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Making Space for Innovative Practice  
Supporting Teaching and Learning through Integrating Online Peer-to-Peer Feedback Between  
Geographically Separated Students

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**Abstract**

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This dissertation is comprised of three linked studies investigating integrating online feedback practices into traditional classrooms. It focuses on one innovative practice, that of online peer-to-peer feedback, and highlights aspects of the process of developing this practice in each article. Each article relies on separate but connected analyses and draws on separate literature bases and developing conceptual frames.

The first article investigated student needs and perceptions of an online community developed for the purpose of exchanging peer feedback on their scientific explanations. It considered teacher instructional decisions and design choices of existing online tools as teachers sought to bridge from traditional pedagogy into supporting student interactions online. Drawing upon analyses of interviews and surveys, students reports about their experiences suggested conditions for online feedback that were largely inconsistent with both related literature in higher education and with what teachers had expected their students would need with regards to the online community.

The second article examined the quality of student online asynchronous talk as well as the skills and processes needed to effectively contribute to feedback discussions online as they worked through an engineering design process. Applying an explanatory mixed methods design, findings suggested a possible mismatch between the emphasis on teaching students how to give feedback and what actually sustains conversation to support reflective thinking.

The third article investigated how teachers implemented the innovations aimed at enabling geographically separated students to give and receive feedback online. Four master teachers identified contextual factors and events that supported or hindered their ability to bring the new tool of online peer feedback into their classrooms: their “implementation pathways.” While online peer feedback technology integration helped focus teacher thinking, this article involved teacher reflection on the process of implementing innovative ideas more broadly. Findings demonstrate how important context is in providing the space for innovative practice.

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## **DEDICATION**

To every educator (colleague, parent, community member, friend) who continues to put

“what is best for kids”

at the forefront of our thinking and decision making.

## Introduction

Feedback is a foundational pedagogical practice in education and an important part of what facilitates learning for students (Brookhart, 2008). Peer feedback is a way for students to engage with each other to improve their work, thereby increasing learning through participation and access to others (Bransford, et al., 2000). Pushing traditional feedback practices online has a strong research foundation in the design of higher education online courses (e.g. Keengwe, & Kidd, 2010; Palloff & Pratt, 1999, 2001, 2005; Rovai, 2002), and many have found value in online peer feedback for higher education (e.g. Ertmer et al., 2007). However, we know considerably less about how a similar move impacts the experiences and learning of younger students, and whether or not transferring design practices across age groups is appropriate.

My dissertation is comprised of three linked studies investigating these issues. These studies represent results from four years of work with four public school teachers and their students. While a single study design with one central conceptual framework and set of research questions could more deeply target the design of online tools to support student learning, it is in my ongoing work with these teachers that I see current relevance in showing an entire process of iterative thinking, designing, implementing, and reflecting around online peer feedback practices. In other words, it's not just about what they are trying to do, but how they go about it. Therefore, taken as a whole, this dissertation focuses on one innovative practice, that of online peer-to-peer feedback, and highlights aspects of the process of developing this practice in each article. Each article relies on separate but connected analyses (for example, year two extends findings from year one) and draws on separate literature bases and developing conceptual frames. The structure of the dissertation is as follows:

*Article 1: From F2F to Online: Defining and Designing Community*

This article investigated student needs and perceptions of an online community developed for the purpose of exchanging peer feedback on their scientific explanations. It considered teacher instructional decisions and design choices of existing online tools as teachers sought to bridge from traditional pedagogy into supporting student interactions online. After using online peer feedback to support work on a classroom activity, students reports about their experiences suggested conditions for online feedback that were largely inconsistent with both related literature in higher education and with what teachers had expected their students would need with regards to the online community.

*Article 2: Online Talk: Supporting Purposeful Online Feedback*

In the second article I looked more closely at the student online asynchronous talk that happened during the 2014-2015 school year. Based on groups of students different from the previous year, findings reinforced the value of online experiences from year one and incorporated design changes teachers made from year one to year two. For 2014-2015, teachers extended online talk into two projects spanning across the entire school year. Given results from year one, teachers focused more on having students discuss schoolwork rather than placing equal emphasis on social talk for community building.

Partway through this second project, I observed that student online talk was often generic and lacked detail. After discussing the issue with teachers and reaffirming their goals, I designed and facilitated an intervention to reinforce student understanding of the nature of feedback, hoping to create more effective online peer support. Article 2 examined the quality of student online talk as well as the skills and processes needed to effectively contribute to feedback discussions online as they worked through an engineering design process. Findings suggested a possible mismatch

between the emphasis on teaching students how to give feedback and what actually sustains conversation to support reflective thinking.

*Article 3: Teacher Actions: Critically Reflecting on Implementation Pathways*

In the third article I investigated how teachers implemented the innovations aimed at enabling geographically separated students to give and receive feedback online. Four master teachers identified contextual factors and events that supported or hindered their ability to bring the new tool of online peer feedback into their classrooms: their “implementation pathways.” Conversations with administration and district leadership provided context for interpreting the situations teachers described. While online peer feedback technology integration helped focus teacher thinking, this article involved teacher reflection on the process of implementing innovative ideas more broadly. Findings demonstrate how important context is in providing the space for innovative practice.

As you go through the articles, it should be noted that much of this work is qualitative in inquiry, and the procedural and analytical choices I made as well as my past experiences certainly impacted the research. For this reason I have tried to examine and present those choices in a transparent manner (Hand, 2003) and return to the data “over and over again to see if the constructs, categories, explanations, and interpretations make sense” (Patton, 1980, p. 339). I have also tried to provide an accounting that is credible to the participants and accurately represents their realities (Schwandt, 1997; Creswell & Miller, 2000). Yet, it is fair to say that having now been in the field of education for 23 years as a 16 year former teacher as well as a teacher educator and researcher has influenced the work and the four years I have spent with the teachers in these studies.

For the teachers, the work began with their interest in trying something new and my

ability to provide access to an online space. While I believe that my positioning positively impacted my access to schools and the openness that teachers had in sharing their thoughts, I was particularly conscious to make sure their decisions were carried out. However, overtime, the voice of the researcher-colleague role that I had taken on shows itself more prominently in the third study as I was in-part trying to facilitate the work they wanted to do and I felt their struggles through my past experiences as well as theirs. I also directly benefitted in their success as being welcomed into the classroom to do the research. With students, I was always open with them as to my role in the classroom, but I believe the amount of time I was present in their daily work, particularly during the times they were online, impacted their comfort in seeing me as another helpful adult in the classroom versus a researcher on the outside. Accounting for this, I hope I have accurately represented participant perceptions in the work, and I leave to the reader to judge applicability and validity to the inferences drawn from the data (Hammersley & Atkinson, 1983).

### **Definition of Terms**

*Asynchronous communication.* The intermittent exchange of messages via digital means that allows participants to read and respond when they choose rather than having sender and receiver transmitting steady messages back and forth during the same time frame (Linux Information Project, 2005).

*Feedback.* A necessary component of student learning (Driscoll, 2000). Feedback is the information provided back to the learner on how the work is being interpreted, experienced, or read by another, which allows one to consider whether or not to revise accordingly. It is also a mechanism for self-regulated learning where students are actively engaged in using the

information received to improve an outcome as well providing information to others (Nicol & Macfarlane-Dick, 2006).

*Implementation pathway.* The steps and situations that a teacher identifies as aiding or hindering his or her ability to fully implement a practice in his or her classroom. This includes design and instructional use of the practice.

*Pedagogical technology framework.* How teachers see the relationships between pedagogy and technology, derived from Okojie, Olinzock, & Okojie-Boulder, 2006.

*Peer Feedback.* Students providing feedback (as defined above) to each other on work they are creating either F2F or via online tools.

*Technology integration.* Incorporating technology into the classroom by making it part of the learning environment and part of the process of learning (Dias, 1999; Morton, 1996; Okojie et al., 2006).

## References

- Asynchronous communication. (2005). In *The Linux Information Project*. Retrieved from <http://www.linfo.org/asynchronous.html>
- Bransford, J. D., Brown, A. L., & Cocking, R. (2000). *How people learn: Brain, mind, experience, and school*. Washington, D.C.: National Academy Press.
- Brookhart, S. (2008). *How to give effective feedback to your students*. Alexandria, Virginia USA: Association for Supervision and Curriculum Development.
- Creswell, J. W., & Miller, D. L. (2000). Determining Validity in Qualitative Inquiry. *Theory into Practice*, 39(3), 124-30.

- Dias, L. B. (1999). Integrating Technology. *Learning and Leading with Technology*, 27(3), 10-21.
- Driscoll, M. (2000). *Psychology of Learning for Instruction* (2<sup>nd</sup> ed.). Boston, MA: Allyn and Bacon.
- Ertmer, P., Richardson, J., Belland, B., Camin, D., Connolly, P., Coulthard, G., Lei, K., & Mong, C. (2007). Using Peer Feedback to Enhance the Quality of Student Online Postings: An Exploratory Study. *Journal of Computer-Mediated Communication*, 12(2), 412-433.
- Hammersley, M., & Atkinson, P. (1983). *Ethnography: Principles in practice* (2nd ed.). New York: Routledge.
- Hand, H. (2003) The mentor's tale: a reflective account of semi-structured interviews. *Nurse Researcher*. 10(3), 15-27.
- Keengwe, J., & Kidd, T. (2010). Towards Best Practices in Online Learning and Teaching in Higher Education. *Journal of Online Learning and Teaching*, 6(2), 533.
- Morton, C. (1996). The modern land of Laputa. *Phi Delta Kappan*, 77(6), 416-419.
- Nicol, D. J., & Macfarlane-Dick, D. (2006). Formative Assessment and Self-Regulated Learning: A Model and Seven Principles of Good Feedback Practice. *Studies in Higher Education*, 31(2), 199-218.
- Okojie, M., Olinzock, A. A., & Okojie-Boulder, T. C. (2006). The Pedagogy of Technology Integration. *Journal of Technology Studies*, 32(2), 66-71.
- Palloff, R., & Pratt, K. (1999). *Building learning communities in cyberspace*. San Francisco: Jossey-Bass.
- Palloff, R., & Pratt, K (2001). *Lessons from the cyberspace classroom*. San Francisco: Jossey-Bass.

- Palloff, R., & Pratt, K. (2005). Learning together in community: collaboration online. Proceedings 20th Annual Conference on Distance and Teaching and Learning. University of Wisconsin, Madison, Wisconsin, August, 2005.
- Patton, M. Q. (1980). Qualitative evaluation methods. Newbury Park, CA: Sage.
- Rovai, A. P. (2002). Development of an instrument to measure classroom community. *The Internet and Higher Education*, 5(3), 197–211.
- Schwandt, T. A. (1997). *Qualitative inquiry: A dictionary of terms*. Thousand Oaks, CA: Sage.

## Article 1

### **From Face-to-Face to Online: Defining and Designing Community**

There is no disputing that in our digital age, technology brings together people previously constrained by geographical distance. The use of digital communication channels not only makes this possible, it comes with a number of social advantages. We have the flexibility to participate at all times, whenever and wherever convenient, and there is an element of choice in the quality, quantity, and amount of time spent. Short or long responses can be equally valuable, and they can encourage reflection because one doesn't have to respond immediately. There is also more equal participation because there are fewer status and position cues online (Eastman, 1995; Harasim, 1990), and relevance and equity are often high because the real experiences that are often shared can be accessed more broadly (Hollingshead, 1996; Price, 2009). People, including those who have never met face-to-face (F2F), are connecting across time and space, and the ability to be together virtually continues to become infused into our daily lives, socially, academically, and professionally (Ito, et al., 2013, Adams, 2011).

This is changing our work environments. Professionally, scientists use digital tools to converse across geographical boundaries in order to solve problems, create solutions, and co-construct new knowledge (Nielsen, 2008). Online science forums, professional learning communities (PLCs), and use of personal blogs help them work together and solicit feedback from others to expand thinking. There are potentially similar advantages for education since learning has long been considered to increase with collaboration and access to others (e.g. Bransford, et al., 2000).

Students can benefit from digital collaborative tools that can support idea exchange, knowledge building and participation in authentic learning communities (Matuk & Linn, 2014).

Connecting students via communication technologies in online classrooms can capitalize on scant resources, providing additional support from experts or other students in similar circumstances (Lips, 2010). For example, if a student is the only one in a F2F classroom reading a particular book or working on a specific math concept, providing online communities for support can help meet individual needs in and out of the school day. It can also encourage students to be proactive and resourceful, requesting help from others in an academically focused and safe environment (Black, 2005).

Young students are already accessing online resources and connecting with unknown others online, particularly in gaming environments, yet this does not necessarily equate to an understanding of digital interactivity (Baym, 2010) or to an ability to productively interact in online and hybrid spaces for academic purposes. While we have significant research about designing higher education online communities for learning (Palloff & Pratt, 1999, 2001, 2005; Rovai, 2002; Shackelford & Maxwell, 2012), one of our challenges in K-12 education is that we know little about whether those same design elements that replicate the needs of a F2F community work in the same ways for younger students. Should the communities that we design for them online be designed in the same way we carefully craft them F2F? Is the kind of community that develops for K-12 students accurately portrayed by relating it to the higher education literature? Are students gaining the needed skillsets to prepare them for continued education or for collaborating online professionally (Meoller & Reitzes, 2011)? If participating in online communities has affordances beyond what F2F activities currently provide, then teachers need to leverage technology to help students learn to access and interact with others more broadly.

In this study, I worked with two 5th grade teachers to design and implement online peer

feedback practices between their classes. Based on their F2F teaching expertise, teachers believed that developing a sense of community was crucial for students to effectively engage in feedback practices because their students had never met F2F. As a result of their design decisions, I investigated student online needs and perceptions where students exchanged feedback on their work and teachers sought to extend traditional pedagogy into supporting student interactions online. The following questions were examined:

1. What are the experiences of students in a collaborative online space designed for the purposes of peer feedback? How do students perceive the usefulness of online peer feedback?
2. How do students compare their online experiences with unknown, geographically separated peers to experiences in their F2F classroom communities?
3. What kind of community develops online between unknown, geographically separated peers engaging in online peer feedback?

The online space provided students a place to asynchronously extend their thinking with geographically separated others. Students shared work, ideas, and gained peer feedback on the evidence-based models they were developing to explain a scientific phenomenon. Specifically, students investigated sound breaking glass as viewed in a video of a man shattering a wine glass with his singing voice. By examining how these younger students experienced the online space and their needs for purposeful online peer feedback, I hoped to contribute to our understanding of how to design online communities to better support F2F instruction for this age group.

### **Literature Review**

In the following review of literature, I map out a relationship between learning and peer feedback where feedback is part of classrooms as communities, discuss F2F classrooms as communities, and describe how concepts of F2F community have been applied to online environments.

## **Learning and Peer Feedback**

Learning is said to increase with participation and collaboration (Johnson & Johnson, 1975; Bransford, et al., 2000; Webb & Palinscar, 2007), particularly in a classroom community environment where there is a culture of learning (Bielaczyk & Collins, 1999). A goal in this environment is that knowledge construction is a group effort that supports the growth of individuals (Scardamalia & Bereiter, 1994). To facilitate this, students are expected to and supported in providing feedback to each other, a way for them to exchange ideas and improve their work. This can happen because “peers can introduce new perspectives and motivate students to reconsider their own ideas” (Linn, 2000, p. 788). While the process of communicating with peers is generally less formal than working with an instructor, the feedback is potentially more accessible (Ellman, 1975).

Cho, Chung, King, and Schunn (2008) explain that peers are “more likely to share knowledgebases, experiences, and problems; such socially shared cognition enables them to establish common ground that stimulates the development of mutual knowledge” (p. 85). In a series of studies comparing peer and expert feedback in improving writing (Cho & MacArthur, 2010; Cho et al., 2008; Cho & Schunn, 2007; Cho, Schunn, & Charney, 2006), Cho and colleagues found that students perceived peer and expert feedback to be equally valuable, and anecdotally, that commenting on others’ work helped them see ways they could improve their own. Feedback by multiple peers was more effective in improving content development and writing than feedback from a single expert in that it prompted more complex repairs (things like organization and thesis revision versus grammatical changes). They also found that peers were able to provide helpful and relevant feedback to each other because they solved problems in similar ways. “[Peers] are more accurate than experts at understanding other non-experts’

problems because they use more cues and more exhaustive search strategies and do not restrict themselves exclusively to private knowledge” (Cho et al., 2008, p. 85).

Xiao and Lucking (2008) looked at feedback effects on task performance and student satisfaction with 232 college undergraduates. Students wrote course-required articles and participated in peer assessment and peer feedback, both as part of their grade in the course. Students were provided training as an 80-minute peer assessment and feedback introduction and opportunities to practice with the rubrics. Post activities, they filled out a 4-point Likert satisfaction survey. They found that the process of providing peer feedback helped students identify places where they could improve their own work as well as gain ideas from others. Liu and Lee (2013) had similar findings using a case study of 12 graduate students over a 10-week course. They investigated online peer feedback and student learning using interviews and student journals. They found that students did use peer feedback to make changes to their work and that participating in the practice could help students evaluate themselves as a means toward self-regulated learning.

While peer feedback is considered an important part of classroom community, peer feedback does not always yield positive results (Hattie & Timperley, 2007; Shute, 2008; Strijbos, Narciss, & Dunnebler, 2010). Particularly if evaluative, peers can see feedback from each other as unfair (Sluismans, Dochy, & Moerkerke, 1999), or they may question whether or not another student is qualified to provide comments (Van Gennip, Segers, Tillema, 2010). Additionally, while some find the quality of feedback to be better from an instructor (Orsmond, Merry, & Reitch, 1996), peer feedback is said to compensate for this because it increases the amount of feedback given and alleviates the tension between timely feedback and instructor workload (Ertmer, et al., 2007; Topping, 1998).

Given the issues above, Roussin and Zimmerman (2014) explained that the focus of feedback should be on mastery not performance and note the importance of trust and positive relationships to support learning. This is important because student perceptions of their own learning are potentially influenced by how successful teachers are in conceptualizing and supporting feedback within their classroom communities. This type of environment enforces the value of peer feedback in learning through participation (McMillan & Chavis, 1986; Dewey, 1889/1990; Sergiovanni, 1994; Furman, 2002; Lave & Wenger, 1991). It is equally important to recognize that feedback is only one type of conversation that happens in a classroom, and Bruffee (1984) emphasizes that understanding “conversation requires us to understand the nature of community life that generates and maintains conversation.”

### **From F2F Community to Online Community**

The term community has been called “one of the most nebulous concepts in the social science lexicon” (Driskell & Lyon, 2002). Lists identifying the characteristics of “community” have come from numerous disciplines such as anthropology (Geertz, 1983; Lave & Wenger, 1991; Rogoff, 1990) and education (Brown & Duguid, 1991; Scardamalia & Bereiter, 1993; Sergiovanni, 1994). While a concrete definition that applies to all remains elusive, common threads can defer back to classic sociology definitions by Park (1936) and Hillery (1955), suggesting that community is comprised of three main characteristics: a specific place, common ties, and social interaction (Lyon, 1999). While Park (1936) originally conceptualized place as an intimate localized group located on the physical “soil it occupies,” others argue that community can exist in larger groups in shared spaces such as schools, work places, and volunteer organizations (Rubin, 1969). Lave and Wenger use the term “communities of practice” in explaining that community does not “imply necessarily co-presence, a well-defined

identifiable group, or socially visible boundaries” (1991, p.98). Going back to the need for common ties and social interaction, they state that community does require “participation in an activity system about which participants share understandings concerning what they are doing and what it means in their lives” (Lave & Wenger, 1991, p. 98). Adding to this, Barab, Kling, and Gray (2004) state, “Community is something that must evolve from within a group around their particular needs and for purposes that they value as meaningful.” Reil and Polin (2004) remind us that all communities are not healthy environments, and when members struggle to develop common practices and shared values, they may be unable to support group activity.

Watson and Battistich (2006) explain that all classrooms and schools are communities in some sense, and many have argued that a strong sense of community is a central component “to a well-functioning and productive classroom and school” (e.g. Kohn, 1996; Putnam & Burke, 1998; Freiberg, 1999; Rogoff, Bartlett, & Turkonis, 2001; Wolk, 1998). While the type of classroom community is dependent on the specific goals, beliefs, and learning theories adopted by the teachers, the classroom community is a place where members matter to each other and meet each other’s needs (McMillan & Chavis, 1986). Such a place also emphasizes the building of strong relationships founded on commonalities (Dewey, 1899/1990; Sergiovanni, 1994; Furman, 2002), and this generally leads to the development of unspoken norms that members acknowledge (Lave & Wenger, 1991).

Beliefs around needs for community extend into the online literature where the idea of shared space includes an even broader virtual environment. Appreciating the complexity of community, Roy Pea (2003) cautions against focusing too much on the details of a definition preferring to allow definitions to guide exploration. Online community has been defined as a “social network” that brings together geographically separated others around “shared interests”

and should be considered “in terms of social relationships rather than in terms of space” (Hiltz & Wellman, 1997, p. 44). Barab et al. (2004) continue the idea of network and adjust a definition of community to apply to online spaces. They insert the term “socio-technical” to define the kind of network “of individuals who share and develop an overlapping knowledge base, set of beliefs, values, history, and experiences focused on a common practice and/or mutual enterprise” (p. 26).

Student needs for online community focus on the value of interaction in lieu of physical space, and much of what we know about how this works comes from research on the development of higher education online courses. Successful online courses are said to create a sense of community similar to what is purposefully crafted F2F (Palloff & Pratt, 1999, 2001, 2005; Rovai, 2002). This involves designing in ways to create connection, participation, safety, support, belonging, and empowerment (McKinney, et al. 2006). This can be done through opportunities for rich and relevant discussions sharing multiple perspectives (Bender, 2003), facilitating and managing strong group participation, and creating a culture of collaboration on group projects (Hurst and Thomas, 2004; Brindley, Walti & Blaschke, 2009; Kumar, Kenney, & Buraphadeja, 2012).

Yet students often feel disconnected online as a result of geographical and time separations inherent in online interaction (Slagter Van Tryon & Bishop, 2009). A strong sense of online community is therefore necessary to address these issues that impact both how students interact as well as overall student satisfaction (Palloff & Pratt, 1999, 2001, 2005; Rovai, 2001, 2002). For example, Gunawardena and colleagues have done extensive work around online social presence (the degree to which one is perceived as “real”). In an initial study, 50 students across five universities participated in a virtual conference that was a required activity in their

course. Satisfaction was defined as the value in the online communication facilitating learning for these students, as measured by 52 five-point Likert-scale items related to social presence, perception of equal participation, and technical skills. Using step-wise regression analysis, they found that social presence was a strong predictor of student satisfaction in an online environment. Their findings suggest that participating online while working on issues of common interest helped students feel part of the group. Other studies have come to similar conclusions and suggest that perceived social presence not only is needed to encourage interaction, but it could make participation more rewarding (e.g. Moore & Kearsley, 2005; Rourke, Anderson, Archer, & Garrison, 1999; Tu & McIsaac, 2002).

While the foregoing literature provides some theoretical perspective which can inform designs for online learning communities in higher education, we know much less about k-12 student experiences. In this study, I investigate how younger students perceived online peer feedback within an online community. My goal was to clarify student needs in order to guide future online design for this age group.

### **Theoretical Perspective**

Socio-cultural theory emphasizes that learning is a social process that involves the community in the activity of “making meaning” (Vygotsky, 1978). Interacting with others to co-construct knowledge while guided by the beliefs, values, and tools of one’s culture play important roles in the development of cognition. Yet learning happens not just through the actions of individuals, but in the context of the community that supports the development of its members (Herrenkohl & Guerra, 1998). Students learn “to take responsibility for their contribution to their own learning and to the group’s functioning...[and] it is a community working together with all serving as resources to the others” (Rogoff, 1994, p. 214). Because my

interest was in peer feedback within a particular technology-mediated context, taking a socio-cultural view helped orient me to looking at how the experiences students had online were affected by the online space, as a new “mediating” tool they used in the context of supporting each other with peer feedback. In the next section, I explain the methodology that addressed the research questions.

### **Method**

This qualitative study investigated the online experiences of students in two 5<sup>th</sup> grade public school classrooms over most of a school year, examining online and F2F activities during a science unit on sound over the course of the three-month collaborative project. Data in the form of surveys and interviews were gathered to analyze student perceptions regarding previous activities F2F and their new experiences online. What follows is a description of the teachers, students, and settings involved, the data sources and collection procedures, and the data analysis approach.

#### **Participants and Settings**

The study sample consisted of two classes of 5<sup>th</sup> grade students (n=49) who had been evaluated and identified as “highly capable” per their district evaluation criteria. They were enrolled in two different schools and districts in a Pacific Northwest state, geographically separated by 40 miles to ensure that students would not have previously met F2F. Their teachers were unknown to each other before the start of the study, and they were both considered experienced. They both held masters degrees along with state certifications and had each taught at least 16 years. The teachers volunteered to be part of this study, and they had administrative support.

