if there was a way for the two groups to collaborate together more" (Sean, online student).

Clearly, these comments indicate that the level of engagement across campuses is perceived as limited. Interestingly, the comments about the limited nature of collaboration among distant and on-campus students are juxtaposed with students' perceptions of a highly collaborative experience in their first semester of VC:

> "I also enjoyed the group work because it was interesting to hear other ideas and perspectives." (Debrah, online student)
>
> "I felt less anxious when you called on us individually. I enjoyed the very engaging discussion of the question at the end of class." (Nicole, on-campus student)

These quotes point to the highly collaborative nature of the class and to the fact that students themselves appreciate the benefits of collaboration for developing new knowledge and internalizing the existing concepts, which is in line with Lantolf's argument for the co-construction of knowledge within SCT (Lantolf, 2012). Moreover, it appears that students' comments regarding their enjoyment of "the very engaging discussion of the questions" point to both increased psychological arousal and cognitive effort that is similar in VC and f2f modalities (Kock, 2007, 2011).

Another challenge pointed out by the student participants pertains to the ability to talk in class informally and privately. For example, students may wish to complement each other or discuss issues unrelated to the lesson at hand. They felt that this type of communication was not available to them in a VC class since the microphones were always live and their private conversations were immediately broadcast to the collaborating school. From the MNT perspective, this feature of a VC class is significantly different from a typical f2f classroom where students are able to engage in private interactions more freely (Kock, 2005).

An important challenge of VC for the distant cohort is the inability to approach the instructor privately during class. Students had to send a message to the instructor or make a phone call in order to have a private conversation. Again, this difference between a f2f and a synchronous online classroom needs to be taken into account during the planning stage, and it is important to provide additional opportunities for students to connect with the professor outside of class.

Students also identified turn-taking in responding to questions and participating in discussions as a challenge in the VC classroom. The primary cause of this difficulty is a minimal, but noticeable, delay in sound transmission, which resulted in an overlap of students' responses across campuses. This overlap created brief confusion until the instructor determined that it was necessary to assign the floor to one of the students. In terms of MNT, this delay resulted in communication ambiguity (Kock, 2011). With time, students got used to the time delay and waited to respond. Thus, the problem of turn taking was resolved, but it is worth considering during the planning stage as the natural floor-negotiation strategies that occur in a f2f classroom are not available in a VC setting. Furthermore, in an online classroom, it is useful to establish a waiting period after a question is asked and then for the teacher to call on a specific student to respond. Even in collaborative settings where groups report their findings, it is important to designate the respondents at the start of the activity and not to rely on students' choices.

As reported in the Results section, the participants also identified technical and instructional/learning benefits of a VC classroom. Clearly, saving time and money on travel to the on-ground location is a significant advantage for many students. This quote illustrates the views of students who would have been unable to enroll in the program had it not been for the online option:

> "If all things were equal I would prefer to be on campus… saving two-three hours of driving in traffic and still being able to make it to committee meetings prior to class make the tradeoff worth it to me. I would not have joined the program if this option was not available" (Jennifer, on-line student).

However, outside of the convenience, there are several features of online learning that may aid in the overall construction of knowledge. For example, students note that they had to rely on their classmates to discuss theoretical points of the course and solve the assigned problems:

> "I found it helpful to work with partners to understand the content of instruction" (Linda, on-line student).

In other words, students had to ask each other for assistance in order to succeed in class. While this need was orchestrated by the instructor through the use of appropriate collaborative tasks, it was the lack of the

instructor's one-on-one private accessibility to the learners that made it crucial for them to rely on each other in order to construct knowledge and apply it to problem solving. Thus, with VC as the medium of instruction, opportunities for student-to-student interactions and co-construction of knowledge become a necessity. According to SCT, this is an essential element of learning for teacher candidates: not only does it help in bringing the ideas discussed at the interpersonal level during class to the student's intrapersonal plane (Vygotsky, 1987), but it also has a particular importance for teacher candidates as it helps apprentice them in teacher training programs to the necessity of collaboration in the teaching/learning process.