The two classroom settings differed because the two districts had different types of

programs to support their highly capable students. Yet, all students saw their time in their program classrooms as being with “others who get my ideas.” One classroom was a once-a-week pullout program considered additive enrichment to enhance the learning of all 3<sup>rd</sup> - 6<sup>th</sup> grade highly capable students in the district. Therefore, students came to this program from all elementary schools across the district, and the teacher running this program only saw her 5<sup>th</sup> graders one day a week. The rest of the week, these 5<sup>th</sup> graders attended their home school general education classrooms to receive core content instruction and this teacher taught the other grade levels, one grade level per day. 26 students were in this classroom, ages 10-11 years old. There were 12 males and 14 females. 9 of the students self-described themselves as expert level in their comfort with technology, 15 as comfortable, 0 as uncomfortable, and two did not answer. The ethnic breakdown was: 12.5% Native American, 16.7% Asian, 37.5% White, and 33.3% Mixed.

The other teacher taught in a fully self-contained program for highly capable students. This meant that identified students, electing to be part of the program, chose the elementary school that housed the program as their primary, full-time school. They saw their teacher all day, every day, and she was responsible for all their core content instruction. The time then that this teacher could decide to dedicate to any one activity or discipline was flexible. 23 students were in this classroom, ages 10-11 years old. There were 9 males and 14 females. 9 of the students in this classroom self-described themselves as expert level in their comfort with technology, 12 as comfortable, 1 as uncomfortable, and one did not answer. The ethnic breakdown was: 9.5% Asian, 9.5% Native Hawaiian/Pacific Islander, 28.6% White, and 52.4% Mixed.

**F2F classroom and feedback.** Both teachers valued the idea of developing strong

classroom community, evidenced by discussing books focused on belonging with their students, and encouraging student voice in procedures and norms. For example, both teachers had their students construct class rules and policies and expectations of each other and teacher. These were visible as posters or a class constitution, and both classes dedicated time on a regular basis to open sharing and supporting each other. Both teachers also operated in a cognitive-developmental model (Feinburg & Mindess, 1994), encouraging students to challenge each other's ideas, raise questions, and consider alternate possibilities.

To this end, the role of feedback as an instructional strategy for both these teachers was not only fundamental to teaching and learning, it required the support of a strong classroom community where students felt safe and comfortable sharing with each other. One teacher described feedback as “happening all day long” in multiple forms: verbal, written, peer, academic, social-emotional. Peer feedback was particularly important because her students spent so much time working in groups, and the class emphasized helping each other be “the best they can be.” The other teacher said her students “give feedback to each other constantly” because they are always sharing and working collaboratively. While she described the feedback she provided, she stressed student accountability, learning to self-assess, and using the language in a rubric to learn to support the work of others.

**Pedagogy and technology.** Both teachers also saw a direct connection between technology and their teaching practice. Technology was seen as a tool to help students engage in the process of learning. It was seen as part of instruction. In the words of one teacher, technology in the classroom should be invisible, “just a normal everyday part of life, integrated into just the way it is.” The other teacher made direct connections to helping her students use the tools the same way professionals did. Students were called on to use the technology to help them

learn, having to constantly make choices about how to organize themselves, what resources they needed to complete a task, and what, if any, technology could help them reach their objectives.

**Online space.** As these two teachers met each other and discussed the set up of the online space (what tools students should have access to, types of discussion threads, amount of adult interaction, student groupings), they also made a number of instructional decisions in how to best prepare their students for peer feedback in a new online environment. Both teachers not only believed that a strong sense of community could be established online, they both felt that recreating the same kind of community their students had F2F was crucial for their students to engage in online feedback practices together because they had never met F2F.

Building on this belief, they designed in introductory activities to help students get to know one another. These included a Skype call so that students could “see” each other, a teacher-led activity to help students notice commonalities, get-to-know-you forums where students would post facts about themselves to share and find connections with others, and student ability to create their own profiles and “fun” discussion threads. Students could respond to each other online any time, in-school or out. Although they decided not to have a teacher present in the online space due to constraints on teacher time (absent teacher presence discussed in higher education literature such as Picciano, 1998), we agreed that I would monitor the discussions for safety and myself and one other former teacher would be the accessible online “wizard” if students felt they wanted adult input.

**The curriculum project.** After students were introduced to each other virtually, they started to investigate the same sound phenomenon in their physical classrooms. Students watched a short video clip presenting the phenomenon of a man breaking a wine glass with his voice. After students drew and described their initial individual models explaining their

understanding of how the glass broke, they were placed in small groups and asked to construct a group model. Teachers then facilitated different activities, crafted by each individual teacher, to help their students explore the phenomenon of sound (discussions, additional video clips, experiments). Students applied their learning to continually revise their models, sharing iterative designs online, co-creating knowledge and providing feedback to each other as their understanding of the phenomenon changed.

### **Data Collection Process and Data Sources**

All students took an anonymous pre-survey focused on identifying aspects that helped them feel included in a classroom and those that were positive or negative issues in the way their F2F learning environments functioned. Each time they were online, they completed a group exit slip survey. After creating a final version of their models, students individually completed a survey probing their sense of online community. Toward the beginning and again at end of their time online, both teachers as well as selected students in each class (n=8) participated in individual semi-structured interviews. These are explained in more detail below.

Exit slips, surveys, online participation analytics, and student interviews were used to investigate the student perceptions about their online experiences. The following additional data sources provided context: ten F2F classroom observations in each classroom prior to and during online interactions, F2F classroom artifacts, semi-structured interviews with each teacher, and online work samples and records of discourse.

**Exit slip surveys.** Pre, during, and post online survey data were gathered from all students in the form of periodic exit slip surveys. Exit slip surveys focused on student use of the online space during class sessions, perceived quality of the feedback, and whether or not they revised based on that feedback. For example, after their first experience online (which included

teacher activities such as the Skype call), students were asked to describe their experiences getting to know other students virtually. Subsequent exit slip surveys focused on how students used their time in the online space (responding to posts, posting something for review, or other), how they interacted (typing, recorded voice, video, or file attachment), a self-assessment on how well they used their time (productive activity), and an evaluation of how purposeful or helpful the online space was in improving their work. Students were also asked if, based on feedback, they added, changed, or had additional questions regarding their models. The following sentence structures were provided in the online exit slip survey for student optional use:

- **We added** (or we will add...) \_\_\_\_\_ because \_\_\_\_\_. We think \_\_\_\_\_ supports our model, but it also tells us that \_\_\_\_\_ should be added to make it more accurate.
- **We changed** (or will change...) \_\_\_\_\_ because \_\_\_\_\_. We used to think \_\_\_\_\_ but now we think \_\_\_\_\_ because \_\_\_\_\_. We think \_\_\_\_\_ contradicts in our original model because \_\_\_\_\_.
- **We are wondering about** \_\_\_\_\_ (part of your model) because \_\_\_\_\_. We think that if we knew \_\_\_\_\_, it would help us explain \_\_\_\_\_.

**Other surveys.** More extensive initial and final online survey data were gathered from all students. These surveys focused on student perceptions of community, although the word “community” was not used in the language of the questions. In the initial survey, students were anonymously asked about what they felt they needed to feel part of their class. The final survey asked students to reflect on their time online (both at school and at home). Open-ended questions asked about previous student experiences working online (talking with unknown others, using a discussion board) and comfort with new technology. They also asked students to compare the two environments (F2F and online) for engaging in useful feedback and the importance of knowing someone well in order to do so.

**Online participation analytics.** Students' online activity analytics provided an overview of student engagement. These data was used to help teachers select students for interviews as well as get an overall sense of how students were using the online space. The measures included total number of participations (actively starting or responding to discussions), total number of pages viewed, and time of postings (to see if students used the space after school allotted hours).

**Student interviews.** Students volunteered to be interviewed by signing up on a sheet in the classroom, and eight students (four in each classroom) were chosen. Using the initial observational and quantitative data for each student, I worked with teachers to choose individual students from those who had volunteered who spanned the range of low to high amounts of online interaction. Interviews (one pre and one post per student) were a minimum of 15 minutes each and were semi-structured in order to inspect changes over time as well as “find out from them those things we cannot directly observe [from observations or the quantitative data]...feelings, thoughts, intentions...the meanings they attach to what goes on [in both F2F and online space]” (Patton, 2002, as cited in Merriam, 2009, p. 88). Data from the first interview guided subsequent questioning, and my evolving understanding from interviews was used to make additions to the final student survey (Miles, Huberman, & Saldaña, 2014).

The interview questions (Appendix A-1) initially sought to determine how much online experience students had previously, their initial experiences interacting online, and their thoughts on whether 1) working online with others they have never met could or would help their learning and 2) whether they could get to know someone well online. Follow up questions toward the end of the online work sought to more explicitly define the community values students saw as necessary to facilitate purposeful learning and collaboration in the online space contrasted to

similar activities F2F. Interview data were recorded, transcribed, and triangulated with those from multiple students, repeated observations, and online discourse and multiple work samples within the online system (Miles, Huberman, & Saldaña, 2014). All of this yielded an in-depth descriptive database appropriate for qualitative work.

### **Data Analysis**

Data analysis started with compiling results of the initial anonymous survey to inform interview questions. Once all interviews were completed, they were transcribed, re-read, and listened to numerous times. I engaged in an iterative coding process, noting positive and negative comments as well as the repetition of commonly used phrases and ideas (Bogdan & Taylor, 1975). The goal was to identify recurring elements that were supported across multiple types of data. A similar process was used to examine the analytics from the online space and the results of the online surveys (exit slips and initial and final surveys). Commonalities were then grouped to look at themes, with commentary tagged per interviewee and student to determine if those who had similar amounts of online interaction perceived their online involvement in similar ways. The following coding scheme was informed by the framing ideas, research questions, and recommendations for community development derived from higher education literature. It went through several iterations starting with what students spoke most about in their pre-survey (having a voice, working together, a friendly environment, others with similar school experiences, feedback, respect, support, and trust) then incorporating data from additional sources into the emerging themes (needing a visual of the person on the other end of the conversation, rules, task, feedback, accountability, time constraints, speed, roles, and feelings), and finally arriving at the following list. For example, in one case, “task,” “feedback,” and “feelings” were combined to form the code of TASK below.

Table 1.1

<i>Coding Scheme</i>	
<u>Code</u>	<u>Definition</u>
TASK	Objectivity of feedback: Any reference to online interactions being more task focused than person focused, resulting in more objective feedback (or references to where feedback would not be objective given other factors like emotions), and differences emotions played into the feedback.
ACCT	Accountability for providing quality feedback: Any reference to whether or not quality feedback was given or received.
TIME	Time as an affordance or constraint in online interactions: Any reference to time as a factor (length of time spent in the online environment, speed of interactions, speed in finding information to get to know others).
ROLES	Role situations affecting the activity: Any reference to role changes in the activity or changes in behavior due to a change in expected roles.
VISUAL	Any reference to the needing to “see” another person, whether in static profile pictures or video.

Initial assertions were made after examining the data to see if ideas were represented across data sources. Integrative memos were written and incidences reviewed with attempts to clarify and link analytic themes (Emerson, 1995).

### **Findings**

In this section, I first provide general statistics on how students used the online space. I then present a summary of findings on student experiences online with regard to perceived usefulness, students’ perceived differences between F2F and online settings, and the kind of community students saw as necessary to engage in traditional F2F feedback practices in an online environment with previously unknown others.

#### **General Statistics**

Table 1.2 provides some general statistics of how students used the online space, noting that on average, students were given 0.5-1.0 hours per week of dedicated in class time for

viewing, posting, and replying over the course of seven weeks. This does not include the hours of time teachers and students dedicated to both content instruction and F2F group collaboration for the development and revision of their science models.

Table 1.2

*Online Space Statistics*

<u>Type of Participation</u>	<u>Total Number</u>	<u>Median</u>	<u>Range</u>	<u>Average Per Student</u>
Total Discussion Threads	67			
Individual Discussion Posts	939	16	4 - 68	21
Page Views	7813	144	67 - 513	174

*Note:* For Total Discussion Threads, a total of 6 were created for the study (3 housekeeping ones and 3 related to science sharing). The rest were student created.

From this we can see that students readily created discussions and participated well and beyond the expectations for the unit. Students also checked in from home and sometimes posted early in the morning or very late at night, although this was never an expectation made by the teachers.

### **Student Experiences Online**

Overall, students generally agreed that online activities were purposeful and worthwhile, enhancing their learning and thinking. For example, one student said this was helpful to do because “we can learn to work with people that we don’t know and to like compare ideas with more people. Like later in life you’re gonna have to do [this] stuff [laugh] so it might be helpful to know it.” Others iterated similar opinions, agreeing that the feedback was good since it “made me look at it in a different way than what I had originally thought” and that the advice “helped to make what we were thinking better.” Another student explained that it was useful to not talk to “people I know already because I kind of think like them a little already.” In his mind, unknown others online would think differently and could help him “learn new things from each other and bounce ideas off each other.” Therefore, the activity of peer feedback itself, even if online with

unknown others, was viewed by students as useful to their thinking.

### **Differences Between Settings**

Students noted that, compared to their F2F experiences, the move to an online space with online tools to interact impacted the activity of feedback in a number of ways. These themes were reflected in their comments: Freedom: balancing the role of an absent teacher; Order without rules; Practical and emotional effects of time; and Objective, critical feedback.

**Freedom: Balancing the role of an absent teacher.** *“It kind of messes it up. Cause, you know, if there’s a teacher in there, it’d just be like ‘you better be talking about something school appropriate.’”* While the student who made the opening quote to this section did not engage in misbehavior, his point was that if a teacher was present, his focus would be on what the teacher wanted and deemed appropriate and not necessarily on what the students wanted to talk about that would be helpful, in the way they wanted to talk about it. Students felt they had more disciplinary liberty and used the word “freedom” repeatedly as a statement of comfort, feeling like they had “a little more freedom to ask or make comments,” even as they continued to adhere to previously established F2F social rules. One student explained:

I feel like [if there was a teacher there] that you’d be, you’d try and um well because the teacher would probably help and correct things from their point of view, but then when you look at another person’s your own ages point of view, it’s...I’d say it was better...cause then you start thinking oh now I need to change this and this and do this and this.

Although teachers were seen to provide good feedback F2F, students did see this as directing (and in some cases, limiting) their thinking. Yet, having peers questioning and telling each other to change things was not seen in the same way: “They weren’t really judging you...and they’re giving advice but it just wouldn’t, well, you’re a kid, and it feels more comfortable around another kid.”

Even though many students felt that learning might have been a little better with a constant teacher presence, particularly to remind them to ask questions, ultimately, most students preferred the absent teacher. One student described this as allowing “interactions, choices, freedoms, being able to decide what you want to do in this environment...and the online trust to do whatever.” Since we had decided on the absent teacher, we still felt the need to have an adult available if students wanted an adult perspective. For this reason, the “wizard” was created and students knew this person was a resource (albeit unused). One student summed up that no one talked to the wizard because they just knew he was available:

We didn't really get to know the wizard 'cause he didn't get into discussions so we kind of felt like, yeah okay, so here's the wizard. If the wizard had been in there like hey guys, what's going on, we would have been like hey wizard, what's up, and then we would have gone and asked him for other stuff.

**Order without rules.** *“Well, there wasn't(sic) very many rules online, but still people knew not to say bad stuff like really mean stuff or really bad stuff about people because they knew they'd get caught.”* Unspoken social rules coming from students F2F environments governed the ways to provide feedback. Unlike both F2F classrooms, where rules and norms were explicit and students held accountable (agreed on by the class, discussed, and documented in forms like a class list of rules or class constitution), students did not see the online space as having rules. Although students knew they would probably never physically meet, being online did not make it acceptable to treat others poorly as happens in some other digital spaces. Even though teachers did not mention rules for online behavior and students were not told that their online interactions would be heavily monitored to make sure they were respectful (which they were), no incidences of disrespect arose. Students stated that they knew the other class would abide by the same rules because:

...um, like no strangers can go on there and [other students] probably won't say

something negative about you, like really negative, like your work stinks or something because then they'd get in big trouble and so and that kind of helps me think that I should um share my work online and stuff.

Trust came for the interviewed students because "...they offered you...what's the word...feedback. They didn't like kill you like oh this sucked, you need to...they were respectful." The social rules on how to treat each other from their F2F classrooms carried over, un-vocalized.

**Practical and emotional effects of time.** Students reported experiences related to the amount of time it took to complete tasks online as well as the emotional results of communicating asynchronously. They appreciated being able to scan quickly through discussion threads to find information about others versus having to have longer conversations with new people F2F. However, the physical act of typing was slower. One student said, "Talking is just faster; online is slower because you have to type." Yet, it was more than just typing that was harder for some of them online.

Inherent in asynchronous communication, there was lag-time in waiting for a response from others. While a number of students described frustration, they also noted that it provided anticipation and mystery. But this was particularly difficult to adjust to for students who were first timers with online asynchronous communication. Trying to make sense of the environment, one student said, "There's not a lot of other people that responded to me and I asked them a couple of questions and I didn't see a response and yeah, I don't know why." Lack of response, if it went unanswered for too long led to insecurities until students understood the nature of the online environment and that the other class only saw each other F2F once a week. This meant that the other class could only be expected to respond once a week, even though they could have outside of class time.

Students also spoke to feeling like it took longer to make a connection, asynchronously online. One student explained:

It's slower because you're not available and at the computer all the time and like if you see this person at school, it's easier to get to know them cause they're in your class and when you see them more often you talk more.

Another said it was harder to talk online not just because of the typing but because "it's harder to show emotion unless like you do all caps to be mad or say 'I'm sad' or something and then it's just harder to tell." Some also talked about sharing fewer words because typing was slower and that affected how much information was shared and thus how quickly they were able to get to know each other. What did help was the use of profile pictures, yet not all students uploaded a picture. One stated that, "I didn't really meet their face." Seeing a face (even if a static picture) made a clear difference in speed of connectedness, and those students who were able to add profile pictures were able to choose how they would present themselves (actual picture, icon, graphic image). One student stated that while she didn't need to see them, "[a picture] was better because I could kind of get an idea of like more of their personality, what they were wearing, what they looked like."

While students spoke to feeling that they did "connect" online, they believed that this just happened over time. One student explained, "You like work with them then you sort of grow with them like working and giving each other ideas and then like you'll get to know them better." Another said, "You just work together a lot, ehh, it's just kind of natural." Yet while others did discuss that they really didn't have enough online time to really get to know the other students, getting to know someone well was generally not a requirement for useful online feedback interactions.

**Objective, critical feedback.** *"You don't need to be friends. They can make*

*constructive criticism and you can learn from that and respond.*” Interacting but never meeting F2F played an important function in the online environment, and not knowing each other well was deemed by most to be an advantage in giving and taking objective, critical feedback. This provided the means to focus more on the task than the person. One student summed up this perspective saying,

Online is different because you don’t need everything in the class. When you’re in a class at school and you’re actually there, you want and you do better with comfort, um, friends, that sort of thing, but when you’re on the computer, you don’t really need that. If you’re just trying to learn on the computer, all you really need is constructive criticism, all you need is feedback. I mean to have friends there that uplift you and help you, that’s great, but you don’t need that on the computer.

Another student agreed that not only would she give better feedback online because she’s not worried about making someone mad and having to deal with them F2F later, she expected to receive better feedback because:

...especially since I don’t know them very much...they are not your best friends who are going to say ‘everything is perfect about this’ because they don’t want to make you feel bad and so they are going to say stuff that might like be a little like more constructive criticism so it’s not like mean but it’s still helping you. They didn’t know you, didn’t care about making you feel really good about yourself, they just wanted to give you good feedback.

Other students also repeated this idea stating, “The other person who has a close relationship with you might not want to hurt your feelings so you wouldn’t get good feedback.”

Additionally, of the 46 students who took the final survey, 31 stated that they did not need to know other students as well as F2F in order share work and get valuable feedback. The general consensus was that emotions and personal connection clouded objective feedback. Although not knowing others well was generally a good thing, online, this did not transfer back. “[Online]...I don't actually know them, but it's just a regular conversation about projects, etc. I would need to really know people who I see almost everyday though.” Why? Because:

...when you're F2F with someone and you're not good friends with them you can fight, it can cause trouble; it can cause you not to focus as well. You wonder, 'oh, if they're going to mess something up for me.' But when you're on the computer, you can just avoid that person and try to make other friends or whatever, or be polite and civil to that person and not try to talk to them.

Still, it is important to note the 15 students that did not agree. These students, if they stated a reason, explained that knowing someone better provided a means to give more personal feedback: "[I] wouldn't want to hurt an almost stranger's feelings. But if you knew someone well, and you see them almost every day, it would be easier to give criticism because you know that they know you mean well and they wouldn't be hurt." It seems then that the opinion on what is needed online varies but is also potentially contingent on the F2F relationships that students had with those they know well.

### **Values and Beliefs about Community**

While the kind of community that developed online was task focused (directed by the goals of giving and receiving feedback), interviews and surveys reflected that the students in these two classes brought similar values to the online space. Although these values may be more pronounced given their highly capable status (Robinson, n.d.), these students cared about effective use of time (not wasting it) directed at activities that had purposeful learning objectives. They commented about using their time wisely, not "messing around" and "being focused."

Students reported that whether or not they felt part of their class (F2F and online) impacted their learning. For example, in the initial pre-survey, the most highly mentioned factors needed to feel part of a F2F class were having a voice (an ability to share their ideas) and having the opportunity to work with others in a friendly environment (group projects, sharing ideas, getting feedback, feeling supported). If they felt they belonged, they felt their learning improved. One student explained, "I mean in past years where I didn't feel included, I kinda

forgot some important key stuff in like math.” Comparing this to the online space, this same student who required feeling part of the F2F class used the same word in describing online work that “just kind of talking with the other class made me feel part of it and made me feel included.” While all the talk students did online was asynchronous typing, what was important was the interaction. Another student said, “It doesn’t matter if you’re F2F or online just as long as you feel like you’re interactive, like you’re part of it.” Another talked about purposefully participating saying, “it’s being social, so you aren’t like on the computer looking around and just like looking at other people’s conversations, but actually trying to join in and interact.” And yet another said, “just the fact that you can share your ideas and be friends with them [online]—there’s someone you can trust, someone you can work with.” Most students seemed to believe enough connection happened online for them to learn, just through friendly talking, sharing ideas, and having a voice. These were the same values that were most highly ranked from the survey targeting a F2F classroom.

There was also variation in the amount of information students wanted to know about each other before proceeding. Some felt like “feedback is feedback no matter who you are” even if it was a bit awkward to initiate conversation with someone they hadn’t physically met, but the majority were comfortable just knowing that they were talking to other “real students” versus computer robots their teacher had created. One student summed it up this way, “They learn different stuff than us and they have different teachers, but they are still students; kids are just kids.” Another said she felt that, “you can put your work out there and talk about yourself and know that they are children like ourselves, in a situation similar to ourselves, [and that] really helps that trust to grow, so to speak.”

While some felt that it was the quality of feedback, not the person giving it that mattered,

stating, “It doesn’t matter as long as the feedback is good,” a number of students specifically appreciated talking to other highly capable students. As one student said, knowing that they were talking to “a class that thinks like us” is in line with how highly capable students identify with each other (Winebrenner & Delvin, 1998). A number of these students made similar comments to this one: “it was really cool that we were working with people our own age who are also accelerated, like even-steven.”

### **Discussion**

The purpose of this study was to examine how two classes of 5<sup>th</sup> grade students experienced an online space, and their needs for useful online peer feedback. While students perceived the feedback they received online as useful in advancing their thinking, findings suggest that while working with peer feedback, they experienced a number of differences between online and F2F settings. Generally, this included appreciating not having a teacher guiding their online discussions and feeling like feedback coming from unknown others was more objective. Additionally, many noted that it takes longer to get to know someone well online. Yet, the majority of students felt that they did not need the same kind of F2F relationships online in order to participate in helpful peer feedback. Students found both time issues and value in online interaction. They also felt connected as students through the task, their values, and the fact that they participated.

#### **Time Issues Online**

Compared to F2F interaction, asynchronous communication led to some insecurity in working with unknown others. Without a previously established relationship to help interpret another’s actions, some students were uncertain about responses when they did not come immediately. This was particularly true for those who had not previously experienced this type

of communication method. Students also commented that even if they did not make the changes as suggested by the peer, the best feedback came from timely responses (e.g. Gielen, et al., 2010; Topping, 1998). While what dictates “timely” is not always clear in the literature, the general agreement is that effective feedback is better sooner than later in order to impact improvement (Kulhavy, 1977; Kulik & Kulik, 1988). Delays of hours or days, online, are not considered immediate for undergraduate students (Vonderwell, 2003). For the students in this study, lapses of days almost became the norm since one class only met once a week. While students eventually adjusted to this, clarity up front around expectations for responding given the different structures of the two classes would have been helpful.

### **Value from an Absent Teacher and Objective Feedback**

A number of students, including all those interviewed, appreciated a space where they could share and discuss ideas without a teacher present. While a few expected that the conversations might have been deeper if directed by a teacher, these students welcomed not having a teacher in their online discussions. Similarly, some higher education studies note that while peer discussion could have been more academically challenging if instructor led, students preferred peer facilitated discussion for higher order thinking objectives (Rourke & Anderson, 2002). Not having an instructor lead discussion provided more opportunity for students to share their own perspectives and take more ownership in determining the direction of the conversation (Hew, 2015).

However, this seems to initially contradict higher education literature that emphasizes a strong teaching presence (that includes facilitating discourse) for successful online learning (e.g. Kanuka, Rourke, & Laflamme, 2007; Lim & Barnes, 2002; Swan & Shih, 2005) and community development (Picciano, 1998). However, much of this research focuses on asynchronous

discussion in fully online courses where teaching presence also includes design, organization, and instruction (Garrison & Arbaugh, 2007). Typically higher education students interact with unknown others (as did the students in this study), but they also are not simultaneously participating in a F2F setting where they know their teacher and some of the peers they are interacting with well. In this study with 5<sup>th</sup> graders, not only was there a connection to a F2F classroom, it seems that the explicit rules governing how to respectfully participate in person also directed online interaction even though this was never addressed by teachers. It is possible that this link to a F2F environment equally impacted the freedom many seemed to covet online as compared to teacher facilitated F2F discussions.

For these younger students, however, teachers and I did not want them to be completely without an adult resource online. While teachers monitored the online space, they did not participate. For this reason, students were told that the “wizard” would be there in the online space if they needed anything. The fact that the wizard never spoke to them ultimately meant they did not seek him out either. Getting a sense of a real person being available to help, even if the interaction was just a “what’s up?” from the wizard as one student explained, was what mattered, even if they didn’t know him at all.

Students also found value in what they perceived as more objective feedback with unknown others online than with F2F peers. Collaborating and communicating with students they did not know meant that they did not have pre-established relationships that could shape the way they received (and gave) feedback (Stone & Heen, 2014). They also did not have to deal with the social and emotional implications of interacting F2F, as in how a student feels in a small feedback discussion might affect the relationship later in the day, on the playground or at lunch, or even tomorrow. Hence, not knowing someone well in terms of never physically meeting was

seen by most to increase the objectiveness of the feedback directly related to the task, unclouded by outside influences. The community created was one where students bounced ideas off of each other, accepting or ignoring advice for further learning and work improvement, but they were not automatically tied to other aspects of a deeper relationship.

### **Revisiting Community**

I use the term community loosely to describe the environment that was created online for the students in this study. Even though students were together online for a short amount of time, the idea of community describes what the teachers discussed was necessary to support students in working online with others they had not met F2F. They specifically made instructional design choices to support their goals of creating online community. Findings suggest that some aspects of community were reflected in student experiences. These students cared about staying focused and providing good feedback to each other, and they felt enough connection to each other online to participate in the task.

The community students participated in was designed around a purpose, and this is consistent with Howard Adelman and Linda Taylor's description of community in schools (2001): "A psychological sense of community exists when a critical mass of stakeholders are committed to each other and to the setting's goals and values and exert effort toward the goals and maintaining relationships with each other" (p. 19). While the relationships that students established online were not deep or lasting, these students were dedicated to the task at hand, and many of them felt that stronger relationships would naturally occur if they continued to work together. Furman (2002) states that 'shared values, common goals, communication and collaboration are symptoms if one feels a sense of community' (p. 11). These students were brought together in the social context of traditional school, and they shared common values

related to an inclusive culture: treating each other with respect and giving each other a voice toward the goals for quality feedback. They actively participated in online activities and, consistent with higher education research, they mentioned that just talking to each other online helped them feel connected (e.g. Gunawardena & Zittle, 1997).

### **Limitations**

Several limitations make the findings of this study tentative. This study only involved two classrooms of 5<sup>th</sup> grade students in two different public school districts. Additional research is needed to determine if findings can be replicated. These students were also evaluated as highly capable, and since research has identified uniqueness to this sub-group (Dunn & Price, 1980; Torrance, 1965), their designation may have impacted the way they viewed the addition of a new academic tool. There are also numerous variables that could have contributed to the way students described their experiences. I did not collect data on how students perceived the different structures of their highly capable programs, and given that the findings suggest that their F2F environments influenced certain online dynamics (like the transfer of rules), this could impact the way they viewed online space as an extension of F2F classroom practice.

Overall, it worked well to co-plan the design and use of the online space with teachers, but the collaborative nature of the planning forced me to be particularly cognizant of my past experience as a practitioner and my current role as a researcher. I was careful to make suggestions regarding practice only when asked, participate in class as a support role, and make sure that teachers' ideas and choices for their students were implemented. While these teachers were interested in exploring the benefits of online feedback and online interaction for their students, at the time their districts did not provide access to technology that would support this. For this reason, my involvement was a huge part of this work. At the same time, it laid the

groundwork for these teachers as they are now utilizing district provided infrastructure.

### **Priorities for Future Research**

Considering the exploratory nature and limitations of this study, there are a number of paths for continued research. I suggest two areas of priority. The first has to do with student feelings of connection, and the second addresses impacts of the F2F environment on the online space. In this study, while not any of the students shared feeling as if they did not know the other students well enough to participate in online feedback practices, some did express that it was “awkward.” The majority of students felt they were able to productively interact online for the purposes of peer feedback as long as they had some sense of connection to each other. How much is enough connection to facilitate useful and valuable feedback? Clark (1994) describes the concept of common ground to reflect the view that people make assumptions in order to make meaning, particularly when trying to coordinate action and work with each other. One type of grounding comes from “all the knowledge, beliefs, and assumptions [people] take to be universally held in the communities to which they mutually believe they both belong” (Clark, 1996, p. 332). The fact that many students expressed that they shared enough commonality as “students,” “kids,” or “accelerated” to engage in the shared task, could mean that additional research on how they perceive these broader commonalities could be a productive way of defining *enough* connection.

Additionally, since it’s clear that students experienced online opportunities differently, what did it mean to them to *connect*? Students seemed to conceptualize this differently. Social presence theory could provide insight into how people interact online. While the term has evolved since its introduction by Short, Williams, and Christie (1976), it’s definition falls on a continuum. On one end, social presence is defined as the degree to which a person is perceived

as “real” online, and on the other end, it extends into encompassing an interpersonal emotional connection (Lowenthal, 2009). Investigating how individual elementary students perceived their connectedness along such a continuum could yield helpful insights for design of online environments for this age group.

The second priority lies in investigating how a student’s sense of community F2F influences how they perceive the opportunities and constraints of online interaction. A student’s F2F community is partially constructed from teacher beliefs around student needs and how students learn best, as well as by a teacher’s goals and objectives. The majority of students appreciated the objective feedback they felt came from not knowing someone well online, but others felt deeper relationships would yield better feedback. A factor here could be that these teachers were dedicated to creating solid F2F communities. If a student felt he or she solidly belonged and was accepted F2F, then perhaps that allowed for a more superficial relationship online. However, I did not specifically compare or track individual student feelings of connectedness to their current F2F classroom against the new online environment. Doing so could also be potentially valuable in discerning how online opportunities can be designed to meet student needs.

### **Recommendations for Practice**

Based on the findings from this study, a number of recommendations can be made for future design:

- Improve instruction for how to use the technology, detailing how threaded discussions work (visually and practically). Understanding how the online space “worked” along with related vocabulary describing aspects of the space are as much about the technical skill needed to participate as is one’s choice to participate or not.
- Define quality feedback and more explicitly teach the students how to provide it.
- Organize the space more clearly, as some students noted that it was difficult to find the specific discussion topics, as they were not grouped.
- Connect the wizard as a real person and part of the community. If this had been done,

this person might have pushed the conversations farther.

- Extend the amount of overall online time with perhaps no student-created discussions initially and starting out with small groups instead of whole group discussion board conversations. This would be particularly helpful for students new to online discussions.

Because I had not considered community engagement (from parents) in the design of this study, the only involvement parents had was a brief explanation of the study and the signing of forms allowing for student participation. Although I looked at time stamps for when students were responding to each other (and many posted outside of school hours) and hoped that students would take up the online space for more than just expected in-class use, students were not specifically asked in interviews or more broadly in whole class surveys about access at home. Proactively seeking more parent involvement could lead to wider student use.

### **Summary**

We are now in the midst of a digital revolution where information is easily accessible on a large scale and available by means of numerous devices. As the educational landscape continues to diversify with new online tools and environments, and as our students increasingly need to know how to effectively utilize them, we continue to strive for ways to provide the best teaching and learning for all students. Presenting students opportunities to engage with new technologies can help transfer skills from school learning to real-work practice (Meoller & Reitzes, 2011). The present research suggests that there is a need to more broadly understand the affordances and constraints of online space as an instructional context for k-12 students.

## References

- Adams, A. (2011). Student assessment in the ubiquitously connected world. *ACM SIGCAS Computers and Society*, 41(1), 6-18.
- Adelman, H., & Taylor, L. (2001). Early Development and School Readiness from the Perspective of Addressing Barriers to Learning. A Center Brief. 2001.
- Barab, S., Kling, R., & Gray, J. H. (2004). *Designing for virtual communities in the service of learning* (Learning in doing). New York: Cambridge University Press.
- Barab, S., MaKinster, J. G., & Scheckler, R. (2004). Designing System Dualities: Characterizing an Online Professional Development Community. In S. Barab, R. Kling, & J. H. Gray (Eds.), *Designing for Virtual Communities in the Service of Learning* (pp. 53-90). New York: Cambridge University Press.
- Baym, N. (2010). *Personal connections in the digital age* (Digital media and society series). Cambridge, UK ; Malden, MA: Polity.
- Bender, T. (2003). Discussion-based online teaching to enhance student learning: Theory, practice, and assessment. Sterling, VA: Stylus Pub.
- Bielaczyc, K., & Collins, A., (1999). Learning communities in classrooms: A reconceptualization of educational practice. In C. M. Reigeluth (Ed.) *Instructional-design theories and models. Volume II, A new paradigm of instructional theory* (pp. 269-292). Mahwah NJ: Lawrence Erlbaum Associates.
- Black, A. (2005). The use of asynchronous discussion: Creating a text of talk. *Contemporary Issues in Technology and Teacher Education*, 5(1), 5-24 .
- Bogdan, R. C., & Taylor, S. (1975). *Introduction to qualitative research methods*. New York: Wiley.

- Bransford, J. D., Brown, A. L., & Cocking, R. (2000). *How people learn: Brain, mind, experience, and school*. Washington, D.C.: National Academy Press.
- Brindley, J. E., Walti, C., & Blaschke, L. M. (2009). Creating Effective Collaborative Learning Groups in an Online Environment. *The International Review of Research in Open and Distant Learning, 10*(3). Retrieved from <http://www.irrodl.org/index.php/irrodl/issue/view/36>
- Brown, J. S., & Duguid, P. (1991). Organizational learning and communities of practice: Toward a unifying view of working, learning, and innovation. In M. D. Cohen & L. S. Sproull (Eds.), *Organizational Learning* (pp. 59-82). London: SAGE Publications.
- Bruffee, K. A. (1984). Collaborative Learning and the "Conversation of Mankind". *College English, 46*(7), 635-53.
- Cho, K., Chung, T., King, W., & Schunn, C. (2008). Peer-based computer-supported knowledge refinement: An empirical investigation. *Communications of the ACM, 51*(3), 83-88.
- Cho, K., & MacArthur, C. (2010). Student Revision with Peer and Expert Reviewing. *Learning and Instruction, 20*(4), 328-338.
- Cho, K., & Schunn, C. D. (2007). Scaffolded Writing and Rewriting in the Discipline: A Web-Based Reciprocal Peer Review System. *Computers and Education, 48*(3), 409-426.
- Cho, K., Schunn, C. D., & Charney, D. (2006). Commenting on writing: typology and perceived helpfulness of comments from novice peer reviewers and subject matter experts. *Written Communication, 23*, 260-294.
- Clark, H. H. (1994). Discourse in production. In M. A. Gernsbacher (Ed.), *Handbook of psycholinguistics* (pp. 985-1021). San Diego, CA: Academic Press.
- Clark, H. H. (1996). Communities, commonalities, and communication. In J. Gumperz & S.

- Levinson (Eds.), *Rethinking linguistic relativity* (pp. 324-355). Cambridge, UK: Cambridge University Press.
- Dewey, J. (1899/1990). *The school and society*. Chicago: University of Chicago Press.
- Driskell, R., & Lyon, L. (2002). Are Virtual Communities True Communities? Examining the Environments and Elements of Community. *City & Community, 1*(4), 373-390.
- Dunn, R. S., & Price, G. E. (1980). The Learning Style Characteristics of Gifted Students. *Gifted Child Quarterly, 24*(1), 33-36.
- Eastmond, D. V. (1995). *Alone but together: adult distance study through computer conferencing*. Cresskill, NJ: Hampton Press.
- Ellman, N. (1975). Peer evaluation and peer grading. *The English Journal, 64*(3), 79-80.
- Ertmer, P., Richardson, J., Belland, B., Camin, D., Connolly, P., Coulthard, G., Lei, K., & Mong, C. (2007). Using Peer Feedback to Enhance the Quality of Student Online Postings: An Exploratory Study. *Journal of Computer-Mediated Communication, 12*(2), 412-433.
- Feinburg, S., & Mindess, M. (1994). Challenging children intellectually. *Eliciting children's full potential: designing and evaluating developmentally based programs for young children* (pp. 81- 83). Pacific Grove, CA: Brooks/Cole Publishing.
- Freiberg, H. J. (1999). Consistency management and cooperative discipline: From tourists to citizens in the classroom. In H. J. Freiberg (Ed.), *Beyond Behaviorism: Changing the classroom management paradigm* (pp. 75-97). Boston: Allyn & Bacon
- Furman, G. (Ed.). (2002). *School as community: From promise to practice*. Albany: State University of New York Press.
- Garrison, D. R., & Arbaugh, J. B. (2007). Researching the Community of Inquiry Framework: Review, Issues, and Future Directions. *Internet and Higher Education, 10*(3), 157-172.

- Geertz, C. (1983). From the native's point of view: On the nature of anthropological understanding. In C. Geertz (Ed.), *Local Knowledge* (pp. 55-70). New York: Basic Books.
- Gielen, S., Peeters, E., Dochy, F., Onghena, P., & Struyven, K. (2010). Improving the Effectiveness of Peer Feedback for Learning. *Learning and Instruction, 20*(4), 304-315.
- Gunawardena, C., & Zittle, F. (1997). Social presence as a predictor of satisfaction within a computer-mediated conferencing environment. *American Journal of Distance Education, 11*(3), 8-26.
- Harasim, L. (1990) *On-line Education: perspectives on a new environment*. New York: Praeger.
- Hattie, J., & Timperley, H. (2007). The power of feedback. *Review of Educational Research, 77*, 81-112.
- Herrenkohl, L., & Guerra, M. (1998). Participant Structures, Scientific Discourse, and Student Engagement in Fourth Grade. *Cognition and Instruction, 16*(4), 431-473.
- Hew, K. F. (2015). Student Perceptions of Peer versus Instructor Facilitation of Asynchronous Online Discussions: Further Findings from Three Cases. *Instructional Science: An International Journal of the Learning Sciences, 43*(1), 19-38.
- Hillery, G. A., Jr. (1955). "Definitions of Community: Areas of Agreement," *Rural Sociology 20*, 779-791.
- Hiltz, S., & Wellman, B. (1997). Asynchronous learning networks as a virtual classroom. *Communications of the ACM, 40*(9), 44-49.
- Hollingshead, A. B. (1996). Information suppression and status persistence in group decision making: The effects of communication media. *Human Communication Research, 23*, 193-219.

- Hurst, D. C. & Thomas, J. (2004). Developing team skills and accomplishing team projects online. In T. Anderson & F. Elloumi (Eds.), *Theory and practice of online learning*. Athabasca University. [http://cde.athabascau.ca/online\\_book/](http://cde.athabascau.ca/online_book/)
- Ito, M., Baumer, S., Bittanti, M., Boyd, D., Cody, R., Herr, B., ... & Tripp, L. (2009). *Hanging out, messing around, geeking out: Living and learning with new media*.
- Johnson, D. W. & Johnson, R. T. (1975). *Learning together and alone: Cooperation, competition, and individualization*. Englewood Cliffs, NJ: Prentice-Hall.
- Kanuka, H., Rourke, L., & Laflamme, E. (2007). The influence of instructional methods on the quality of online discussion. *British Journal of Educational Technology*, 38(2), 260-271.
- Kohn, A. (1996). *Beyond discipline: From compliance to community*. Alexandria, VA: Association for Supervision and Curriculum Development.
- Kulhavy, R. W. (1977). Feedback in written instruction. *Review of Educational Research*, 47(1), 211-232.
- Kulik, J. A., & Kulik, C.-L. C. (1988). Timing of feedback and verbal learning. *Review of Educational Research*, 58(1), 79-97.
- Kumar, S., Kenney, J., & Buraphadeja, V. (2012). Peer Feedback for enhancing students' project development in Online Learning. In H. H. Yang & S. Wang (Eds.), *Cases on Online Learning Communities and Beyond: Investigations and Applications* (pp. 345-360). Hershey, PA: IGI Global.
- Lave, J. & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. New York: Cambridge University Press.
- Lim, C. P., & Barnes, S. (2002). "Those who can, teach" — The pivotal role of the teacher in the information and communication technologies (ICT) learning environment. *Journal of*

- Educational Media*, 27(1-2), 19-40.
- Linn, M. (2000). Designing the knowledge integration environment. *International Journal of Science Education*, 22, 781–796.
- Lips, D. (12 Jan 2010). “How online learning is revolutionizing K-12 education and benefiting students.” Backgrounder. No. 2356. The Heritage Foundation. Retrieved from: <http://www.heritage.org/technology/report/how-online-learning-revolutionizing-k-12-education-and-benefiting-students>
- Liu, Eric Zhi-Feng, & Lee, Chun-Yi. (2013). Using Peer Feedback to Improve Learning via Online Peer Assessment. *Turkish Online Journal of Educational Technology - TOJET*, 12(1), 187-TOJET, 2013, 12(1), 187-199.
- Lowenthal, P. R. (2010). The Evolution and Influence of Social Presence Theory on Online Learning. In T. T. Kidd (Ed.), *Online education and adult learning: New frontiers for teaching practices* (pp. 124-139). Hershey, PA: IGI Global.
- Lyon, L. 1999. *The Community in Urban Society*. Prospect Heights, IL: Waveland Press, Inc.
- McMillan, D., & Chavis, D. (1986). Sense of community: A definition and theory. *Journal of Community Psychology*, 14(1), 6-23.
- Matuk, C., & Linn, M. C. (2014). Exploring a digital tool for exchanging ideas during science inquiry. In *ICLS'14: Proceedings of the 11th International Conference for the Learning Sciences*, Boulder: International Society of the Learning Sciences.
- McKinney, J. P., McKinney, K. G., Franiuk, R., & Schweitzer, J. (2006). The College Classroom as a Community: Impact on Student Attitudes and Learning. *College Teaching*, 53(3): 281-284.

- Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation*. San Francisco: Jossey-Bass.
- Miles, M., Huberman, A. M., & Saldaña, J. (2014). *Qualitative data analysis: A methods sourcebook* (3rd Ed.). Thousand Oaks, California: SAGE Publications.
- Moeller, B., & Reitzes, T. (2011). *Integrating technology with student-centered learning*. Quincy, MA: Education Development Center, Inc. Nellie Mae Education Foundation.
- Moore, M. G., & Kearsley, G. (2005). *Distance education: A systems view* (2nd Ed.). New York: Wadsworth.
- Nielsen, M. (2008, July 17). The future of science: Building a better collective memory. *Social Software & Future of Science*. Retrieved from: <http://michaelnielsen.org/blog/the-future-of-science-2/>
- Orsmond, P., Merry, S., & Reitch, K. (1996). The importance of marking criteria in the use of peer assessment. *Assessment and Evaluation in Higher Education*, 21:239-249.
- Palloff, R., & Pratt, K. (1999), *Building learning communities in cyberspace*. San Francisco: Jossey-Bass.
- Palloff, R., & Pratt, K (2001), *Lessons from the cyberspace classroom*. San Francisco: Jossey-Bass.
- Palloff, R., & Pratt, K. (2005). Learning together in community: collaboration online. Proceedings 20th Annual Conference on Distance and Teaching and Learning. University of Wisconsin, Madison, Wisconsin, August, 2005.
- Park, R. (1936). "Human Ecology," *American Journal of Sociology*, 17(1), 1–15.
- Pea, R. (2003). Forward. In S. Barab, R. Kling, & J. H. Gray (Eds.), *Designing for Virtual Communities in the Service of Learning* (pp. xiii-xv). New York: Cambridge University

Press.

- Picciano, A. (1998). Developing an asynchronous course model at a large, urban, university. *Journal of Asynchronous Learning Networks*, 12(1), 1-14.
- Price, V. (2009). Citizens Deliberating Online: Theory and Some Evidence. In Todd Davies, & Seeta Peña Gangadharan (Eds.), *Online Deliberation: Design, Research, and Practice* (pp. 24-37). CSLI Publications/University of Chicago Press.
- Putman, J., & Burke, J. B. (1998). *Organizing and managing classroom learning communities*. San Francisco: McGraw-Hill.
- Riel, M., & Polin, L. (2004). Online Learning Communities: Common Ground and Critical Differences in Designing Technical Environments. In S. Barab, R. Kling, & J. H. Gray (Eds.), *Designing for Virtual Communities in the Service of Learning* (pp. 16-50). New York: Cambridge University Press.
- Robinson, N. (n.d.). In Chapter 6: Who Are "Gifted" or "Highly Capable Students"? Retrieved from <http://www.state.gov/m/a/os/44036.htm>
- Rogoff, B. (1990). *Apprenticeship in Thinking: Cognitive Development in Social Context*. New York: Oxford University Press.
- Rogoff, B. (1994). Developing understanding of the idea of communities of learners. *Mind, Culture, and Activity*, 1(4), 209-229.
- Rogoff, B., Bartlett, L., & Turkonis, C. G. (2001). Lessons about learning in a community. In B. Rogoff, C. G. Turkonis, & L. Bartlett (Eds.) *Learning together: Children and adults in a school community* (pp. 3-20). New York: Oxford University Press.
- Rourke, L., & Anderson, T. (2002). Using Peer Teams to Lead Online Discussions. *Journal of Interactive Media in Education*, 2002(1), 1.

- Rourke, L., Anderson, T., Archer, W., & Garrison, R. (1999). Assessing social presence in asynchronous computer conferencing transcripts. *Journal of Distance Education, 14*(2), 50-71.
- Roussin, J. L., & Zimmerman, D. P. (2014). Inspire learning not dread—create a feedback culture. *Journal of Staff Development, 36*. Retrieved from <http://infoweb.newsbank.com.offcampus.lib.washington.edu/resources/doc/nb/news/15357B10A7303DE8?p=WORLDNEWS>
- Rovai, A. P. (2002). Development of an instrument to measure classroom community. *The Internet and Higher Education, 5*(3), 197–211.
- Rubin, I. (1969). “Function and Structure of Community: Conceptual and Theoretical Analysis,” *International Review of Community Development 21-22*(Dec.), 111–122.
- Scardamalia, M., & Bereiter, C. (1993). Technologies for knowledge-building discourse. *Communications of the ACM, 26*, 37-41.
- Scardamalia, M., & Bereiter, C. (1994). Computer Support for Knowledge-Building Communities. *Journal of the Learning Sciences, 3*(3), 265-283.
- Sergiovanni, T. J. (1994). *Building community in schools*. San Francisco, CA: Jossey-Bass.
- Shackelford, Jo L., & Maxwell, Marge. (2012). Sense of Community in Graduate Online Education: Contribution of Learner to Learner Interaction. *International Review of Research in Open and Distance Learning, 13*(4), 228-249.
- Short, J., Williams, E., & Christie, B. (1976). *The social psychology of telecommunications*. London: John Wiley & Sons.
- Shute, V. J. (2008). Focus on formative feedback. *Review of Educational Research, 78*, 153-189.