Another integral benefit of VC and online learning in general is that future teachers learn new technologies and consider applying them in pedagogically beneficial ways:

> "I think being exposed to technology like Padlet was useful because it is a resource I can implement as a teacher to engage students." (Emily, in-class student)

Technologies in a f2f lecture classroom are often used in a display mode, i.e. students observe the instructor using these technologies rather than utilizing them for their own work. In a VC classroom, nearly all technologies are participatory. In other words, they require that students upload their contributions to the relevant application and work with it in order to solve a problem or answer questions. Moreover, in the class discussed here, all technologies were deliberately used in an interactive mode, thus empowering students to be active learners and rely on each other to use discipline appropriate language in their negotiation of meaning while trying to find solutions for the tasks. By actively participating in the use of new technologies, students were able to learn not only the content of the class, but also the ways to incorporate technological applications into a variety of topics. They commented that, as teachers, they would infuse such technological tools into their own classes to promote a more collaborative environment:

> "I think being exposed to technology in such an intensive way was useful because it is a resource I can implement as a teacher to engage students" (Sean, on-line student).

As mentioned above, one of the tools that was used most often for collaborative tasks in this class was Padlet. We analyzed students' and instructor's responses to Padlet. Recall that Padlet is a virtual whiteboard that can be set up by the instructor and/or students. The instructor is able to upload and display videos, photos, and documents that students can view, discuss, and respond to. Padlet allows developing tasks for individual students, small groups, or the whole class. Students can post their comments, reflections, essays, and other types of responses in real time. While students work collaboratively on Padlet, the instructor can observe their writing in progress and listen to their discussions. Padlet can also be implemented in an asynchronous way for individual projects or homework. Padlet is cost effective as it is free for students and carries a nominal annual subscription fee for instructors. Overall, Padlet can be described as a collaborative interactive online tool (Lysunets & Bogoryad, 2015) that is easy to use, inexpensive, and readily available. It is particularly useful for collaborative tasks in language teaching. Sample activities developed for Padlet during this research are discussed in the Results section and illustrated in Appendix A.

From the perspective of MNT, the results of the analysis of students' and instructor's reflections and surveys indicate that Padlet approximates f2f communication in the following areas:

1. Students consistently point out that the "Padlet activity was a good way to reinforce various theoretical concepts introduced in class" (anonymous response in a survey). This indicates that there was no perceived increase in cognitive effort while using Padlet (Kock, 2005).
2. Students and the instructor pointed out the value of the immediacy of communication and feedback (Kock, 2011) provided by Padlet: "I enjoyed the collaboration on problems using padlet" (student exit slip); "I find it valuable that I can read students' responses as they are writing them and redirect the activity at any time" (instructor's reflection).
3. Padlet allows students to "not only discuss, but also track and write out our answers" (anonymous survey) and go "beyond the face-to-face medium" as they "could see everyone's responses right away and question them whenever we were in doubt" (anonymous survey), thus making communication less ambiguous (Kock, 2011).

From the SCT perspective, Padlet encourages:

1. Agency of learners (Meskill, 2013): "I liked the small group discussions because it helped me express my knowledge and also listen to what others had to say" (anonymous survey).
2. Mutuality of individuals and their sociocultural environment (Meskill, 2013): "It is good to work with our Stamford colleagues to see the variety of answers that we come up with" (exit slip).
3. Assistance from others (Vygotsky, 1987): "I enjoy working in groups on padlet and discussing out loud our answers between the classes. I feel like I am understanding and

getting a good hold on the material through these discussions" (exit slip).

4. Internalization via verbalization (Vygotsky, 1987): "A nice way for us to not only discuss but also track and write our answers"; "The discussion on Padlet proved to be very useful in clarifying my understanding" (exit slip).

Overall, Padlet is used and perceived as an interactive tool that allows students to collaborate, problem solve, build community, and negotiate meaning in the VC environment.