- Slagter van Tryon, P., & Bishop, M. (2009). Theoretical foundations for enhancing social connectedness in online learning environments. *Distance Education, 30*(3), 291-315.
- Sluijsmans, D., Dochy, F., & Moerkerke, G. (1999). Creating a learning environment by using self-, peer- and co-assessment. *Learning Environments Research, 1*, 293-319.
- Stone, D., & Heen, S. (2015). *Thanks for the feedback: The science and art of receiving feedback well (even when it is off base, unfair, poorly delivered, and frankly, you're not in the mood)*. New York, New York: Penguin Books.
- Strijbos, J. W., Narciss, S., & Dunnebler, K. (2010). Peer feedback content and sender's competence level in academic writing revision tasks: are they critical for feedback perceptions and efficiency? *Learning and Instruction, 20*(4), 291-303.
- Swan, K., & Shih, L. F. (2005). On the nature and development of social presence in online course discussions. *Journal of Asynchronous Learning Networks, 9*, 115-136.
- Topping, K. (1998). Peer assessment between students in colleges and universities. *Review of Educational Research, 68*(3), 249-276.
- Torrance, E. (1965). *Gifted children in the classroom* (Psychological foundations of education series). New York: Macmillan.
- Tu, C.-H., & McIsaac, M. (2002). The relationship of social presence and interaction in online classes. *The American Journal of Distance Education, 16*(3), 131-150.
- Van Gennip, N. A. E., Segers, M. S. R., & Tillema, H. H. (2010). Peer assessment as a collaborative learning activity: the role of interpersonal variables and conceptions. *Learning and Instruction, 20*(4), 280-290.
- Vonderwell, S. (2003). An Examination of Asynchronous Communication Experiences and Perspectives of Students in an Online Course: A Case Study. *Internet and Higher*

*Education*, 6(1), 77-90.

Vygotsky, L. S. (1978). *Mind in society: The development of higher psychological processes*.

Cambridge, MA: Harvard University Press.

Watson, M., & Battistich, V. (2006). Building and sustaining caring communities. In C. M.

Evertson and C. S. Weinstein (Eds.), *Handbook of Classroom Management: Research,*

*Practice, and Contemporary Issues* (pp. 252-279). Mahwah, New Jersey: Lawrence

Erlbaum.

Webb, N. M., & Palinscar, A. S. (1996). Group processes in the classroom. In Berliner, D. C.

and Calfee, R. C. (Eds.), *Handbook of educational psychology*. pp. 841-873. New York:

MacMillan.

Winebrenner, S., & Devlin, B. (1998). Cluster Grouping of Gifted Students: How To Provide

Full-Time Services on a Part-Time Budget. *TEACHING Exceptional Children*, 30(3), 62-

65.

Wolk, S. (1998). *A democratic classroom*. Portsmouth, NH: Heinemann.

Xiao, & Lucking. (2008). The impact of two types of peer assessment on students' performance

and satisfaction within a Wiki environment. *The Internet and Higher Education*, 11(3),

186-193.

Appendix A-1  
Student Interview Questions

First Round interview with students in the beginning of online interactions:

- Have you ever talked to someone online that you have not met before?
- Why do you think we're doing this? [...i.e. getting you into an online space with other students?]
- Do you think it can help your learning or be cool for you in any way? [Can you think of any times where you go to others for help or to talk to others about your ideas on something? Why do you go to those people? How do they help you?]
- Do you think that you can get to know people well that you've never met, just by talking or working with them online? [How so or why not?]
- What was it like to meet those students online today? [Cool? Not so? Why? Did you see anyone there you think you might have something in common with?]

Second Round interview with students at the end of online interactions:

- Why do you think we did this?
- Do you feel like you got to know anyone really well in the other class? [If so, whom and why...and if not, why not? Why do you think this was so? Would you want to go meet someone(s) in the other class F2F and do stuff together if you lived closer together? ]
- What might you or your teachers have done to help get students to know each other better? Anything?
- Do you think that talking with other kids you've never met about your science work helped your thinking? [Did you feel supported? Did you change anything you did in your work because of something that someone said? Can you give me an example?]
- If you could have talked to them online at any time (and not just during class), would you have? [Would it have been helpful? Were there people you wanted to talk to more about other things, not just what you did talk about?]
- Did what happen online with those other students differ from what happens in your classroom when you all do similar activities? [Do you feel you could talk to them in the same way? Was it easier or harder to talk to them? Why do you think that was?]

## Article 2

### Online Talk: Supporting Purposeful Online Feedback

The saturation of new digital communication technologies is dramatically affecting how we live, work, and learn. The result is an increasingly networked society where, for many, communicating via a number of communication channels simultaneously and connecting with known and unknown others has become a habitual part of our daily lives. This includes not only keeping smart phones on one's person and at the bedside, checking email, texting, tweeting, blogging, real-time conferencing, or document sharing on a regular basis, but an emotional and physical need to be connected to a device in order to function in the world (Hayles, 2012).

These changes have profound implications for education—both in terms of the skills to be taught and the affordances of new technologies as tools for teaching and learning. We cannot assume that just being plugged-in equates to an understanding of digital interactivity (Baym, 2010) or to an ability to give, take, and respond to comments in online and hybrid spaces in order to improve work. While adults use online spaces professionally to connect this way with those they have not met face-to-face (F2F), students have often not considered the implications of how they speak through their numerous communication channels. There is often not awareness that specific goals, tasks, or situations may require an intentional crafting of responses or different behaviors online in order to extend a conversation to get desired information rather than closing off a discussion prematurely. This is not surprising given that students receive little to no instruction regarding how they use and interact with media (Moeller, 2012). Using online tools as a means of feedback is an important skill that should be taught.

While there has been a focus in supporting students' online feedback talk in higher education courses (e.g. Ertmer, Richardson, Belland, Camin, Connolly, Coulthard, Lei, & Mong,

2007), this is no longer just a higher education issue. Teachers in k12 schools are encouraged to provide, and have students request, feedback from each other via online media (Dean & Marzano, 2012). Yet, data gathered on how this is happening is often entangled in reports of student use of technology for doing online research versus communicating online with others. To complicate this, “few states and districts collect data that can tell us about the myriad of ways in which online learning is being used in schools” (Clements, 2016). While we know students aged 8-18 are spending 7.5 hours or more a day interacting and communicating via digital technologies (Henry J. Kaiser Family Foundation, 2010), these communication skills are not readily taught or measured in the k12 education system (American Association for the Advancement of Science, 2009).

As we look to support younger students in using new technologies and developing the socially situated mindsets they will need to participate and engage meaningfully, we find that they are already online for primarily social purposes, but that the interactions they are learning may not support academic efforts (e.g. Buckingham, 2007). A continual challenge in public education is in identifying ways to support these students in learning to professionally engage in digitally mediated dialogue to improve work. Much of the research regarding student needs, behaviors, and quality of online peer-to-peer dialogue comes from higher education contexts, and applying findings given differences between learning contexts should be done with restraint (Bakia, Shear, Toyama, & Lasseter, 2012).

The goal of this project was to design and analyze an example of technology integration to expose younger students to digital communication focused on the challenging practice of giving and receiving asynchronous feedback on drafts of classwork. This would provide a bridge for understanding the levels to which we can apply higher education findings to K-12 contexts as

well as more closely aligning school interactions to those of professional settings to increase intellectual competence (Newmann & Associates, 1996; Newmann, Lopez, & Bryk, 1998).

Because feedback has the potential to open up opportunities to learn, it is an important practice across theories of learning and instruction (Bangert-Drowns, Kulik, Kulik, & Morgan, 1991). A 50+ year research history in education attests to the fact that feedback is central to learning as a means of assessment and reinforcement (Thorndike, 1913) and as a participatory activity for the learner (Butler & Winne, 1995).

In this study, through the activities geographically separated 4<sup>th</sup> and 5<sup>th</sup> grade students were doing together online, I sought to understand the elements that impact the quality of asynchronous feedback as defined by the length of the each conversation and the perceived value of the interaction. On a high level, participation has been used as an indicator of learning, defined by the quantity of comments students make (Hiltz, 1986). But I also wanted to look at quality. Spiller (2009) explains that a high quality conversation is 1) sustained in order to impact deeper reflection and learning, and 2) provides information that is valued by those involved.

The following research questions guided the study:

1. What is the quality of the asynchronous feedback discourse geographically separated students exchange online in terms of conversation length and perceived value compared to already existing F2F experiences with known peers?
2. What strategies do students use to solicit feedback? Do they sustain conversation?

The study was designed to use a sustainable architecture curriculum already planned for by the teachers and provide additional opportunities for peer feedback using online tools to network students. Students designed and physically built individual and small group environmentally friendly playgrounds and used the online space to virtually share research and resources, planning suggestions, and design drafts. Feedback was an important part of the process because

their design drafts went through successive iterations. To ground the framework for the study, it is important to trace our understanding of feedback in education, feedback's contribution to learning, and the need for dedicated research for elementary students interacting with unknown peers via technology-mediated communication.

### **Literature Review**

In the following review of literature, I start with a broad definition of feedback to discuss its established role in education, emphasizing its value in learning and the importance of learner participation. I then attempt to demonstrate that what we know about F2F feedback also extends into online feedback mediated by various technologies. Finally, I look at the way quality online talk has been evaluated.

### **Feedback for Learning**

Feedback as a communication process stems from sharing information with the intent of improving an outcome, performance, or product (Oxford Dictionaries, 2017), and knowing how a work is interpreted, experienced, or read by another allows one to consider whether or not to revise accordingly. A fair amount of research evidence across K-12 and higher education contexts emphasizes the value of feedback for learning. For example, citing Fraser, Walberg, Welch, and Hattie's (1987) synthesis of meta-analyses of studies, Beaumont, O'Doherty, and Shannon (2011) state that there is "a compelling consensus from research that high quality feedback is the most powerful single influence on student achievement" (p. 671). Similarly, in a meta-analysis of over 250 studies spanning 10 years, Black and Wiliam (1998) found that effective feedback (teacher and peer) led to consistent learning gains across all content areas compared to other teaching practices. Others have also come to comparable conclusions linking feedback to learning gains (e.g. Crooks, 1988; Race, 2001), all of which have led to changes in

teaching practices in K-12 contexts (Black, Harrison, Lee, Marshall and Wiliam, 2003).

Feedback's role in education has a long history, evolving from conceptualizing learning as a response to stimuli (Skinner, 1953; Thorndike, 1913) to newer conceptions that emphasize learner participation in feedback as a meaning-making process (Kulhavy, 1977). While cycles of test item-answer-correctness (Sadler, 2010) are a significant area of research (Bayraktar, 2002; Roper, 1977; Shamir, Feehan, & Yoder, 2017), engaging in feedback discussions encourages self-regulated learning that repositions students as active in the feedback process versus being reactive receivers (Nicol & Macfarlane-Dick, 2006). Hattie and Timperley (2007) explain that the student needs to participate in "gaining information about how and what they understand and misunderstand, finding directions and strategies that they must take to improve, and seeking assistance" (p. 102). Students can benefit from providing feedback as well as receiving it as they learn to use feedback to compare the status of current work to their own goals or the expected learning objectives and begin to craft ways to close that gap (Sadler, 1989).

### **Asynchronous Online Feedback: Value and Participation**

Coming primarily from higher education, research on technology-mediated feedback is consistent with what we know about the value of feedback and the need for students to be involved in the process. In fact, in the absence of feedback, a student's tendency to disengage is higher online than F2F (Ko & Rosen, 2001) so more frequent feedback and participation helps keep students involved in the learning process (Mory, 2004; Xie, 2013). A recurring finding is that students find value in online feedback as they consider alternative ideas, evaluate, and provide feedback to others (e.g. Ertmer, et al., 2007). Students were also found to prefer feedback via social media (Demirbilek, 2015) and via a wiki (De Wever & Van Keer, 2012) over paper not only for the ease of information transfer but for the added value of the responses that

improved the quality of their work. A similar study of feedback via a wiki environment reported that increased value was due to more detailed feedback online (Gielen and De Wever, 2012). First year undergraduate students in an instructional sciences course were randomly assigned to small groups. Groups were then assigned to one of two feedback conditions via a wiki: structured (guided by a web form) and non-structured. Student small groups were tasked with creation of a wiki to summarize and synthesize the main topics of the course. They filled out course content questionnaires before and after group assignment to track insight on the course topics, provided peer feedback to the other groups, and after the assignment, filled out a Likert scale questionnaire looking at student preferences, perceptions, and attitudes. While the final products improved for both groups, students in the structured feedback condition received more detailed feedback and ended up being more critical of the peer feedback they received.

While asynchronous communication may increase misunderstandings due to limited social cues typical of F2F interactions (Berge, 1997), it can also lead to more open conversation and increased participation by shyer students. For example, Vonderwell (2003) reported that students appreciated feeling like they could ask more questions online than they felt comfortable doing so F2F. They also stated that online participation helped them construct better ideas, embracing having to specifically craft their responses to pay more attention to clarity and word choice to communicate well. Increased participation led to learning experiences that were perceived as more positive, yet looking only at the total number of comments an individual makes is only one way of looking at asynchronous online conversations. Another means is to measure the length of the conversation. Length has been used to gauge quality because if a conversation is sustained, it opens up increased opportunities for reflective practice and learning (Spiller, 2009).

## Measuring Quality of Online Discussions

Measuring quality of online discussions refers not to the length of individual responses, but to the number of turns of talk or how many “posts” make up a particular discussion or “thread.” If the back and forth motion of the conversation continues, then the expectation is that the conversation has more substance and value to support reflective practices (Hewitt & Tevlops, 1999). This provides more opportunity to glean helpful feedback and understand suggestions. There is no indication that this varies by grade level of students, yet the research base is fairly isolated to higher education. This method was initially used by Hewitt and Tevlops in 1999, and continues to be an accepted method (e.g. Ridings & Wasko, 2010).

Hewitt & Tevlops (1999) initial study looked at patterns of threaded conversation to understand how threads evolve over time and their ability to predict the life of a thread. They found the mean length of a discussion thread where discussions were not sustained to be 2.69 posts or 2-3 total comments, including initial top-level post. Guzdial (1997) found a similar 2.2 post average (1 post and 1 response). Guzdial and Turns (2000) then compared two types of asynchronous discussion environments, one with and one without scaffolding features such as category choices to classify post types and suggested phrases for composing specific types of posts. Effective discussion was defined as being sustained, having broad participation, and being on topic. Mean thread length with supporting features was 4.2 posts, the other 2.2 posts. The authors acknowledged however that their analysis was limited in determining what exactly sustained conversation. While length does provide a means of comparing discussions, the content was only evaluated for being on topic. This is not enough to surface patterns to support practical application to instruction for sustaining conversation between students. For example, an on-topic conversation of 5 posts may still follow a 2-3 post pattern of Post-Thanks or Post-

### Comment-Thanks.

Similar short discussion threads, with students who already knew each other, are also seen when we look specifically at online talk between elementary students. Lipponen, Rahikainen, Hakkarainen, & Palonen (2002) explored how 3<sup>rd</sup> and 4<sup>th</sup> grade students communicated in a technology-mediated environment. This study resulted in a mean thread size of 3.76. Suppositions for the short threads include the age of the students and their developing skills as readers, writers, and thinkers via a written form (Lipponen, 1999; Roschelle & Pea, 1999), but did not include an analysis of the content to inform thread length.

Lipponen and his colleagues (2002) also extend previous work on the structure and quality of the threads by adding content analysis to provide a means of looking at the focus of comments (on topic, off topic); the nature of comments (positive, negative, neutral); and the function of comments (providing information, asking clarification, and other) to determine reflective discourse. Of all on-topic comments, 62% provided information and explanation and 38% asked for clarification. With these results (both thread length and content), they then question whether this is enough to show reflective discourse, adding that the analysis was too narrow, as it did not consider the value of the threads in how posts are conceptually linked. Nor did they look at the value students perceived from the process.

The present study incorporates previously established methods of measuring threaded discussions but focuses on elementary students, online feedback for the purpose of improving a classroom assignment, and sustaining conversation without previously established F2F relationships or instructor involvement. It also furthers the qualitative content analysis of the threads to look at the kinds of comments made, why conversations were not sustained, perhaps how to sustain them, and how students perceived the value of the online task. In the next

section, I lay out the framing ideas that guided this study.

### **Theoretical Perspectives**

This research draws on social learning theories that suggest that discourse is a key concept in learning that results from participation in social processes (Wenger, 1998). In this view, learning is located in relationships where the individual and the social world come together. The motivation for participating in social activities as a co-participant is directed by perceptions of use and value for learning as opposed to “display[ing] knowledge for evaluation” (Lave & Wenger, 1991). Student participation in a threaded online feedback conversation as well as their opinions about whether or not feedback activities were helpful would identify situations where learning occurs. Since a purpose of feedback is to help one reflect on how they are meeting their goals, of particular interest is how the online context itself mediates one’s choices to participate and sustain an online conversation.

Contribution Theory provides a means of interpreting why conversations are or are not sustained, which involves how people make contributions to conversations by seeking understanding and requesting clarification. It explains why and how people ‘coordinate content and process’ based on purpose (goal of the communication) and medium in order to make meaning with each other. In other words, finding common ground is a process of continually evaluating evidence during a conversation. One judges what the other person seems to understand in order to determine the direction of any additional comments (Clark & Brennan, 1991). When grounding breaks down (often around inaccurate assumptions), it requires repair (attempts to fix miscommunications). The associated constraints and cost trade offs resulting from this differ across communication media. To explain this, Contribution Theory uses the concept of Least Collaborative Effort, the idea that speakers want to talk in ways that will

effectively communicate intentions with as little effort as possible. However, because language is used differently and there are nuances in the ways people communicate dependent upon the media, each means of communication has varying trade offs and costs of grounding. Generally, communication is considered a collective activity that requires coordination. Throughout the course of any discussion, participants need to reevaluate the common ground to keep a conversation flowing. Taken together, these framing ideas outline a path for exploring student ability to participate in feedback practices for learning and sustaining conversations via digitally mediated tools. Next, I explain the methodology that addressed the research questions.

### **Method**

I used an explanatory mixed method design (Creswell & Clark, 2011) to better understand how students used and evaluated the online space for feedback with geographically unknown peers. This method is characterized by quantitative data followed by qualitative. Since literature in asynchronous threaded discussions has previously defined conversation quality using a quantitative measure (Hewitt & Tevlops, 1999; Guzdial & Turns, 2000), I started there to examine the quality of student threaded asynchronous conversations. However, as explained earlier, more is needed to define quality than just the length of threads. This mixed method design provided a means to use the quantitative data from online discussions to focus my qualitative content analysis and use that same analysis to draw additional meaning on length. I examined the types of comments and the strategies students used to give and get feedback. I then compared findings against the literature, triangulated between different types of data points, and allowed qualitative data to clarify the online counts with the goal of integrating both data forms to provide a fuller understanding of student interactions online (Edmondson & McManus, 2007). An analytic unit consists of instances where online text interaction involved a specific

move by an individual to seek out feedback online.

Relative to the goals of this study, *feedback* is considered to be qualitatively different than *evaluation* or *advice*—other comments that are also often considered under a larger feedback-umbrella (Wiggins, 2012). As part of professional development for teachers, Wiggins (2012) categorizes and describes these terms in the following way. Evaluation often explains the features of something in relation to the final result, as in “It’s great” or “I like it”. Advice provides specifics for the recipient to follow such as “You could add trash cans” or “I suggest that you label the squares and rectangles.” While both of these are necessary and helpful in sharing information as one works toward a goal, Wiggins separates out the term feedback for comments that specifically inform whether or not one is on the path toward actually achieving that goal. Examples are: “I’m not sure where the tunnel leads” or “If I was with my mom at the entrance, would she see me? Where would she sit?” or “Where is the bathroom?” Note that feedback doesn’t directly state what to do to improve the design, which would be advice, but it provides the receiver with more in depth information to consider.

One goal was to look at the mid-level “in process” discourse and interactions students engaged in that might sustain conversation and support reflective thinking as they shared their work online with students they did not previously know. The teachers’ aim for the feedback was to have students engage in helping each other identify areas of improvement, creating and considering options during the playground design process rather than provide a final assessment score or script of instructions that must be followed. In other words, the definition of “useful feedback” was not determined by examining the quality of the final build or by whether or not students made changes because of the feedback. Instead, it was based on whether participating in an online network provided added value for students beyond what they were already doing F2F,

as measured by their perceptions of the feedback exchanged and the experience itself.

### **Participants and Settings**

The study sample consisted of 4<sup>th</sup> and 5<sup>th</sup> grade highly capable students enrolled in three public school classrooms in two different schools and districts in a Pacific Northwest state. One classroom was in School A and two were in School B (described below). They comprised a relevant group to analyze in light of the research questions because on their own, they were starting to explore online environments and interact with people they had never met F2F (Kafai & Fields, 2013). They were also learning to see each other as resources in the classroom and were generally able to cognitively reflect and write about their experiences (Manning, 2002).

The two schools were located 40 miles apart to increase the likelihood that the students would not have previously met F2F. The three teachers were determined to be experienced based on their certifications and years of teaching. They, and their elementary students (n=58), were selected because all three teachers responded to a call to participate. Despite moves to standardize education nationwide (Shepard, Hannaway, & Baker, 2009), these teachers had some pedagogical flexibility because the teaching of highly capable students falls under the umbrella of special education resources. This allows for some local control where school districts can design for themselves the best ways to meet the needs of their students, including defining the qualifications they will use to determine highly capable status and the types of program options offered. As teachers of highly capable students, all three had district and principal-endorsed support to apply expertise and integrate technology to explore something new to improve student learning (alongside district scripted expectations).

**District A.** District A was a geographically large suburban-rural district serving predominantly middle class families and approximately 9,800 students. Free and Reduced

Lunch rate across the district was approximately 41%. There were about 500 classroom teachers with an average of 16 years experience, and almost 70% held at least a master's degree.

Students whose teachers and/or parents filled out referral forms for the highly capable program were evaluated for selection based on a variety of criteria, including cognitive assessment (Cognitive Abilities Test, CogAT), intelligence (Wechsler Intelligence Scale for Children, Fourth Edition, WISC IV), creative thinking (Torrance Test of Creative Thinking, TTCE), a teacher rating scale, a parent rating scale, and a portfolio of state, district, and building-level academic assessments.

***School A and its Highly Capable Program.*** School A served about 550 students, grades 3-6. The highly capable program was considered additive enrichment to enhance the learning of all highly capable students in the district and was housed on the grounds of school A. The structure was a once-a-week pullout program where students attended their home school general education classrooms the rest of the week. Yet, aside from common lunch and recess, the program was not directly associated with the school. The students came from all elementary schools across the district, and the teacher saw each grade level once a week for one full day. For example, she may have seen 3<sup>rd</sup> graders on Mondays, 4<sup>th</sup> graders on Tuesday, 5<sup>th</sup> graders on Wednesdays, etc.

***Students in Classroom A.*** The 24 students in Classroom A were all identified highly capable 5<sup>th</sup> graders, ages 10-11 years old. There were 14 males and 10 females, and on their given day of the week, they all were bussed in from their home schools. Despite lunch and recess where they could interact with other students outside the program, they did not identify themselves as part of the elementary school that housed the program, insisting that any logo used to represent them was a program logo and not that of the school. Since identification for the

option of participating in this program began at 3<sup>rd</sup> grade, most of the 5<sup>th</sup> graders in Classroom A had known their teacher and each other for the last three years. 8 of the students in this classroom self-described themselves as expert level in their comfort with technology, 15 as comfortable, and 1 as hesitant. The ethnic breakdown was: 4% Hispanic/Latino, 12% Asian, 4% Native Hawaiian/Pacific Islander, 76% White, and 4% Mixed.

***Teacher in Classroom A.*** The teacher in Classroom A was the only teacher for the district highly capable program and also the coordinator of the program. While the portable she taught in was on the grounds of an elementary school, she was not considered staff of that school, and she did not work under that building's principal. Instead, her immediate administrator was a director at the district office. She taught grades 3-6, seeing each grade level once a week, and had been teaching for 17 years. She held a K-8 statewide teaching certificate, a BA in business management, and a master's degree in education.

**District B.** District B was primarily an urban school district with pockets of suburban and rural areas. It served about 7600 students. It had approximately a 73% Free and Reduced Lunch rate across the district. There were about 460 teachers with an average of 10 years experience, and about 68% held at least a master's degree. Students referred into the highly capable program were evaluated using a variety of criteria, including cognitive assessment (CogAT), state and district test scores, and parent and teacher surveys.

***School B and its Highly Capable Program.*** School B served nearly 500 students, grades 3-5. It housed fewer male students than the district average, but was still fairly evenly split between genders. The structure of the highly capable program was a fully self-contained model. This meant that identified students, electing to be part of the program, chose the elementary school that housed the program as their primary, full-time school. They attended School B all

day, every day, and had one teacher for all their academics. The time then that the teacher could decide to dedicate to any one activity or discipline was flexible. Per program policy, if a student left mid-year, his/her spot was not filled. New students were only added at the beginning of a new school year in order to protect the pacing and integrity of the programs in these classrooms.

***Students in Classroom B-1.*** The 14 students in Classroom B-1 were all identified highly capable 5<sup>th</sup> graders, 10-11 years old. There were 10 males and 4 females. These students were integrated into all school-wide activities and took on the school mascot as their own. Since identification as “highly capable with additional learning options” began at 4<sup>th</sup> grade in this district, most of the 5<sup>th</sup> graders in Classroom B-1 had already known each other for a year, coming into the program as 4<sup>th</sup> graders. 13 of the students in this classroom self-described themselves as comfortable with technology and 1 as hesitant. The ethnic breakdown was as follows: 88% White and 12% Mixed.

***Teacher in Classroom B-1.*** The teacher in Classroom B-1 was a 19-year veteran teacher, teaching only 5<sup>th</sup> grade that year. She held a K-8 statewide teaching certificate, a BA in education with a minor in math, a master’s degree in art, and her National Board Teaching certificate in math.

***Students in Classroom B-2.*** The 21 students in Classroom B-2 were all identified highly capable 4<sup>th</sup> graders, ages 9-10 years old. There were 10 males and 11 females, and many of them, coming from different home schools in the district, met each other for the first time in the beginning of the school year. 3 of the students in this classroom self-described themselves as expert level in their comfort with technology, 16 as comfortable, and two did not answer. The ethnic breakdown was as follows: 9% Hispanic/Latino, 4% African American, 13% Asian, 57% White, and 17% Mixed.

***Teacher in Classroom B-2.*** The teacher in Classroom B-2 had been teaching for 9 years and was responsible for teaching only 4<sup>th</sup> grade. She held a K-8 statewide teaching certificate, a BA in education, a master's degree in school counseling, and her National Board Teaching certificate in literacy.

### **Procedure**

In this section, I describe the behind-the-scenes coordination that supported this work and the technical tool students used to communicate with one another. I also lay out the progression students went through throughout the study, leading up to and including an intervention.

**Coordination.** This study required fitting into teacher schedules to carry out the research and support the online work, but also additional teacher collaboration. While the green architecture theme was already part of all three teachers' curriculums, they were not identical, so the teachers came together F2F to organize the work: planning the unit, coordinating scope and sequence, and discussing student characteristics in order to place students into small groups for online feedback. These groups were a mix of all three classes, and procedures are discussed below in the section titled, The Process.

**The Technical Tool.** Students communicated asynchronously in the online space using the discussion tools available in the Canvas learning management system (LMS). Students attached or embedded images of their playground designs to asynchronous text-based threaded conversations and solicited and provided feedback to each other. While students could access the system at any time and could log in from non-school computers and on other devices, most communication occurred during time allotted in their classroom settings. They were able to create new discussion topics, respond directly to a discussion topic (teacher or student created), respond to others' posts and comments, and attach or embed artifacts they wished to share for

feedback. They could also create profiles to include a photo or image with brief information about themselves.

**The Instructional Process.** While the purpose of the classroom activity was to design an environmentally friendly playground, teachers thought students should consider the nature of online talk since the addition of online peer feedback was framed as a resource to improve their work and gain an experience using online tools. Therefore, prior to gaining access to the online space, students engaged with teacher and researcher in exploring the similarities and differences in online versus F2F conversation. In small groups and then in whole group, students discussed ideas around body language, speed of communication, internal jokes, distracting characters when typing, and the cognitive effort of the different communication types (mainly typed conversations versus audio or F2F).

Then, students participated in online book clubs for four weeks. Students chose the book they wanted to read from a list of teacher pre-determined books, and this sorted them into their asynchronous discussion groups. While students had access to go into any book discussion, they set the expectation that only those who read the book really should be discussing a particular book. Student tool use was limited, but not directed. They were given technical instruction on how to post comments, how to interpret conversations as they would appear on the screen, and how to create a profile. Yet, while the threaded discussions were teacher created, they did not include prompts to guide the discussion. Students decided what to discuss and how to discuss it. Limited tools were given because the purpose was to introduce them to the online space and establish technical comfort with a familiar activity.

Moving forward, students were granted additional communication and sharing privileges (such as starting their own discussions, embedding images, and adding attachments) in order to

engage with each other around a more structured task that was already part of the teachers' planned curriculum: sustainable architecture. Students were to design and build an environmentally friendly playground, either individually or in small groups of three peers from their F2F class. The teachers then collaborated to assign students to online feedback groups, considering that common student interests and communication and leadership skills would provide a starting place for productive discussion. However, students were not prompted to engage in these issues, nor were they provided direction beyond technical support and the initial online versus F2F conversation discussion. The online groups were comprised of a mix of 3-4 students across the F2F classrooms, and each group had private discussion threads, inaccessible by students in other groups. This was designed to help focus students by minimizing the number of people and designs they would be accountable to in providing feedback.

Online playground discussions occurred from February through April, and some students continued checking in through the end of the school year. Students used the online space during each phase of the engineering design process to extend thinking by asynchronously sharing ideas, images of their work, and gaining peer feedback. Designs involved iterative cycles of research, design and redesign of prototypes or models, and a final 3D build of individual and small group environmentally friendly playgrounds.

As students started discussing their playground designs online, the teachers and I noticed short discussion threads consisting of continual evaluation and advice comments, with little in-depth feedback. Integrating teacher concerns and intentions, I designed an intervention to further scaffold student online conversations. It involved student analysis and reflection on their own-posted comments and was a facilitated conversation that happened the middle of March.

The intervention was a fully F2F activity completed by all students in small groups (in their respective physical classrooms) and then shared in full F2F class discussion. Small groups of students read, discussed, agreed upon, sorted, and glued five “feedback” comments on a continuum from “Most Helpful” to “Least Helpful.” These comments were their own, taken from and typically seen in the online space as students conversed about their designs. Students then analyzed the work they had done on the worksheet together on two levels: 1) what the top [or bottom] comments had or didn’t have that led to where they were placed and 2) critically analyzing the specific characteristics of the top two comments listed as “Most Helpful”.

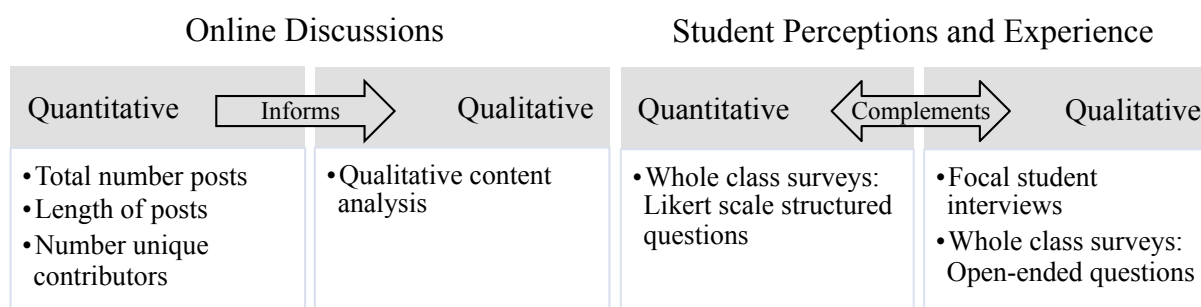
A few groups then shared with the class and explained their sorting rationale. As a whole class, students discussed their interpretations of the comments using the categories of Evaluation, Advice, and Feedback. They noted how they were similar and different, and what each provided in terms of information toward improving work. Students then talked about how providing feedback might be different asynchronously and online such as when you don’t “see” the person or there is significant time lapse between posts.

After the intervention, students continued to discuss their designs and issues they encountered in building their playgrounds online. In the case of one class, the teacher also had her students request feedback online for a connected assignment. In addition to design and build, her students wrote letters to the City Council from the standpoint of a company submitting their proposal for full-scale build. Finally, as closure to the whole project, some students posted pictures of their completed 3D playgrounds, built from the designs they had been developing.

### **Data Sources and Data Collection Approaches**

Multiple data sources were used to look at the quality of online discussions and the strategies students used during those discussions. Quantitative methods included counts on the

online discussions such as total number of posts, number of turns of talk, number of unique contributors, and Likert scale structured whole class survey questions. Qualitative methods included qualitative content analysis on the online discussions, semi-structured interviews with focal students, and open-ended whole class survey questions.



*Figure 2.1.* Quantitative and Qualitative Data Sources

Looking at the quantitative data from student discussion posts across the entire online space, an unusually high or low number of posts in a topic thread initially identified the places to initiate qualitative content analysis. In other words, this count indicated a fair amount of back and forth talk or a single unanswered post. After that, the number of unique students participating in the thread provided insight into factors contributing to sustained conversation, noting if the talk occurred throughout the group or was limited to one or two students. Content analysis added a way to first determine if the posts were on topic as well as a way to understand how the structure and strategies that were present or lacking impacted thread length. Additionally, student interviews and whole class survey data were gathered on student perceptions and experiences.

**Semi-structured interviews.** Two audio recorded interviews were conducted F2F with seven total students selected across all three classes, one as the projects began and a second toward the end of work on the design and building of student playgrounds. (See Appendix B-1 and B-2). While 36 students volunteered to be interviewed (via a sign up sheet), total counts of

how students were participating in the online discussions (number of posts and page views) informed teachers who ultimately chose which students would be interviewed. They selected students to represent low, medium, and high participation counts. Prior to the interview, I talked with each student about the nature of the interview process as one of sharing opinions to help me support them better. Interviews were 15 to 25 minutes each and were semi-structured in order to inspect changes over time (in both F2F and online space) as well as “find out from them those things we cannot directly observe [from observations or the quantitative data]...feelings, thoughts, intentions...the meanings they attach to what goes on (Patton, 2002 as cited in Merriam, 2009, p. 88). By the time interviews started, I had known all the students a minimum of 6 months, observing and working with them, so they appeared to be comfortable with my presence. Additionally, selected students volunteered and appeared to understand the process of an interview and the types of things I would be asking. For reliability purposes, I facilitated the interviews individually one-to-one (Conway, Jako, & Goodman, 1995), the interview protocol was related directly to the topic under discussion (Canger & Kelman, 1994), and it was consistently used with each student.

The expectation was that students would define their experiences in different ways and that patterns would emerge across student informants. Focal student interviews provided insight on the online discussions as a whole as well as individual student perceptions of the value or usefulness of those discussions given the task. Interview questions focused on the differences between F2F and online interaction, the activities of giving and taking feedback, and whether they needed to know peers in the same way in both settings for purposeful work.

**Whole class surveys.** Online survey data in the form of 5-point Likert scale items and open-ended questions were gathered from all student participants at the beginning and end of the

project. Questions focused on comparing the two environments (F2F and online) for engaging in useful feedback and the importance of knowing someone well in order to do so. Likert scale items were adapted from the McKinney et al. 2006 classroom community survey, a survey evaluated as highly reliable, but initially created for just F2F classrooms. Therefore, some of the survey questions needed to be revised to target the unknown peers students were meeting online. Open-ended questions added onto the beginning survey asked about previous student experiences working online (talking with unknown others, using a discussion board) and comfort with new technology. Open-ended questions on the end survey asked about whether online feedback helped their thinking and learning, what could improve online feedback, and if it was important to understand why feedback comments were made.

Survey data provided a way to see changes throughout the process and assess the extent to which the focal interviews were representative of the responses from all students. Periodically, short exit slip surveys were also collected to focus on student use of the online space, perceptions of usefulness, and student definitions of feedback. Partway through the study, the combination of content analysis on initial online discussions and participation counts led to the intervention described earlier. Its goal was to provide additional support for students in identifying and constructing helpful feedback. Exit slips collected after this intervention included additional questions to gauge impact and their perceived ability to apply their learning to participating in higher quality feedback practices.

### **Data Analysis**

Analysis started by developing algorithms and building programming instructions (Application Programming Interface integrations) to extract data from the LMS including: discussion topic title, the name of the person starting it, the date/time it was created, the total

number of replies, number of responses before and after the intervention date, and the total number of unique students contributing to a particular conversation. This was then put into a Summary Table in .csv format. (See Table 2.1).

Table 2.1

*Summary Table, Student Online Discussion Threads*

Topic Title	Started By	Start Date	# Posts In Topic	#Unique Students	# Posts Before 3/10/15	# Posts On/After 3/10/15
Jackson's Playground Model	Jackson F.	4/21/15 20:24	8	4	0	8
Emma's Finished Playground	Emma Sp.	4/21/15 20:24	4	2	0	4
Our student council letter.	Rebecca V.	3/19/15 18:44	2	1	0	2
Alfredo and Rebecca's Birdeyes view	Rebecca V.	3/16/15 17:27	6	1	0	6
What items are you going to build?	Rebecca V.	3/5/15 18:07	4	2	3	1
Jackson's birds eye view	Jackson F.	2/24/15 19:15	23	6	19	4
Emma's playground rough draft.	Emma Sp.	2/24/15 19:13	10	2	1	9
Birdseye Views	Rebecca V.	2/23/15 18:30	7	4	3	4

An analysis of the number of discussions, number of posts per thread, and length of individual responses in the online text based asynchronous talk provided a foundation in understanding of how students interacted online (Guzdial, 1997; Guzdial & Turns, 2000). However, there are constraints to counted data. Typically content in this context is analyzed for the degree to which it is task oriented (Cohen & Scardamalia, 1998; Lipponen, Rahikainen, Hakkarainen, & Palonen, 2002). While this was of interest, additional content analysis provided a means of identifying the types of strategies or feedback moves students relied on to inform if, how, and why conversations were or were not sustained.

During content analysis, Start Date of each discussion was considered to determine if more or less topic focused discussion occurred at particular steps in the engineering design process. Topic Titles also set the tone or revealed the work being posted for feedback. Students decided on the topic titles when they created individual discussions to post their work. For example, “[student name] birds eye view” was created to get feedback on the embedded aerial view drawing, and “What items are you going to build” was a place where students shared things they were planning to build in their parks, such as paths, big toys, sandboxes, etc. In calculating

mean number of posts per discussion and for the purposes of coding posts, one discussion that was created for all groups was excluded, that of “Group Name and Research Topics”. This was done because the purpose of this discussion was to negotiate name and topics and was not focused on providing feedback on each other’s work.

The remaining discussion posts were coded by Wiggins’ (2012) types of F2F feedback: Evaluation, Advice, and Feedback. Combination codes (Evaluation+Feedback, Evaluation+Advice, Advice+Feedback) were used given the content of a set of words in one comment could overlap categories. To look at sustained conversations, I counted the number of posts in a given thread that followed a coded post to see if any particular types of comments accounted for additional length (sustained talk) in a thread. Then, an iterative coding process was used to note recurring comments and repetition of commonly used phrases as well as asking, “what is missing?” (Bogdan & Taylor, 1975). Overall, participation was measured by the total number of posts; interaction by the number of turns of talk and the number of unique contributors; and content by coding talk as on-task or not, the type of comment posted, and repetition of words and phrases (see Table 2.2 and Figure 2.2).

Student interview data and whole group survey data were incorporated to further explain and interpret the meaning of the coded posted comments. While both the interviews and survey data were analyzed separately, only the themes and parts that are specifically relevant to the asynchronous posted discussions are considered here. For example, all recorded student interviews were transcribed and examined through successive rounds of coding by myself and one other independent researcher. We came together after coding three interviews to discuss, recode, and come to full agreement. Together, commonalities were grouped into themes that were useful in interpreting the numbers. The emerging themes relevant to the online discussions

referenced the types of comments made back and forth, the quality of the online conversations in providing value for the activity, and those referring to any specific strategies students used or considered while crafting feedback comments online. Given the context of the interview, students discussed online comments relative to their F2F feedback experiences. Relevant codes were triangulated with the quantitative data, and data from the first interview guided subsequent questioning. My evolving understanding from interviews was used to make additions to the final all-student survey. This was done in order to also use the survey as a way to check if focal student interviews represented the broader whole (Miles, Huberman, & Saldaña, 2014).

### **Findings**

In this section, I present a summary of findings in two parts, discussing quality of the asynchronous talk, and then the strategies students used to get feedback relative to a strategy's ability to sustain conversation. Since high quality conversations are both valuable to those involved as well as being sustained (Spiller, 2009), findings regarding quality involve students' perceived value of the overall experience and the feedback exchanged, as well as reporting the actual student post data, summarized in Table 2.2. Strategies used include general requests for information, stating one's goal, and being involved after the initial post.

#### **Perceived Value**

Overall, across all three classrooms, students appreciated the opportunity to participate in an activity they felt would prepare them for future tasks, beyond school. They described it as “fun” while “teach[ing] you life skills.” One student represented the common sentiment saying

[This] is a valuable experience that will prepare us for when we have a job and do this; it helped me learn to work together with other people that we might not have met before and we're going to have to put away our differences to get work done.

From the final survey, some also spoke to other social impacts, such as “help[ing] with anxiety

or other shynesses,” feelings that “now I know that I can trust more people,” or explaining “I am more of a quiet person so it helped me to cooperate with others.” Additionally, many students realized that they had learned technical and practical skills beyond feedback such as improving typing and online researching. For example, via the survey, a student explained “I am now a better typist because I don't usually type as much! I also learned how to post links, make plans, and find websites.”

Students described participating in online feedback tasks as helpful in supporting their thinking and learning as they moved through the design process, identifying specific changes they considered due to peer comments. Examples are: “[My partners were very encouraging and helpful (not to mention there amazing ideas about playground designs!). I felt very supported and they gave me some great tips. They gave me ideas about rope maze, benches, and many more, and i gave them lots of tips to! *[sic]*” “If all kids did this everyone would be much smarter.”

However, some students reported that they did not get what they needed from online feedback. This was due to the new online environment and the usefulness of the comments shared. Students new to the talking online had to adjust to interacting asynchronously, summarized in the following comment: “They just typed in what they thought; they weren't like right there, waiting for me to do something.” Also, in responding to the final survey question asking if talking to other students you've never met about your work helped your thinking, 21 of 52 students (40%) said no, but 21% of those gave as the rationale that there were too few comments made about their work. Many also mentioned that because they didn't know each other, it was hard to understand why someone would make a particular comment. An example of this was Anna discussing her trees. Anna felt that if she knew someone liked trees she probably

would not tell them to remove any in their design, even if there was a good reason to do so. And, she stated that if roles were reversed and someone suggested to her to remove her trees without further explanation, she would disregard the comment and end the conversation. During her interview, she acknowledged that because it was online, she wouldn't think to ask why the trees should be removed, possibly due to just interacting directly with text. She came to realize that by ending the conversation, she wouldn't hear their thinking—that too many trees could be a safety concern where parents couldn't see their kids playing. Other students also said similar things like “I need to know why, so I can understand...”.

Still, similarly to a previous study (Kim, 2015), the majority of students (77%) found value beyond typical F2F experiences because the focus was on the feedback and not on previously established social connections, emotional ties, or having to deal with the impact emotional responses could have on a F2F friendship. The following comment summarizes this belief:

You know they don't dislike you so you can focus more on what they are saying, but like some of your friends might not be as objective like they might say you did really good to not hurt your feelings. People in other classes might give you better feedback cause they don't really know you.

Students felt they could speak openly with one another online with 82% agreeing or strongly agreeing and 18% opting a neutral response; none disagreed.

### **Student Post Data**

The following measures will be presented per the literature on quality asynchronous conversations: the number of total comments (Hiltz, 1986) and both the length and on-topic nature of the conversation (Guzdial & Turns, 2000). Additionally, while the type of comment made is most often discussed in teaching students how to give F2F feedback, it was relevant and I include it because comments coded as feedback are considered higher quality (Wiggins, 2012).

Table 2.2 provides an overview of online activity.

Table 2.2

*Overview of Online Activity*

Total discussions	133
Total student posts	1125
Off-topic posts (isolated, not included as part of an on-task post)	9
Mean unique contributions (# different students who participated in a discussion)	3.24
Total student posts (minus discussion topic on Group Name and Research Topics)	827
Mean # posts in a discussion	6.83
% Posts coded as advice, evaluation, feedback, or combination	33.8

*Note:* Students were in small online groups, a mix of 3-4 students across the F2F classes.

**Participation.** One measure of quality is student participation, as indicated by the students contributing 1125 total posts over three months. This was an average of 19.4 posts per student. A second data point on total student posts excludes the discussion topic on Group Name and Research Topics because the purpose of that discussion was not focused on feedback or actual student work but on negotiating name and topics. Of the 1125 total, 827 student posts specifically involved discussing and sharing work.

**Length of the thread.** Another measure of quality was the length of the discussion thread. The mean length was 6.83, meaning that on average each thread had 6 turns of talk amongst the 3-4 students per small group. Since the purpose was feedback, the calculation for the mean number of posts in a discussion did not include the Group Name and Research Topics. Additionally, most conversations had at least three students talking as evidenced by the mean number of unique contributions (3.24). Generally, threads ended with a “thanks” comment or when the person who started the conversation (initiator of the thread) was not involved.

**On vs. off-topic.** The proportion of conversations being on-topic further measured

quality. Only nine posts were entirely off-topic, and one student contributed six of them. This is not to say that students never mentioned off-topic things, but if they did, it was part of a post that also included on-topic work. For example, “Happy Birthday! (sorry i didn’t know, so it’s late). And nice job on the Project!” This post includes evaluation so was not coded as strictly off-topic. For context, it also came after a feedback discussion, requests for responses, and an apology for not responding due to building the actual model and having a birthday.

**Types of comments.** Finally, the types of comments being made provided an index of quality. Sensing that students were doing a fair amount of evaluative comments online led to the intervention to help students analyze the types of comments they were using. On the post-intervention exit slip, 91% of students (n=54) gave average to high ratings to the activity. All students identified “feedback” type comments as the most helpful. The details in the types of comments coded are presented in Figure 2.2.

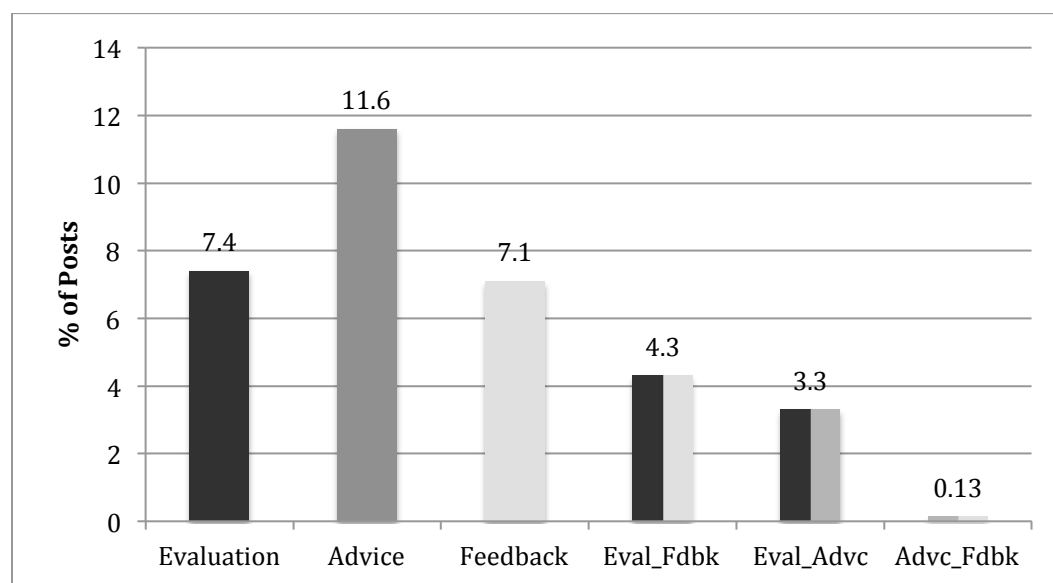


Figure 2.2. Percent of Posts Coded as Evaluation, Advice, Feedback, or Combination

*Note.* Eval\_Fdbk is a combination code for Evaluation and Feedback; Eval\_Advc is a combination code for Evaluation and Advice; Advc\_Fdbk is a combination code for Advice and Feedback.

The process of coding the types of comments students made on each other’s work accounted for

33.8% of all comments. The rest, coded as Other, consisted of supporting responses and other on-task conversation such as the types of resources, landscape plants, eco-friendly building materials they were finding, helping each other with technical support, and supplies they might need or where they might get them. Advice was the most common type of response (11.6%) and Evaluation/Feedback (4.3%) was the most common combination such as when students followed “good job” with a comment about why they thought it was good. Table 2.3 presents more detail in comparing the types of coded posts, including the mode for each type of coded comment.

Table 2.3

*Details on Coded Posts*

<u>Code</u>	<u>% Posts</u>	<u>Mode</u>	<u>Range</u>
Evaluation (59)	7.4	0	0-5
Advice (92)	11.6	0	0-9
Feedback (56)	7.1	1	0-8
Eval_Fdbk (34)	4.3	0	0-8
Eval_Advc (26)	3.3	1	0-4
Advc_Fdbk (1)	0.13	1	

Since the goal was to identify whether certain types of comments drove sustained conversation, the method was to count the number of posts following a particular type of comment. The mode for Evaluation, Advice, and Evaluation/Advice was zero, meaning that they tended to end a conversation even if the range was upwards of 8 to 9 posts after the coded comment. However, the mode for Feedback, Evaluation/Advice, and Advice/Feedback were 1, meaning that typically one more comment followed. However, a number of different comments appear within one thread, so this method of counting was not particularly useful as the count started over with each subsequent coded post. For example, in a given thread, one feedback comment might follow another feedback comment (which counted as 1) and the second feedback comment might result in one evaluation post after it, again counting as 1. Since the flow of conversation is not always linear, that first feedback post cannot necessarily be credited with driving all subsequent posts.