Conclusion

This descriptive study of using VC technology in a TESOL teacher education program indicates that it is a feasible alternative to f2f teaching and that it has clear benefits and some challenges. Several features shared by the VC and f2f classrooms include:

- Collaborative teaching/learning;
- Opportunities for negotiation of meaning;
- Visual presence of students and instructors;
- Real time communication; and
- Simultaneous availability of oral and written modalities in activities and tasks.

We identified the following differences between the two types of class environments:

- VC requires more attention from the instructor in designating the floor during collaborative tasks;
- VC lacks opportunities for informal and private communication among students;
- VC does not provide opportunities for private communication with the instructor during class for distant cohort; and
- VC allows for more convenience and time/money savings in regard to travel.

Overall, we find that given the convenience of VC, it is a viable solution for teacher certification needs, professional development requirements, and other aspects of teacher training when f2f meetings present a hardship that prevents teachers from engaging in the necessary course work. This is particularly important for teacher training in shortage areas, which includes ESL and bilingual education specialties. In addition to the usefulness of VC for course work, we find that teacher candidates in VC classes are exposed to, and actively engaged in, using current pedagogical techniques and technologies for learning. In other words, they are apprenticed into "the professional community of practice" (Darling-Hammond et al., 2005, p. 200) which trains them to infuse technological tools and collaborative pedagogical tasks into their own classrooms.

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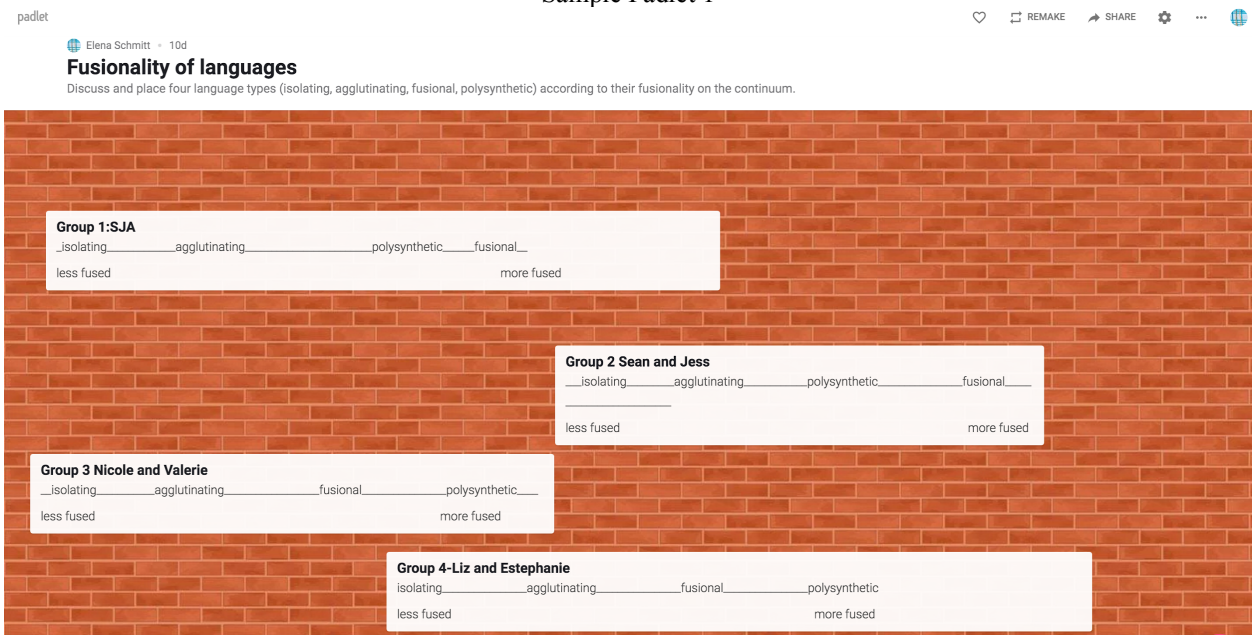
Appendix A
Sample Padlet 1



Sample Padlet 2