The following Thread A is an 8-post example with four students participating.




**Birds eye view** Student A

This is the Birds eye view.

 Birds eye view.pdf

---



Student B

Feb 24, 2015

**Evaluation/Feedback**

I like your playground. The river is a great idea for this. It is a little overlapping, but that is fine. However, is the log like a boat? The huts are great for the activities. Is their a shed for swimming equipment? What are the holes for? I like the petting zoo. In all, this is pretty good.

---




Student C

Feb 24, 2015

**Evaluation/Feedback**

what are the holes for? someone could fall. I don't know about the lamb cage either what is it for? though the huts are great and so is the log and lake.

---




Student A

Feb 25, 2015

Thank you for the good opinions, and the holes lead to an underground cavern in which the children could swim up the river. My team thought the log would be for sitting on and walking across, not necessarily like a boat, but that would be a great idea. The lamb cage is for petting, and the idea of a shed is a pretty good one. Thank you for the awesome replies.

---




Student D

Feb 25, 2015

**Evaluation**

cool idea, Student A

---



Student C

Mar 10, 2015

**Feedback**

how would they swim up the river that could be dangerous and what if someone who couldnt swim fell through the holes?

---




Student A

Mar 11, 2015

The holes do not lead into the river, but to a cavern that could lead to the river. We should add stairs to get out of the holes in case someone doesn't want to swim up. We thought that the river would be shallow at the start, then getting deeper as the go on.

---



Student C

Mar 17, 2015

thank you for clarifying

Figure 2.3. Thread A, 8 Post Example.

Three different types of posts are coded within the thread, leaving initial top-level post and other on-task conversation coded as Other. Student names have been replaced by letters. Student A initially posts his work for review and participates within the thread, answering questions and

clarifying. While Student D evaluated, which tended to end discussions, Student C continued (although almost two weeks later) to provide feedback that facilitated the need for a response from the initiator of the conversation, Student A. Next, I will discuss the strategies students used to get feedback and whether they sustained conversation.

### **Student Strategies**

Students understood that they were to share work and support peers by providing feedback, but they were not instructed on how to engage in feedback conversations. Their strategies for doing so were a focus for analysis. Three main types of involvement emerged as having a significant impact on sustained conversation: general requests, stating one's goal, and being involved after initial post. Table 2.4 summarizes the first two types as ways students solicited feedback. Additional tables will be presented for involvement after initial post.

Table 2.4

#### *Summary of Soliciting Feedback Strategies*

<u>Strategy</u>	<u>Percent</u>	<u>Mean # Posts</u>
General Requests (94)	94.9	5.80
Stated Goals (5)	.05	18.5

Of the 133 total discussions, 99 started with a student posting work. The two most common requests accompanying that work were for general feedback or that related to a specific goal.

**General requests.** As students posted work online, 94.9% had a general request for feedback or implied request made by just posting the work. Students frequently stated variations of, "Here it is, let me know what you think." When there were time lapses or few responses, students repeated the ask as in "Ideas...anyone?" The average length of these threads was 5.80.

**Stating one's goal.** The other strategy seen in posting work was for the initiator of the thread to include a specific ask. Examples were "I'm stuck on...any ideas?" or "Do you think a better idea for the Eco friendly pathway is wood chips or tar?" While this only happened five

times, those threads were longer as evidenced by an 18.5 mean number of posts.

**Being involved after initial post.** The third type of involvement that impacted sustained conversation was whether or not the initiator of the thread was involved after the initial post. While Evaluation posts still tended to end the conversation, as the common response was nothing or a “thanks,” advice and feedback posts drove sustained conversation particularly when the initiator of the top-level post was simply involved in the conversation. For example, in Thread A, Student A started the conversation by posting his work and explaining that it is the bird’s eye view. He participates in the thread. In comparison, in Thread B, Student 1 similarly posts his work for review. While there is a time lapse between sets of comments and three coded posts, he does not contribute to the conversation after the initiating post, and the overall thread is shorter.

The screenshot shows a forum thread titled "Student 1's birds eye view side 1" posted on Feb 24, 2015 at 11am. The thread contains four posts:

- Post 1:** Student 1 (Feb 24, 2015 at 11am) posts a hand-drawn image of a bird's eye view and says, "this is hand drawn hope you like and look at the second." The image is labeled "Playground1.jpeg".
- Post 2:** Student 2 (Feb 25, 2015) responds with "Thats cool, do you think you can outline it to make it more clear?". This post is labeled "Evaluation/Advice".
- Post 3:** Student 3 (Mar 11, 2015) responds with "I don't really like the ship idea, nice idea though.". This post is labeled "Evaluation/Feedback".
- Post 4:** Student 4 (Mar 13, 2015) responds with "Cool! So far I think your trying to make it into a sea themed park? Is that your idea? If so I like your idea.". This post is labeled "Evaluation/Feedback".

Figure 2.4. Thread B, 4 Post Example

Of the total number of discussions, 80 filtered out as being student initiated and having at least two students involved. Table 5 breaks those 80 down to see the number of posts in a thread where the initiator contributed and where he/she was not involved.

Table 2.5

*Initiator Contributed Significance by Percentage*

	<u>5 or More Posts</u>	<u>4 or Fewer Posts</u>
Initiator Contributed (54)	92.6% (50)	7.4% (4)
Initiator Not Involved (26)	23.1% (6)	76.9% (20)

When the *receiver* or *initiator* participated at least once after creating the discussion, there were more turns of talk (more posts in the discussion). Table 2.6 shows that the discussions were longer by a factor of 3.

Table 2.6

*Initiator Contributed Significance by Count*

	<u>Mean # of Posts in a Discussion</u>	<u>Mode</u>	<u>Range</u>
Initiator Contributed (54)	9.06	5	3-31
Initiator Not Involved (26)	4.31	2	2-14
All (80)	7.51	5	2-31

Also, the initiator contributed discussions on the upper end of the range tended to have students asking more questions of each other and engaging in conversation that addressed someone else's comments within the discussion, not just those made by the initiator. With these findings on the quality of the asynchronous feedback and the strategies students used, I proceed in the next section to discuss major findings in light of how they can inform how we can best support students in online feedback.

## Discussion

I explored how three classrooms of highly capable 4<sup>th</sup> and 5<sup>th</sup> graders participated in and perceived online peer feedback with geographically separated others. While the differing

structure of the two district programs impacted the amount of time students had to work online during the school day as well as their turn around time for responding, no significant differences were found in ability to interact online, feedback seeking strategies, or perceived value. Similarly, there was no indication that ethnic breakdown or variation in socio-economic status of the students in these classes impacted these particular areas. While others claim differences in socio-economic status relative to “technology competence” (e.g. Sun & Metros, 2011), it is important to note that 1) this was not a targeted focus of inquiry for this study, and 2) these students had the underlying commonality that they were all designated highly capable. They all had parents who specifically made choices to have their students involved in special programs, and the students saw themselves as being in a classes “with others like me.”

Overall, it is clear that students valued the experience and the feedback (despite some receiving too few comments), participated in the task, and that most conversations were almost entirely on-topic. While students did mix social comments with on-topic posts, it is perhaps unreasonable to expect that only on-topic dialogue be exchanged between students online or F2F. It may be that these comments additionally support learning and are integral to maintaining the atmosphere needed for productive conversation (Bruckman, 1997). However, since a goal was to look more at the interactions, I added additional measures of quality to look at the kinds of comments students were making and actions impacting sustained conversation.

### **Types of Comments Matter**

In terms of the kinds of comments students posted to each other, it’s not surprising that the single code seen most was Advice and the highest combination code was Evaluation/Feedback. Students are often instructed to not merely make an evaluation comment unless it is followed with some specificity, which would lead to Evaluation/Advice or

Evaluation/Feedback. Yet during the intervention, all students classified Feedback-type comments as the most or second most helpful type of comment in providing the information needed to decide what to do next. On the post-intervention exit slip, 91% of students marked average to high ratings on the activity and felt they would provide better feedback to each other as a result. Yet in this study, even where the comments were Feedback ones, the length of the conversation also matters.

### **Sustained Conversation Matters**

While counting the length of a thread is not enough without considering the type of comment, Spiller's (2009) assessment that a conversation is of higher quality if sustained holds true. Even feedback-type comments in short threads provide less opportunity for reflective thought or an ability to hear and understand the thinking behind the comment. Anna discussing her trees was an example. She explained that if she didn't like someone's comment about her trees, she would just disregard it online rather than seek to understand why the comment was made. Yet, while many expected the explanation of thinking from others, they didn't generally offer it or think to ask if it wasn't provided. This resulted in shorter un-sustained conversations. It also suggests some important ways we can support students to more productively interact online with peer feedback by adjusting the focus of instructional support from solely how to give, to emphasizing how to respond.

### **Supporting Students with Online Feedback**

To support F2F feedback interactions, attention has been devoted to how to give feedback (Brookhart, 2008), not on teaching students strategies for how to *receive* or how to *participate* in a feedback discussion (Stone & Heen, 2015). This was reflected in the goal teachers had for the intervention. When support was needed, students analyzed the feedback comments they were

giving in order to learn to craft them better. The focus was on the giver.

Knowing how to participate and respond may be more important online given a need to clarify thinking due to fewer social cues for interpreting the meaning of others, timing issues, and asynchronously posting work for feedback. Knowlton (2000) says that online, students need to be more actively engaged. While the mean length of a threaded discussion in this study was 6.83 (six turns of talk), what extended the conversation was not necessarily the type of comment made. When the *initiator participated* after the initial post, threads were longer, and opportunities for new information and explanation arose. Still, the threaded discussions revealed minimal requests for clarification that are needed for reflective discourse (Liponnen, 2000; Van Zee, 2000). Recall that online, Anna did not even think to ask.

**Clarifying thinking.** Given this, we need to emphasize increased involvement to learn more, intentionally ask questions and clarify thinking (his/her own or that of the giver), whether or not comments provide what is needed. In small groups, this also means addressing the thoughts and ideas of others as a whole conversation and not just thinking about posts between two people. Online, students are apt to let the comments simply “exist” without response, particularly when they may not initially agree. Many times students also responded with just “thanks” because they saw their role as accepting someone else’s ideas versus clarifying and seeking the thinking behind the comments if they did not understand or felt the feedback was not helpful. If this happens, the potential learning may be lost. Additionally, since the comments were made via online text, students may not have felt the need to respond. One student said, “They weren’t like right there, waiting for me to do something.” The absence of a physical body expecting an immediate response and providing nonverbal cues resulted in ended conversation. While being involved in clarifying thinking and asking questions is a good practice F2F as well,

it is a specific skill set that must be learned to effectively receive feedback, particularly online—one that we have not emphasized enough with students.

Students also need to learn to think critically about the types of comments (feedback, evaluation, advice) and language they use online. Since feedback is more effective if followed by the thinking behind the comment, providing that thinking (versus waiting for someone to ask) needs to be intentional because the medium itself lends to quick and short responses. It was initially designed to coordinate emergency tasks, not as a means of descriptive formative feedback (Walther, 1996). The minority of students who wanted to know each other better in order to provide better feedback felt that with the absence of this, they could be supported online if the rationale behind the comments was shared. This would provide a sense of knowing the person behind the comment. Students generally did not know how to address issues in an online environment in order to get what they needed. So, examples of support would be to encourage the receiver to ask for thinking and for the giver to provide more context.

**Timing.** Another issue in asynchronous online conversation is that the comment stands alone, perhaps for days on end. Pauses can mean either intent to continue the asynchronous conversation or end it by simply not responding, ever. Students in this study initially had to adjust how they thought about intent based on response time and the amount of feedback received since one class only met once a week and the other every day. It was difficult at first to understand that a delay of even a few minutes did not necessarily mean disregard. To help with this, guidelines and expectations on feedback frequency should be provided and detailed.

**Sharing work online, targeted and broad requests.** In order to provide information to help another person evaluate current progress, consider feedback, and make appropriate adjustments to better reach goals, the giver needs to know those goals and share them with

others. While students felt they gave good feedback, many did not provide targeted guidance in defining or asking for what they wanted. When they did, the result was a mean thread length of 18.5 versus 5.8 for the general asks like “What did you think?” In other words, students need to share the goal so someone else can provide an opinion on whether or not it was met.

Yet broad asks are not to be dismissed. While stating the intended goal is a step toward gaining targeted feedback, the place to *start* may still be with a general ask for initial overall thoughts. Dan Suthers (Information and Computer Sciences at the University of Hawaii) has researched interactive learning technologies and learning in online communities for 30 years (e.g. Suthers, Hundhausen, & Girardeau, 2003; Suthers, 2012). In a personal conversation (December 28, 2015), he agreed with the importance of targeting feedback, but also highlighted a concern that immediately narrowing the scope of desired feedback limits what might be seen. Part of what students valued in sharing work with others they had not previously met was in what they perceived as a more objective view. They welcomed the ideas others surfaced that they had not previously considered, appreciating someone else’s “untainted” opinion—what might be really helpful but not asked for because one hadn’t yet thought about it. Therefore, starting with the general “What do you think” might still be a good strategy. The fact that it wasn’t often followed by anything specific, added to the end of the conversation.

## **Conclusion**

In this study, I sought to understand perceived value of adding online asynchronous peer feedback with unknown others to the F2F classroom, elements that impact the quality of asynchronous feedback conversations exchanged by elementary students, and the strategies they used online. Mirroring higher education literature, students valued the online feedback received and the experience working online with unknown others. However, findings did not align in that

the majority did not want or need to develop deep relationships with each other in order to do this work. They found added value beyond their F2F feedback practices in what they deemed as a more objective perspective from unknown others. Additionally, while I found that the length of these elementary students' online conversations was longer than previous studies, what contributed to that length was not particularly the type of comment used but how involved students were, particularly the initiator of the thread. While sustained conversation did matter in terms of providing more opportunity for reflective thought or an ability to hear and understand the thinking behind the comment, students did not generally have the strategies to know how to respond to get the support they needed online if it wasn't offered freely.

**Further research.** While I found promising results of students trying to employ feedback strategies online, due to the amount of time students had online and the differences between F2F classrooms, it is difficult to determine incremental growth in student skill set. With a longer time period and instruction targeting *participating in* and *receiving* feedback, I expect that growth to improve. Ultimately, since there were benefits for these highly capable students beyond the same task F2F, then perhaps there may be benefits for other students (Renzulli & Reis 1994; Tomlinson 1996). While this study speaks to the potential added value of augmenting current practices with online feedback and strategies to further support students, more is needed targeting a younger age group that is already immersed in the digital world.

Particularly when looking at students who do not already know each other, it is important to delve more into how security in one's F2F classroom connects to what is needed online. Is it that students who are comfortable in their F2F communities do not need that online because the F2F community grounds them? Is it that students who are not satisfied F2F need those missing elements more online? Also, per the intervention in this study, students stated they would give

and receive feedback better as a result, but is there empirical added benefit evidencing that they are actually able to do so?

In the end, while there is “a compelling consensus...from research that high quality feedback is the most powerful single influence on student achievement” (Hattie, 1987), if the initiator does not participate in the process or he/she is unclear about goals or is uncertain on how to respond to get what is needed, it is difficult for feedback to be applied. While “both delivering and receiving are skills that can be improved with training” (Schartel, 2012), it is this process of *receiving* and *participating* that need to be better researched and integrated into practice. In fact, while Bangert-Drowns, Kulik, Kulik, & Morgan’s (1991) meta-analysis of 40 studies noted relatively weak connections between feedback and achievement, a main conclusion was that in order for feedback to influence learning, it must be “received mindfully”—and particularly for online, I add, accompanied by skills for how to respond.

## References

- American Association for the Advancement of Science. (2009). *Benchmarks Online: The Nature of Technology*. Retrieved from:  
<http://www.project2061.org/publications/bsl/online/index.php?chapter=3>
- Bakia, M., Shear, L., Toyama, Y., & Lassetter, A. (2012). *Office of Educational Technology, US Department of Education, Office of Educational Technology, US Department of Education, 2012*. Retrieved from  
<https://www.sri.com/sites/default/files/publications/implications-online-learning.pdf>
- Bangert-Drowns, R. L., Kulik, C. C., Kulik, J. A., & Morgan, M. (1991). The instructional effect of feedback in test-like events. *Review of Educational Research, 61*, 213-238.
- Baym, N. (2010). *Personal connections in the digital age* (Digital media and society series). Cambridge, UK; Malden, MA: Polity.
- Bayraktar, S. (2002). A Meta-Analysis of the Effectiveness of Computer-Assisted Instruction in Science Education. *Journal of Research on Technology in Education, 34*(2), 173-88.
- Berge, Z. L. (1997). Characteristics of online teaching in post-secondary, formal education. *Educational Technology, 37*(3), 35-47.
- Black, P., Harrison, C., Lee, C., Marshal, B., & Wiliam, D. (2003) *Assessment for Learning: putting it into practice* (Maidenhead, Open University Press).
- Black, P. & Wiliam, D. (1998) Assessment and classroom learning. *Assessment in Education, 5*(1), 7-74.
- Bogdan, R., & Taylor, S. J. (1975). *Introduction to qualitative research methods*. New York: John Wiley.
- Brookhart, S. (2008). *How to Give Effective Feedback to Your Students*. Alexandria, VA:

ASCD.

Brown, J., & Duguid, P. (2000). *The social life of information*. Boston: Harvard Business School Press.

Bruckman, A. S. (1997). *MOOSE crossing: Construction, community and learning in a networked virtual world for kids*. Unpublished doctoral dissertation, Massachusetts Institute of Technology, Cambridge.

Buckingham D. (2007) *Beyond Technology: Children's Learning in the Age of Digital Culture*. Polity, Cambridge, MA.

Butler, D. L., & Winne, P. H. (1995). Feedback and self-regulated learning: A theoretical synthesis. *Review of Educational Research*, 65, 245-281.

Canger, S., & Kelman, G., (1994). Validity of interviews. *Digital Library and Archives Journal*. Retrieved from <http://scholar.lib.vt.edu/ejournals/JVME/V21-2/kelman.html>.

Clark, H. H., & Brennan, S. E. (1991). Grounding in communication. In L. B. Resnick, J. M. Levine, & S. D. Teasley (Eds.), *Perspectives on socially shared cognition* (pp. 127-149). Washington: APA Books.

Clements, P. (2016, March 2). The Need for Better Data about K-12 Online Learning: Starting with How and Why [Web log post]. Retrieved from <http://ltd.edc.org/need-better-data-about-k-12-online-learning-starting-how-and-why>.

Cohen, A., & Scardamalia, M. (1998). Discourse about ideas: monitoring and regulating in face-to-face and computer-mediated environments. *Interactive Learning Environments*, 6, 93-113.

Conway, J. M., Jako, R. A., & Goodman, D. (1995). A meta-analysis of interrater and internal consistency reliability of selection interviews. *Journal of Applied Psychology*, 80, 565-

579.

- Creswell, J., & Plano Clark, V. L. (2011). *Designing and conducting mixed methods research* (2nd ed.). Los Angeles: SAGE Publications.
- Crooks, T. J. (1988) The impact of classroom evaluation practices on students, *Review of Educational Research*, 58, 438-481.
- Dean, C. B., & Marzano, R. J. (2012). *Classroom instruction that works: Research-based strategies for increasing student achievement*. Alexandria, VA: ASCD.
- Demirbilek, Muhammet. (2015). Social Media and Peer Feedback: What Do Students Really Think about Using Wiki and Facebook as Platforms for Peer Feedback? *Active Learning in Higher Education*, 16(3), 211-224.
- De Wever, B. & Van Keer, H. (2012). Student perspectives on wiki-tasks and the introduction of computer-supported peer feedback. *Procedia-Social and Behavioral Sciences* 69, 558-565.
- Edmondson, A. C., & McManus, S. (2007). Methodological fit in management field research. *Academy of Management Review*, 32(4), 1155-1179.
- Ertmer, P., Richardson, J., Belland, B., Camin, D., Connolly, P., Coulthard, G., Lei, K., & Mong, C. (2007). Using Peer Feedback to Enhance the Quality of Student Online Postings: An Exploratory Study. *Journal of Computer-Mediated Communication*, 12(2), 412-433.
- Feedback. (2017). In *OxfordDictionaries.com*. Retrieved from <https://en.oxforddictionaries.com/definition/feedback>
- Guzdial, M. (1997). Information ecology of collaboration in educational settings: Influence of tool, in *Proceedings of CSCL '97: The Second International Conference on Computer Support for Collaborative Learning*. In R. Hall, N. Miyake, and N. Enyedy (Ed.),

- Erlbaum, Mahwah, NJ, pp. 83-90.
- Guzdial, M., & Turns, J. (2000). Effective discussion through a computer-mediated anchored forum. *Journal of the Learning Sciences*, 9, 437–469.
- Hattie, J. A. (1987) Identifying the salient facets of a model of student learning: a synthesis and meta-analysis, *International Journal of Educational Research*, 11, 187-212.
- Hattie, J. A., & Timperley, H. (2007). The Power of Feedback. *Review of Educational Research*, 77(1), 81-112.
- Hayles, K. (2012). *How we think: Digital media and contemporary technogenesis*. Chicago; London: The University of Chicago Press.
- Henry J. Kaiser Family Foundation (Ed.) (2010). *Generation M2: Media in the Lives of 8- to 18-year-olds*. Menlo Park, CA.
- Hewitt, J., & Tevlops, C. (1999). An analysis of growth patterns in computer conferencing threads. In C. Hoadley (Ed.), *Proceedings of CSCL '99: The third international conference on computer support for collaborative learning* (pp. 232–241). Mahwah, NJ: Erlbaum.
- Hiltz, S. R. (1986). The “virtual classroom”: Using computer-mediated communication for university teaching. *Journal of Communication* (Spring), 95–104.
- Kafai, Y. B., & Fields, D. A. (2013). *Connected play: Tweens in a virtual world*. (John D. and Catherine T. MacArthur Foundation series on digital media and learning).
- Kim, C. (2015, April 18). *Brain Bounce: Defining and Designing Community in Online Collaborative Spaces for K-12 Students*. Paper presented at the 2015 AERA Annual Meeting, Chicago, IL.
- Knowlton, D. S. (2000). A theoretical framework for the online classroom: a defense and

- delineation of student-centered pedagogy. *New Directions for Teaching and Learning*, 84 (Winter), 5-14.
- Ko, S., & Rossen, S. (2001). *Teaching Online: A Practical Guide*. Boston, MA: Houghton-Mifflin.
- Kulhavy, R. W. (1977). Feedback in written instruction. *Review of Educational Research*, 47(1), 211-232.
- Lave, J., & Wenger, E. (1991). *Situated learning: Legitimate peripheral participation*. New York: Cambridge University Press.
- Lipponen, (1999). Challenges for computer supported collaborative learning in elementary and secondary level: Finnish perspective. In *Proceedings of CSCL '99: The Third International Conference on Computer Support for Collaborative Learning*, C. Hoadley (Ed.), Erlbaum, Mahwah, NJ, pp. 368-375, 1999.
- Lipponen, L. (2000). Towards knowledge building discourse: from facts to explanations in primary students' computer mediated discourse. *Learning Environments Research*, 3, 179-199.
- Lipponen, L., Rahikainen, M., Hakkarainen, K., & Palonen, T. (2002). Effective Participation and Discourse through a Computer Network: Investigating Elementary Students' Computer Supported Interaction. *Journal of Educational Computing Research*, 27, 4, 355-84.
- Manning, M. L. (2002). *Developmentally Appropriate Middle Level Schools* (2nd ed.). Olney, MD: Association for Childhood Education International.
- McKinney, J. P., McKinney, K. G., Franiuk, R., & Schweitzer, J. (2006). The College Classroom as a Community: Impact on Student Attitudes and Learning. *College*

*Teaching*, 53(3): 281-284.

Merriam, S. (2009). *Qualitative research: A guide to design and implementation* (Jossey-Bass higher and adult education series). San Francisco: Jossey-Bass.

Miles, M., Huberman, A. M, & Saldaña, J. (2014). *Qualitative data analysis: A methods sourcebook* (Third ed.). Thousand Oaks, California: SAGE Publications.

Moeller, S. (2012). “The world unplugged” and “24 hours without media”: Media literacy to develop self-awareness regarding Media/El mundo desconectado y horas sin medios: Alfabetización mediática para la conciencia crítica de los jóvenes. *Comunicar* (English Edition), 20(39), 45-52. Retrieved from <http://search.proquest.com.offcampus.lib.washington.edu/docview/1152149725?accountid=14784>

Mory, E. H. (2004). Feedback research revisited. In D. H. Jonassen (Ed.), *Handbook of Research on Educational Communications and Technology* (pp. 745–783). Mahwah, NJ: Lawrence Erlbaum.

Newmann, F. M., & Associates (1996). *Authentic Achievement: Restructuring Schools for Intellectual Quality*. San Francisco: Jossey-Bass.

Newmann, F. M., Lopez G., & Bryk, A. S. (1998). *The Quality of Intellectual Work in Chicago Schools: A Baseline Report*. Chicago: Consortium on Chicago School Research.

Nicol, D. J., & Macfarlane-Dick, D. (2006). Formative Assessment and Self-Regulated Learning: A Model and Seven Principles of Good Feedback Practice. *Studies in Higher Education*, 31(2), 199-218.

Project Tomorrow (2015). Trends in Digital Learning: Empowering Innovative Classroom Models for Learning. <http://bbbb.blackboard.com/project-tomorrow-2015?s=web>

- Race, P. (2001). *The Lecturer's Toolkit: a practical guide to assessment, learning and teaching*. London: Routledge.
- Renzulli, J. R., & Reis, S. M. (1994). Research related to the schoolwide enrichment model. *Gifted Child Quarterly*, 38, 2-14.
- Ridings, C., & Wasko, M. (2010). Online discussion group sustainability: Investigating the interplay between structural dynamics and social dynamics over time. *Journal of the Association of Information Systems*, 11, 95-121.
- Roschelle, J. & Pea, R. (1999). Trajectories from today's WWW to a powerful educational infrastructure, *Educational Researcher*, 43, 22-25.
- Sadler, D. R. (1989). Formative assessment and the design of instructional systems. *Instructional Science* 18, 119-144.
- Sadler, D. R. (2010). Beyond feedback: Developing student capability in complex appraisal. *Assessment & Evaluation in Higher Education*, 35(5), 535-550.
- Schartel, S. (2012). Giving feedback – An integral part of education. *Best Practice & Research Clinical Anaesthesiology*, 26(1), 77-87.
- Shamir, H., Feehan, K., & Yoder, E. (2017). Computer-Assisted Instruction in Early Literacy for African American, Economically Disadvantaged Children. *Journal of Educational Multimedia and Hypermedia*, 26(2), 179.
- Shepard, L., Hannaway, J., & Baker, E. (Eds.) (2009). *Standards, Assessments, and Accountability*. (White paper). Washington D. C.: National Academy of Education.
- Shute, V. (2008). Focus on formative feedback. *Review of Educational Research*, 78(1), 153-189.
- Skinner, B. F. (1953). *Science and Human Behavior*. New York: Macmillan.

- Spiller, D. (2009). Assessment: Feedback to promote student learning. Teaching Development Unit-Wāhanga Whakapakari Ako. The University of Waikato.
- Stone, D., & Heen, S. (2015). *Thanks for the feedback: The science and art of receiving feedback well (even when it is off base, unfair, poorly delivered, and frankly, you're not in the mood)*. New York, New York: Penguin Books.
- Sun, J. C., & Metros, S. E. (2011). The digital divide and its impact on academic performance. *US-China Education Review A* 2, 153-161. Retrieved from <http://files.eric.ed.gov/fulltext/ED524846.pdf>
- Suthers, D. D. (2012). *Computer-Supported Collaborative Learning*. In Seel, Norbert M. (Ed.), *Encyclopedia of the Sciences of Learning*. New York: Springer.
- Suthers, D. D., Hundhausen, C. D., & Girardeau, L. E. (2003). Comparing the Roles of Representations in Face-to-Face and Online Computer Supported Collaborative Learning. *Computers & Education*, 41(4), 335-351.
- Thomas D. & Brown J. S. (2011). *A new culture of learning: cultivating the imagination for a world of constant change*. London: Soulellis.
- Thorndike, E. L. (1913). *Educational psychology. Volume I: The original nature of man*. New York: Columbia University, Teachers College.
- Tomlinson, C. A. (1996). Good teaching for one and all: Does gifted education have an instructional identity? *Journal for the Education of the Gifted*, 20, 155-74.
- Van Zee, E. H. (2000). Analysis of a student-generated inquiry discussion. *International Journal of Science Education*, 22, 115-142.
- Vonderwell, S. (2003). An Examination of Asynchronous Communication Experiences and Perspectives of Students in an Online Course: A Case Study. *Internet and Higher*

*Education*, 6(1), 77-90.

Walther, J. (1996). Computer-mediated communication: Impersonal, interpersonal, and hyperpersonal interaction. *Communication Research*, 23(1), 3-43.

Watson, D. (2001). Pedagogy before Technology: Re-thinking the Relationship between ICT and Teaching. *Education and Information Technologies*, 6(4), 251-266.

Wenger, E. (1998). *Communities of practice: Learning, meaning, and identity*. Cambridge, Cambridge University Press.

Wiggins, G. (2012). Seven Keys to Effective Feedback. *Educational Leadership*, 70, 1, 10-16.

Xie, K. (2013). What do the numbers say? The influence of motivation and peer feedback on students' behaviour in online discussions. *British Journal of Educational Technology*, 44(2), 288-301.

## Appendix B-1

## Student Interview Questions, Beginning of Online Interactions

1. What is it that you feel most makes you feel a part of any class? (Possible things to think about: trust, respect, encouragement, support, having a voice, feedback, opportunities to work with others and share work).
2. Have you ever talked to someone online that you have not met before?
3. Why do you think we want to get you into online space?
4. So those things you mentioned you need in your F2F class: Do you need those things online when you talk to others you have not physically F2F in order to learn or make the time useful for say class assignments?
5. Do you think it can help your learning or be cool for you in any way? [Can you think of any times where you go to others for help or to talk to others about your ideas on something? Why do you go to those people? How do they help you?]
6. How was what happened online different from doing a similar thing F2F?
7. What was talking to others about your books online like? [Purposeful? Helpful?]
8. Did you experience social issues? Concerns or problems in the online space?
9. Do you think that you can get to know people well that you've never met, just by talking or working with them online? [How so or why not?]
10. Do you think you participate differently online (compared to F2F?) [Do you feel like who you are (identity) is different?]

Appendix B-2  
Student Interview Questions, Near End of Online Interactions

Environmentally Friendly Playgrounds:

1. Why do you think we did this? [Was it just for fun or do you think your teachers had a “higher” purpose?]
2. Do you think that talking with other kids you’ve never met about your work helped your thinking? [Did you feel supported? Did you change anything you did in your work because of something that someone said? Can you give me an example?]
3. Did participating in the online space help you learn or improve your skills? [What did you learn? ...about online technology, about feedback, about working with others you’ve never met?] If so, how? If not, what might be changed so that the space becomes useful?
4. Do you feel like you got to know anyone really well in the other classes? Do you need to in order to do productive work like we were doing?
5. Should we have done anything to help students get to know each other better? Why or why not? If so, what might we do that would help you benefit from participating in the online space?
6. If you could have talked to them online at any time (and not just during class), would you have? [Would it have been helpful? Were there people you wanted to talk to more about other things, not just what you did talk about?]
7. Did what happen online with those other students differ from what happens in your classroom when you do sharing and feedback activities? [Do you feel you could talk to them in the same way? Was it easier or harder to talk to them? Why do you think that was?]

Design of Online Space:

1. Were there benefits to doing feedback online that you don’t get F2F? [i.e. Was it valuable? Should all kids have these kinds of experiences?]
2. Are there tools you need online to better do the work that you did? [In other words, what features do you need? What do you need them for? How can we make them better?]

### Article 3

#### Teacher Actions: Critically Reflecting on Implementation Pathways

Technology has evolved rapidly in affording new opportunities to improve teaching and learning from what was once unimaginable 20 years ago. It now has the ability to provide students with greater and speedier access to information, connect with others across continents, share work, review skills, suggest next steps in content on an individualized and adaptive level, track progress toward learning goals, and summarize and produce real time learning analytics, just to name a few. Additionally, integrating new technologies into the classroom can provide real world experiences (Hickey, Moore, & Pellegrino, 2001) and achieve valuable learning outcomes such as increased communication technology skills, self-regulation, and problem solving (Bereiter & Scardamalia, 2006; Kozma, 2003). Yet despite this definition, technology has not generally been taken up in this way to change instructional practices (Bull et al., 2016; Reiser, 2002). It therefore, often fails to result in the kind of student-centered instruction deemed most effective (Cuban, Kirkpatrick, & Peck, 2001; Herold, 2015).

A number of barriers continue to be of concern, such as a lack of external resources and technical infrastructure. Additionally, teachers' weak conceptual connections between technology and pedagogy, as well as resistance due to prior beliefs, have been identified as primary challenges (e.g. Johnson, et al., 2013; Kennedy, 2016; Bichelmeyer, 2005; Okojie, Olinzock, & Okojie-Boulder, 2006). These barriers have led to teacher professional development that specifically targets changing the way teachers think about interacting with technology as well as helping them re-envision how technology connects to learning goals.

Past studies of teachers who have won technology awards have contributed to our understanding of how teacher beliefs impact what is taught (e.g., Ertmer & Ottenbreit-Leftwich,

2010). However, not all teachers who desire to integrate and attempt to do so get publicly recognized, particularly if they are not successful. To this end, improved knowledge of these teachers' implementation experiences could increase awareness of the issues involved with teacher technology integration.

For example, using technology to support student-centered instruction may be particularly difficult under current high-stakes testing pressures which place time constraints on what and how subjects are taught as dictated by what is to be assessed (Stillman & Anderson, 2011). These pressures may also impinge on a teacher's ability to incorporate new ideas and the potential affordances of technology. Responding to this policy environment and choosing to proceed with technology-related innovations requires different skills and understandings (Cuban, 2008). How do experienced teachers successfully design, justify, and navigate the pedagogical, social, and political dimensions of this work in public schools (Sternberg & Horvath, 1995)? What is the role that technology plays in facilitating teaching and learning in their classrooms? How do they work within broader administrative structures? What are the facilitative conditions master teachers rely on, and how do those support meaningful technology integration and inform others (Ely, 1999)?

Given these types of questions, I undertook a qualitative case study involving four master teachers who were engaged in using information technologies in the classroom. I used classroom observation, document analysis, and semi-structured interviews to examine the full process teachers engaged in from first indicating interest in participating in this research study to designing and using an innovative practice to support students peer feedback activities online with geographically separated students. I refer to this as an "implementation pathway". The study investigated the facilitating and challenging points each teacher identified throughout

his/her pathway that impacted the ability to carry out intended instructional plans. Rich descriptions of the contexts in which the teachers worked provided the background for interpreting the critical points or situations they identified.

The guiding research questions were:

1. What are the characteristics and beliefs of these master teachers relative to instructional feedback, online feedback, and implementing innovative ideas?
2. What are the external influences that impact teacher abilities to integrate technology and how do they navigate them in order achieve their goals?

I focused on teacher characteristics and implementation factors related to an online peer feedback project between geographically separated elementary and middle school students. For the project, students engaged in asynchronous feedback with others they never met face-to-face to develop models of scientific phenomenon, and/or share iterative designs of an environmentally friendly playground or a Lego Mindstorms robot. Teacher goals were to expose students to current online tools, respond to the call to support the development of 21<sup>st</sup> Century Skills (Shear, Gallagher, & Patel, 2011), and provide students with experiences closely aligned to professional settings (Newmann & Associates, 1996; Newmann, Lopez, & Bryk, 1998). In the next section, I trace our understanding of the barriers that restrain technology integration to ground a framework for the present study concentrating on master teachers' implementation pathways.

### **Literature Review**

The following review of literature maps outlines a research rationale for looking at teacher characteristics and beliefs, discusses some identified barriers that have been the focus of teacher professional development, and comments on how accountability in high stakes environments may impact teacher technology integration.

## **Research on the Barriers Affecting Technology Integration**

Theorizing disconnects between technology affordances and integration into actual classroom practices is not a new endeavor (e.g. Collins & Halverson, 2010; Cuban, 2001). Research has identified integration barriers such as lack of infrastructure, resources, curriculum, and support (e.g. Pelgrum, 2001). Brickner (1995) and Ertmer (1999) categorized these as “first-order” barriers, those external to the teacher and often outside teacher control. They labeled underlying “second-order” barriers as those internal to the teacher. Second-order barriers include teacher characteristics and beliefs, as well as an understanding of the relationship between technology and pedagogy (Okojie et al. 2006). In 2005, Wood, Mueller, Willoughby, Specht and DeYoung suggested that many of the first-order access and technical issues were no longer as formidable as in the past. Ertmer and colleagues (2012) made a similar case that due to intense focus on increasing technology access in schools in the early to mid-2000s, the strength of first-order barriers had significantly decreased or in some cases was eliminated. They argued that less emphasis on first-order barriers opened up a revisiting of an earlier trend to examine teachers themselves (Marcinkiewicz, 1993).

Whether or not first-order barriers still need to be addressed, focusing on teachers can expose ways to increase technology integration because beliefs about value influence instructional approaches, including choices about whether to use or not use technology with students (Dexter, Anderson & Becker, 1999; Kagan, 1992; Richardson, 1996). Technology itself does not transform practice without teachers choosing to change practices (Somekh, 2008), and if they choose to integrate, they directly experience a variety of barriers and supports that may affect the implementation process (Mueller, Wood, Willoughby, Ross & Specht, 2008). For these reasons, an area of research has been identifying the necessary teacher beliefs and qualities to

start teachers on paths of integration and using those as targets for specific professional development (e.g. Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012; Foon & Brush, 2007; McGrail, 2005; Mueller, et al. 2008; Ottenbreit-Leftwich, Glazewski, Newbyn, & Ertmer, 2010). Professional development and changing attitudes continue to be the highest ranked challenges for technology integration (Johnson et al., 2013).

### **Barriers That Have Been the Focus of Professional Development**

A number of teacher qualities, skills, and beliefs have been reported as influencing technology integration into classrooms. For example, using a forward regression model, Vannatta and Fordham (2004) surveyed 177 K-12 teachers measuring teacher self-efficacy, philosophy, openness to change, amount of professional development, and amount of technology use. While they did not look at the way technology was being used in the classroom, they did determine that a “willingness to commit one’s time above and beyond the call of duty” (p. 261) and a risk-taking attitude were essential. These two variables, combined with technical training, best predicted technology use. Because the nature of technology is innovation, teachers needed to be able to risk making mistakes in order to learn.

Mueller et al. (2008) used discriminant function analysis to compare groups of teachers who did and did not integrate technology. Surveying 185 elementary and 204 secondary teachers, the authors identified variables affecting implementation including positive teaching experiences with computers, teacher’s comfort with computers, beliefs supporting the use of computers as an instructional tool, training, motivation, support, and teaching efficacy. They found that the strongest predictors for computer use in the classroom were: positive experiences and comfort, attitudes involving the confidence to try new things, and seeing the value of the computer as an instructional tool. Additionally, they hypothesized that successfully using

technology in one's classroom might be a prerequisite for integration and suggested direct practice could create the experiences to encourage teachers to take a risk toward integration. While the two previous studies gathered information on years of teaching experience, Vannatta and Fordham (2004) did not report the influence of general teacher experience, and Mueller et al. (2008) found it not to be a significant factor. However, the goal of Mueller et al.'s work was to compare elementary and secondary teaching groups not experienced versus novice teachers. They did not consider general experience to be a possible mediating factor for advancing technology integration if such integration was desired. In other words, expertise gained through experience could impact one's ability to navigate the system in order to enact desired practices (Bransford, Brown, & Cocking, 2000).

Continuing this line of inquiry, Mueller and Wood (2012) surveyed elementary and secondary teachers, comparing "high and low integrating teachers." They sought to identify rationales that hindered or supported integration, believing that integration was "not necessarily given as an everyday learning tool" (p. 1). Key themes for those that did integrate were: believing that technology was a pedagogically current tool and a necessary skill for students, and that technology presented valuable resources, a variety of tools, or individualized options for teaching and learning. Themes for those that did not integrate were: insufficient resources, exorbitant time to learn, prepare, and deliver activities, comfort and skill, and logistical barriers. However, a key finding was that teachers needed to believe in the value of integrating technology into the classroom and into their teaching. If technology fit in with their views for learning and instruction, they were more likely to support integration. Those that did not integrate frequently cited technical and logistical barriers. This is consistent with a study reported by Snoeyink and Ertmer (2002) who found that experienced teachers new to technology

attributed their lack of comfort or skill with computers to external factors such as lack of time or inappropriate training until they saw purpose; at which point they made the time and the external barriers dissipate.

This finding between teachers seeing the value of technology integration before overcoming other issues has led to research focused specifically on teacher beliefs as a major barrier (Hermans, Tondeur, Valcke, & Van Braak, 2006). Watson (1998) discussed teacher hesitancy about the value of integrating, and that found that teachers who integrate technology talked definitely about its value (e.g. Watson & Tinsley, 1995). Watson and Tinsley (1995) observed that the few teachers who were using computers in the classroom at the time in Canada, England, the Netherlands, and Spain were those who could articulate how computer use connected pedagogically to their teaching. Instead of focusing on the computers, they used computers to help them deliver instruction in their content areas. Others were not confident in using the computers and did not see a valuable relationship. In 2001, Watson reasoned that while technology had found a clear role in the business world, a similar pathway had not been embraced in education because technology integration had not been connected to pedagogy. He made this point clear as part of the article's title: "Pedagogy before Technology". His claim was that as technology integration became perceived as promoting educational change, difficulties arose because it did not get directly connected to teacher pedagogical beliefs. In other words, the emphasis for change was on the technology itself, not deeply connected to the educational issues and practices that might benefit from an intervention.

Others have also noted the importance of connections between technology use and pedagogical knowledge for experienced teachers. Using a hermeneutical phenomenology approach and multiple case study design, Ottenbreit-Leftwich, et al. (2010) looked at eight

award-winning teachers recognized statewide for teaching with technology (considered as more than just computer use). Specifically, the focus was on teacher use and rationale for incorporating technology into teaching and learning as a reflection of value beliefs. From a review of an electronic teaching portfolio (part of the state award program submission), a semi-structured interview and a classroom observation, they found that teachers held a strong value belief that technology helped students learn and prepare for their futures. Additionally, teachers believed that the technology skills students gained would transfer to multiple situations.

Ertmer, et al. (2012) also used a multiple case-study approach, but sought to investigate the alignment of teacher pedagogical beliefs and actual classroom practices with 12 teachers who had also won technology awards. Based on evaluation of personal and/or classroom websites, scale-ratings for barriers, and a semi-structured interview, results noted that teacher beliefs regarding relevance to learning had the biggest impact on their implementation, overcoming any identified technological, administrative, or assessment barriers. For example, despite any issues encountered, teachers who believed in student-centered practices used technology to support student choice and collaboration. However, only 3 of the 12 mentioned administrative support. Limited school and district context was provided, and perhaps because the purposely-selected group of teachers had won technology achievement awards, the award provided each the legitimacy to implement whatever practices aligned with his/her beliefs, abating any identified barriers.

Dexter, Anderson, & Becker (1999) also emphasized teacher choice in focusing on teacher beliefs and technology to change practice. They came to the same conclusion as Ottenbreit-Leftwich, et al. (2010) and Ertmer, et al. (2012): technology implementation must incorporate opportunities to connect practice to pedagogy. They stated “for teachers to

implement any new instructional strategy, they must acquire new knowledge about it and then weave this together with the demands of the curriculum, classroom management, and existing instructional skills” (p. 223). They further added that culture and context facilitate this change process, and that with some structure, “teachers can choose...the approach that works for them” (p. 224).

### **Effects of High Stakes Accountability on Technology Integration**

Many researchers have argued that increased freedom and autonomy to make instructional decisions allows teachers to provide students with more meaningful and relevant learning experiences (Darling-Hammond, 1985; Hemric, Eury, & Shellman, 2010; Fresko, Kfir, & Nasser, 1997). Becker (2000) echoes suggestions to put more control into teacher hands by allowing them to define meaningful technology integration and trusting them to make good decisions. These findings suggest an additional barrier to a teacher’s ability to integrate technology within current high stakes accountability systems. Choice may be limited because teachers “have increasingly been told what and how to teach” (Stillman, 2011, p. 133). Whitby (2016) explains that choosing to innovate and experiment in our current policy environment can be “a perilous road” because accountability mandates and evaluations do not provide room for teacher learning—the process of failing, readjusting, and continuing to work toward success.

Daniel (2012) discussed technology integration from the standpoint of the No Child Left Behind Act (NCLB) of 2001 (U. S. Department of Education, 2002), which mandated that teachers fully integrate their curricula with technology with the goal of building 21<sup>st</sup> Century Skills. However, Kleiman (2004) explains that technology has been framed as a means of increasing test scores in order to meet NCLB expectations, a significantly different purpose than preparing students for the future. Instead of providing guidance and support to change practices

with individuals who were not integrating, NCLB set a precedent of tightly defining strict criteria to measure success in a one size fits all policy. Scripted directives from NCLB impede intellectual risk-taking and result in limited attempts to capitalize on the potential advantages of technology for teaching and learning (Fox & Henry, 2005; Henriksen & Punya, 2015).

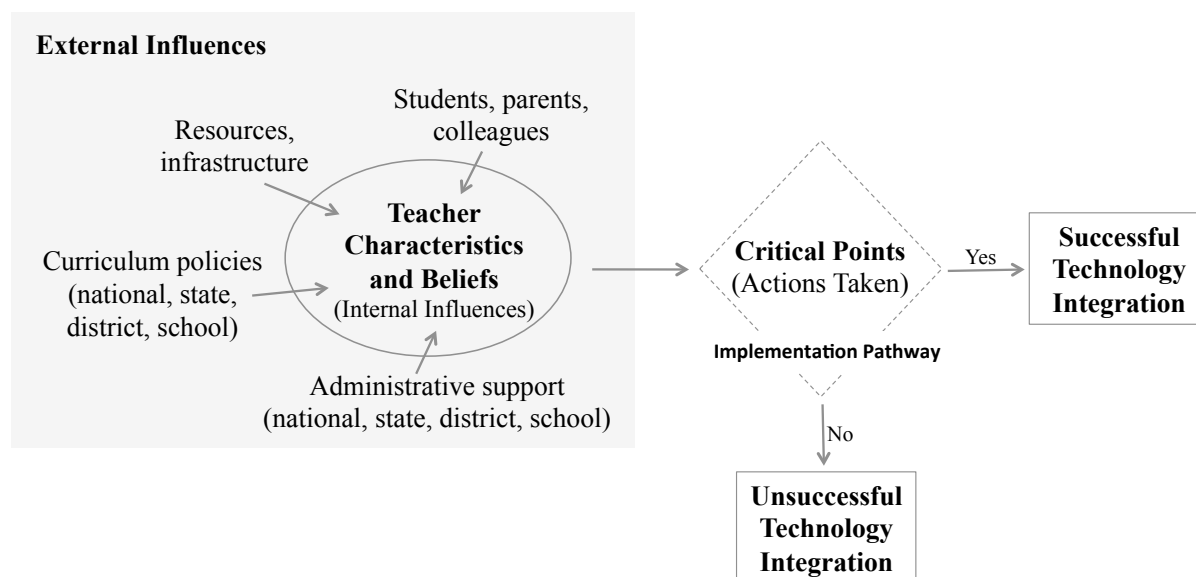
Given the backdrop of implementation barriers, teacher characteristics and beliefs, and the current educational atmosphere, the present study further investigated the integration problem. The focus was on experienced teachers who were interested in enacting innovative online peer feedback practices in their classrooms, but who had not gained legitimacy through public awards recognition. Understanding more about how these teachers think and how they experience their struggles for implementation in our current educational environments could provide insight for others as well as surface additional areas for professional development. In the next section, I lay out the framing ideas that guided my study of these issues.

### **Conceptual Framing**

A number of ideas make up the conceptual framing that guided this study. Cuban (2001) noted teachers operate in an environment of “contextually constrained choice” with regard to technology. This suggests that work teachers do (or are able to do) around innovation and technology integration must consider broader contexts and other stakeholders (Hew & Brush, 2007). Additionally, Somekh (2008, p. 450) stated that “Teachers are not ‘free agents’ and their use of ICT [information communication technologies] for teaching and learning depends on the interlocking cultural, social, and organizational contexts in which they live and work.”

The choices teachers make are the results of how these contexts and external influences interact with teacher internal characteristics and beliefs in determining whether or not teachers take up an innovation (Rogers, 1995). A teacher who is more open to change or continues to try

new things may be more prone to believe that technology can be an effective way to deliver instruction (Carvin, 1999). A teacher, who sees feedback as integral to classroom learning, may believe that technology-mediated feedback can offer some advantages. In both these cases, teacher beliefs may influence the desire to integrate technology with or without external support. Figure 3.1 depicts a conceptual framework that organizes these variables as they relate to the present study.



*Figure 3.1.* Conceptual Framing for Teacher Implementation

Teacher characteristics and beliefs are situated in and interact with external influences such as varying school and district contexts that influence not only the decisions a teacher makes, but what an individual teacher may be able to accomplish (Roehrig, Kruse, & Kern, 2007; Somekh, 2008). In today's high-stakes environments, a teacher's decision to enact something new or pursue a practice that may not be explicitly detailed or outlined as a directive may involve risk (Walker, 2015). All this influences the critical points or actions that are central to the framing and located in the dashed lined decision diamond. The critical points are the incidences that teachers identified as crucial in their ability to carry out online peer feedback practices as

something new. They make up a teacher's implementation pathway. The diamond is a place of constant action, adjustment and strategizing until a final outcome is reached. Either successful technology integration is implemented in the classroom with students, or a determination that no further progress can be made, thus ending the pathway with an unsuccessful result. Investigating these concepts together in this way can reveal facilitative conditions and challenges in the situations that arise when teachers attempt to implement technology-integrated practices from within their existing environments. In the next section, I explain the methodology I used to pursue such an investigation.

### **Method**

I used a comparative embedded case study design to study how four elementary and middle school master teachers' navigated implementation of innovative practices featuring a project with online peer feedback (Yin, 2003). Qualitative case study is particularly relevant because teacher moves (choices, actions, steps, considerations) in context impact their ability to implement innovative practices (Somekh, 2008). Also, how far teacher characteristics and beliefs can influence outcomes within those contexts may not be clearly evident. Rich descriptions of the processes teachers engage in provide the reader a basis to judge the relevance of findings to other settings; results may be more compelling because more than one case is studied (Borman, Clarke, Cotner, & Lee, 2006; Merriam, 2009).

### **Participants and Settings**

The selection of teachers for this study was purposeful (Merriam, 2009; Patton, 2003). Table 3.1 describes each teacher (via a pseudonym) in terms of years of service and certifications. They were not new to the profession or new to connecting technology to pedagogy in support of teaching and learning goals. They also appeared to have a fair amount of perceived

autonomy, evidenced by the fact that they all responded to a call to participate without gaining prior approval.

Table 3.1

*Descriptors of Case Teachers*

	Miranda	Whitney	Megan	Gavin
Years Teaching	18	21	11	25
Certifications	State: K-8 all subjects  BA in business management  Masters in education, emphasis on multiple intelligences	State: K-8 all subjects  BA in education, minor in math  Masters in art  NBCT math	State: K-8 all subjects  BA in education  Masters in school counseling  NBCT literacy	State: K-8 all subjects, 4-12 computer science  BA in elementary education  Masters in curriculum & instruction, emphasis on computers in education
Race/Ethnicity	White	White	White	White
Age	51	45	33	53
Grade Levels Taught	3-6	5	4	6-8
Classroom Type	High Cap Pull-out	High Cap Self-contained	High Cap Self-contained	Gen Ed Technology
School District	A: sub-urban rural	B: primarily urban, pockets of sub-urban/rural	B: primarily urban, pockets of sub-urban/rural	C: large urban
FRD lunch	41% district 38% school	73% district 79% school	73% district 79% school	64% district 91% school

*Note.* Teacher are identified by pseudonyms.

School-based factors and settings differentiated the teachers. Because the focus of the online peer feedback integration was to connect geographically separated students (who would not have previously known each other), the teachers worked in three different school districts in a Pacific Northwest state. What follows is a brief description of each teacher and his/her teaching context.

**Miranda.** Miranda was an experienced teacher, having taught 18 years prior to the start of this study. She held two different state K-8 certifications, a BA in Business Management, and a Masters degree in education with an emphasis on multiple intelligences. She taught highly capable students in grades 3-6. This meant that her students had been evaluated to meet district specific criteria for acceptance into the highly capable program. Miranda explained that as a “purely enrichment program,” district and school core curriculum policies did not apply. What she did “was all based on critical thinking, creative thinking, logical reasoning, technology based thinking.” The district model was also a pull out program where her students were together only one full day per week. They spent the majority of their public schooling time in their “home” schools in general education programs.

Miranda’s community context was a geographically widespread sub-urban/rural school district, primarily middle class. While many of the families in the school community lived in trailer parks, they were primarily two-parent families with multiple children. Parents were generally very supportive and “respect[ed] the teacher’s decisions in most cases.” Since most of her students were identified highly capable in grade 3, by grade 6, she had known some of her students and families going on four years.

**Whitney.** Whitney was a 21-year veteran teacher with a K-8 state certificate, a BA in education with a minor in math, a Masters degree in art, and a National Board teaching certificate in math. She taught highly capable 5<sup>th</sup> grade students in a self-contained district program that was only an option for 4<sup>th</sup> and 5<sup>th</sup> graders. This meant that while her students also met specific district determined criteria to be in her classroom, they chose to leave their “home” schools to attend Whitney’s classroom full-time, every day. Just as in a common general education elementary classroom, she taught all subjects to her students. She explained that she

had to attend to the district core curriculum as well as “going deeper” and “being different” than general education classrooms.

Whitney’s elementary school was in a primarily urban school district that had pockets of sub-urban and rural areas. She generally worked with the same group of parents since students who came into the program as 4<sup>th</sup> graders moved the next year to her class as 5<sup>th</sup> graders. While parents were generally supportive, they were also seen to be quick to judge if something did not go well. Since she worked closely together with the 4<sup>th</sup> grade highly capable teacher (Megan), often having students do projects together, by the time Whitney’s students came to her as 5<sup>th</sup> graders, she knew many of them already.

**Megan.** Megan was an 11-year experienced teacher at the start of the study. She held a K-8 state teaching certificate, a BA in education, a Masters degree in school counseling, and a National Board teaching certificate in literacy. She taught highly capable 4<sup>th</sup> graders in the same district, school, and program as Whitney. Since their district highly capable program began at 4<sup>th</sup> grade, Megan was largely responsible for helping students and parents adjust to the changes between a highly capable model and what students had been used to their home school general education classrooms. Part of this was supporting students in seeing multiple perspectives and not just expecting that their typically correct answers would go unchallenged.

**Gavin.** Gavin was a 25-year veteran teacher with a K-8 state teaching certificate as well as a 4-12 certificate in computer science. He held a BA in elementary education and a Masters degree in curriculum and instruction with an emphasis on computers in education. He taught a general education technology class in a middle school setting. While the other three teachers were in highly capable programs in elementary settings, in this Pacific Northwest state, however, the norm is that these types of highly capable programs do not continue into middle school;

students identified for these programs are typically integrated into the mainstream. Thus, Gavin's students came to him specifically for technology-focused learning. Whether or not he had designated highly capable students in his classroom, his class was considered technology specific, general education. As is common in a middle school structure, his students rotated to different teachers for specific content.

Additionally, Gavin's technology related classes were part of the Career and Technical Education (CTE) program in a low-income area of a large urban school district. His school was labeled a struggling school and was under a School Improvement Grant (SIG). SIG funds are granted to state educational agencies to locally support lowest performing schools. For this reason, Gavin explained that it was not uncommon for groups of people from the state to "walk through the school and into classrooms." He noted little parent involvement and students that he felt saw school as a waste of time evidenced, by extremely low attendance. He emphasized his environment and the importance of being present for his students:

Middle school is such a dramatic place, there's so much drama all the time between kids, and problems all day long—that's something I didn't insert yet is the dynamic of being in the school. Yes we have to teach academics; we have to teach content, but just getting some kids through the day without a blow up is a huge ticker-tape parade, celebration. You did it! Never mind the academics.

He added that he felt students respected and appreciated that he cared about them—"the fact that I'm not all about just teaching. It helps to be a person as opposed to strictly being a teacher with these kids."

### **Online Peer Feedback Project**

I collaborated with these teachers in designing an online feedback technology integration project they all attempted to implement. In analyzing their implementation pathways, each teacher used their recent online feedback efforts to focus their thinking. In this project, all

teachers sought to provide their students with the opportunity to engage in asynchronous peer feedback using digital communication tools widespread in professional settings. Their goals were to raise their students' awareness of the functionality of current tools as well as help them consider affordances, constraints, and skills to appropriately and effectively communicate online. Geographically separated students used the discussion tools available in the Canvas learning management system to give and take feedback around developing models of scientific phenomena (year 1), the design and build of individual and small group environmentally friendly playgrounds (year 2), and Lego Mindstorms robots (planned year 3). Students used the online space to virtually share research and resources, planning suggestions, and design drafts. Feedback was an important part of these processes because student drafts went through successive iterations.

It is also important to note that this study was part of a larger study that spanned two years (2013 – 2015) of full online feedback integration and a third year (2015 – 2016) of planning that did not result in student participation. This started with Miranda and Whitney the first year, adding Megan the following year, and adding Gavin the year after. Year 3 plans were not enacted because Miranda changed to a position without students and Gavin's efforts were ultimately discontinued. This led to not having students in different geographical locations.

**Researcher role in the project.** I also previously knew two of the four teachers in this study (Whitney and Gavin) because we had worked in the same school six years before the larger study started. However, because it was a virtual school, we did not share the same students nor typically see each other more than once every couple of months. While this research considered how each teacher viewed technology supporting teaching and learning, the analysis was multi-perspectival in that I considered my own values and perceptions along side each teachers'.

However, all decisions surrounding implementation were teacher decisions, and they used me as leverage if my voice as a researcher was deemed a positive influence. In all cases, they directed and chose who was approached, how, when, and why. Additionally, as a participant observer and collaborator, I worked beside them and could not extract myself from their lives, problems, and struggles.

### **Data Sources and Data Collection Approaches**

Data were collected using classroom observations, document analysis, semi-structured interviews with teachers, and additional interviews or contacts with principals and district leadership. Critical incident Technique (Flanagan, 1954) was used for both data collection and analysis. [This will be discussed in more detail at the end of this section]. Table 3.2 below outlines how each data source connected with the stated research questions.

Table 3.2

#### *Research Questions and Corresponding Data Sources*

Research Questions	Observation	Artifacts	Interview
What are the characteristics and beliefs of these master teachers relative to instructional feedback, online feedback, and implementing innovative ideas?	X	X	X
What are the external influences that impact teacher abilities to integrate technology and how do they navigate them in order achieve their goals?		X	X

**Classroom observations.** A minimum of ten face-to-face (F2F) classroom observations was made for each classroom prior to and during implementation. [Note that since Gavin did not get to actual implementation with students, I did not formally observe his classroom]. Field notes included both what was seen and heard as well as comments and ideas on what was taking place. The observations focused on such things as moments where the teacher was interacting with or physically present with individual students, the kinds of activities students were involved

with and how they responded to them, and the nature of the talk that was heard between students and between teacher and students. These notes often guided conversations with teachers during breaks or after school. They provided insight as to whether teacher self-reported beliefs about feedback and technology design aligned with actual classroom practice. In two cases (with Whitney and Megan), I was also able to observe and participate in their open house where they first shared information about the planned online interactions with their parents.

**Document analysis.** I collected archival material such as email records and parent communications for analysis as well as curriculum, teacher created student guides, and lesson plans as artifacts of classroom practice. This was used in conjunction with CIT interview methods and mapping data to clarify identified themes. It also added to an understanding of implementation steps taken, responses, and outcomes, as well as accountability and support dynamics.

**Teacher interviews.** One semi-structured, approximately 1-hour interview (recorded and transcribed) per teacher was used primarily to analyze the incidences along their implementation pathways. [See Appendix C-1: Teacher Interview Questions]. The three teachers that had used the online feedback approach with their students had an additional 3-4 interviews during that time. These lasted 20-30-minutes each and discussed topics such as feedback practices, the role of technology in teaching and learning, the meaning of innovation and teacher ability to innovate. The semi-structured format was chosen because it assumes teachers will define their experiences in different ways (Merriam, 2009, p. 90). Yet because the specific information of pinpointing incidences where the action teachers took either positively or negatively impacted the implementation outcome, I used CIT to structure the protocol [Appendix C-1]. In Gavin's case, as he was the newest teacher to be included in the project, the interview

was approximately 2-hours to incorporate the other elements of the protocol. Additionally, prior to starting the implementation process with him, he and I had an 1.5-hour phone conversation explaining the project, verifying a good fit with his goals and beliefs, and starting to plan logistics such as timeline, which classes to use, and set-up for students gaining access to Canvas.

**Additional contacts.** Semi-structured interviews and phone calls were conducted with willing principals and other school and district leadership as another means of interpreting teacher commentary and critical point pathways. These interviews ran from 21-63 minutes in length. [See Appendix C-2: Additional Interviews Questions]. A focus here was on gaining a perspective of how these school administrators viewed feedback relationships between students mediated through technology and innovative practice.

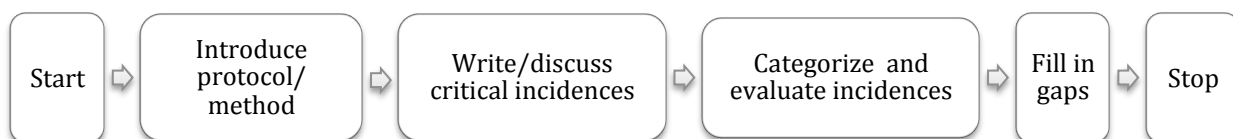
**Critical Incident Technique (CIT).** CIT, is a flexible set of principles used to analyze practical problems (Flanagan, 1954). While often applied in the field of industrial and organizational psychology, it provides a focus on examining the relationships between tasks and improving outcomes, particularly where the tasks are complex or “allow for a high degree of individuality” (Carlisle, 1986). Kain (2003) explains that it enables an in-depth view of job behavior and significance in context that goes beyond identifying what each teacher does to elucidating the when, how, and why. Carlisle also emphasizes that because the goal of the technique is to identify specific critical points, CIT produces facts, not generalizations. Each teacher is directly involved in the analysis process, helping record time-consuming tasks, discovering mental tasks and corresponding emotions, and clarifying and expanding on data collected by other means (Carlisle, 1986). For example, the archival materials collected not only stand as individual artifacts to be interpreted and triangulated with interview data, but they act as prompts to help cast teachers back into the moments of their decisions. Each teacher described

the circumstances around each incident, what he/she decided to do and did, and the outcome.

Per CIT protocol, all incidences occurred within 18 months before the interview.

While this interview process was focused on critical points, a goal was to gain an understanding and sense of each teacher's decision-making process. For example, in line with CIT, the researcher can determine critical incidences from the interviews as well as have teachers identify them. I asked teachers to think about the tasks and goals they had for online feedback and to use the archival material to reflect on specific examples situations, conversations, or incidences that resulted in good movement or barriers toward implementation. [See Appendix C-1: Teacher Interview Questions]. This involved describing the circumstances surrounding the incident, its complexity, what was done, and the outcome. Teachers started the analysis process by noting the types of incidences experienced and evaluating the level of helpfulness or challenge of each. Then, they broadly examined what had been discussed to fill in other factors.

Figure 3.2 outlines the general flow.



*Figure 3.2.* Modified Flow of Critical Incident Technique (Carlisle, 1986)

### **Data Analysis**

Data analysis was an iterative, ongoing process that allowed me to triangulate my findings across data sources (Merriam, 2009) and categorize and identify themes as well as commonalities and discrepancies. Critical Incident Technique (CIT) guides both data collection and analysis. After each teacher identified critical points, he/she started the analysis process by directing and verifying the initial thematic connections. Following CIT guidelines, the interview data were organized and analyzed immediately after collection “to clarify meaning, solve

problem areas, and plan for additional analysis”. I followed each interview session with a “formal memo reviewing the results and thanking the participants” (Carlisle, 1986, p. 14). This was done to “member check” what had already been collected. Teachers responded to the memos without any concerns, and my additional clarifying questions were answered via email and phone conversations.

Interviews were recorded, transcribed and reviewed numerous times against other data sources. Individual case data were analyzed separately per teacher, and I developed a case level data matrix to help organize incidences and themes for analysis as well as to help identify gaps and/or contradictions in my data. Data across sources were examined to investigate how teacher beliefs and external influences impacted the decisions they made on their implementation pathways. I also noted related themes in the additional information gathered from principals and district administration. Following analysis of the individual teacher cases, I conducted a cross-case analysis to identify similarities and differences between cases (Merriam, 2009).

### **Findings: Within-Case**

This section presents the four teachers’ individual cases, considering their characteristics and beliefs and how they described their implementation pathways.

#### **Case 1: Miranda: “I have my own separate world”**

**Characteristics and beliefs.** Miranda carried her core beliefs about the value of instructional feedback into a willingness to try new things, confident that if it made sense pedagogically, she would find a way to make it successful. She described feedback as a constant thing in the classroom for academic, behavioral, and socio-emotional purposes. Feedback started as her students walked in the door, she greeted them, and each prepared a plan sheet and settled in for the day. She asked them about events in the last week, answered questions, provided

editorial feedback (positive and negative on class work), and this continued into each student's more formal check in chat to review the completed plan sheet.

Because Miranda emphasized group work, she believed that it was important for students to not only learn how to give each other comments on presentation, content, and next steps, but to think critically while providing social-emotional support. During class discussions, she often answered student questions with more questions. She explained this as a way to explicitly teach, model, and encourage students not to give a "right answer" but to think: challenge each other's ideas, raise questions, and consider alternate possibilities. She said, "We do so many things where there is not an exact answer and that's so abnormal for school." She also described "refocusing feedback" in helping students understand how their behavior is perceived and impacts a group. She illustrated that sometimes her students want to be leaders "but not in a nice way," so they are "bossy" and unhappy if their idea is not chosen as the project focus. Her role then is to "instantaneously reestablish those situations," teaching them how to "help others stay on task and be the best they can be" by emphasizing "being kind, and caring, and considerate." These beliefs and practices are reflected in the way she viewed online feedback as well:

In an ideal situation, [students] would be able to have access to that technology feedback at anytime, home or at school; they would have feedback from people whom they trust, who are reliable who are intelligent enough to give them the kind of feedback that is going to help them with their creative thinking and their education and who they are, and it would be a regular thing. It wouldn't be a wow factor, right? It would be part of their everyday life that they have this information and sometimes maybe they are sharing it live with people that they're with, and other times they're sharing it interactively and they're getting feedback electronically. Whatever that form looks like, I'd want it to be just a normal everyday part of life, integrated into just the way it is.

Technology supports and enhances the work that her students need to accomplish, and for Miranda, she felt she had a responsibility to teach students how to use it for academic purposes. They used a classroom set of laptops to work on drafts, share with peers, access information on

the Internet and from classroom folders, and strengthen vocabulary. She commented that:

As much as kids today are technically savvy, they're not. So they know how to play video games really well and they know how to do Facebook, and they know how to do things that are not academically favorable, so really there is still a huge curve when we put them into even a Canvas type forum which should be somewhat similar to a social media setting, but it's funny, it's not. And so they still struggle with where do I go and what do I do.

While she considered using technology as innovative, innovation was just doing “something amazing” which could be done ‘in every classroom every day in any environment in any school in a thousand ways.’ However, as a caveat describing what she felt most other teachers have to consider, she said, “If I’m supposed to be doing [a particular] curriculum to fidelity, I’m still going to have to do that but it doesn’t mean that...if it doesn't interrupt the fidelity teaching... I couldn’t do that other thing.” Miranda acknowledged that she felt she had more flexibility than others. While she strongly believed that online feedback could be implemented in general education classrooms as long as it was “about something that is standardized,” she didn’t think that it could happen in today’s current environment:

No. No, I don't think so because I think there's so much pressure on the on principals to show that they're doing exactly what they're told and I think that it all drives, well let's face it, it all drives from the testing if we're going to go down that nasty path. Everything is driving from ‘I've got to get my kids ready to take the [state test]’ and if in fact the [state test] is ultimately going to be based on the core, then I need to teach specifically and only to this core, and teachers subconsciously if not consciously, are teaching to the test as much as they can so that they’re not in trouble because their scores are low.

While she felt this pressure did not apply to her, she believed this was a huge barrier to innovative implementations.

**Miranda’s implementation pathway.** Miranda felt she had full control over anything she wanted to do. She talked about the director of special programs at the district office, her parents, and resources such as time and hardware. First and foremost, she explained that she did not deal with typical organizational layers (principal, district board, or superintendent) to get

permission; the steps she took were to inform administration out of professional “courtesy,” and to make sure “parents were happy.” She stated,

I decided on my own. I run my program. This was something I wanted to partake in. These are the reasons why. I let my boss know. She said great. I let my parents know, and you know, they were fine with it.

She did not feel that the district office director, as her supervisor, oversaw her or her program in any way, but she attributed what she felt was her straightforward path to her “supportive boss who let me run my own show and trusted my judgment.” She said that her “own separate world” provided her “freedom and flexibility” to make her own decisions and “take on those risks and challenges” she decided were valuable. If something fit her goals, she just went with it and dealt with resulting issues later. The challenges she identified were not “*getting* to do it or getting to the point where we are doing it, it’s in making it as successful as possible once we’re doing it.”

Miranda identified her parents as the most important on her implementation pathway, but acknowledged that she had “very minimal, if existent” parent issues. In fact, she couldn’t think of any specific parent incident. She explained that she thought about her parents needs, anticipated their possible concerns, and prepared the information she shared with them about the project accordingly. That information included assurances to her parents, stating:

This is a [university] research project and I requested that our class participate...The person conducting the research from [university] and I will monitor all communication and the site is secured and safe...I have no reservations regarding this activity...All student information is confidential. Students will be assigned a pseudonym and code for the actual study information and no personal information will be released.

For parents, she said, “Knowledge is power” so it was a matter of explaining the nature of the platform students would be working within and that it was a controlled and safe environment. With the few she felt would need more than her stamp of approval, she provided ways they could research the platform and the connection with the university, and she compared it to something

they were familiar with (e.g. Blackboard). But generally, she said her parent population was “pretty trusting that the teacher is making the good decisions for the class.”

Miranda’s number one challenge on her pathway was finding the time to work out the technical issues since she only saw her students once a week. She believed that if she saw them daily, they would get regular practice, logging in, finding the correct forums, and scanning work to share online every session. Then, after “a couple of weeks of school, that’d be done” and students could smoothly engage in online feedback processes all year. Instead, since these skills were not used in her students’ home schools, they had to revisit these skills each week. This imposed on the limited time they had to meet objectives of the task—providing quality feedback to others and reviewing the comments received. She also mentioned that it would have been nice to have been able to have students use their cell phones to take and upload pictures of their work rather than use the one scanner in the classroom—but the district did not allow cell phones in classrooms at the time. While this was a challenge, it was not a barrier. Despite technical issues, Miranda still successfully implemented the project, having her students engage in online feedback practices with geographically separated students.

### **Case 2: Whitney: “A real tough balance”**

**Characteristics and beliefs.** Whitney went searching for the newest best practices, and she laughed while explaining that there can never be enough feedback. She believed that feedback was central to the multiple ways that students learn, and emphasized having them look at their own work and learn to self-assess. Whitney’s principal shared the value she placed on student self-assessment and immediate feedback when she described its significant role in the classroom:

...as we move toward proficiency-based learning, students need to recognize where their holes are, where they need to make those improvements in order to become proficient,

and without feedback, whether it is from a teacher or from a student, they're...flying blind. So, that's really a vital part of that classroom proficiency work that students do.

Whitney supported her students' feedback process with rubrics, guiding questions, and organizing worksheets. Students were taught how to use a rubric to identify expectations before a project starts (recognizing what meets and exceeds necessary criteria). Learning to pay closer attention to the rubric helped them participate in and understand teacher feedback. It also helped them with language to use in giving peer feedback, which Whitney said they did "constantly." Students presented things to the whole class as well shared collaboratively in small groups and asked for help, finding out more about someone else's thinking and offering suggestions. Whitney also regularly met student questions with questions, guiding them to explain and justify their work, and she encouraged students to use a reflective question chart they had created that was on a classroom wall. Access to her, each other, and physical and digital resources provided many opportunities for students to get feedback.

Whitney saw online feedback with unknown peers as an innovative practice to help her students participate in the process of gaining knowledge the way professionals currently did. This meant using the computer to find and evaluate information, but also digitally sharing and collaborating, making choices on how to organize themselves, determining resources needed to complete the task, and supporting each other to reach their objectives. She strongly believed that her role was to prepare students for jobs "I can't even imagine...ten years down the road," and that meant going "beyond reflecting and teaching the curriculum, the skills that are laid out for you...to looking at what is cutting edge that I can get my hands on and expose them to."

Technology helped provide valuable and transferrable experiences her students would need to "understand how to be online and global citizens," and she saw her role as one of providing and preparing her students for the unknown including, and in some cases in spite of,

her required curriculum. She was concerned about all teachers (herself included) having to be on the same page of the district curriculum. She took on the perspective of an administrator as she explained her concerns:

I know you can meet these standards if you teach these lessons. It's not trusting teachers to be innovative and say here are the Common Core Standards, create and do what you need to do to meet them. It's easier to track when everyone is supposed to be on day 1, book 1, so I know what I should see to say I know you're doing your job. It's easier to tell teachers to stick to the curriculum so I don't have to worry about what texts you're bringing into the classroom and whether or not it's appropriate.

**Whitney's implementation pathway.** Whitney felt she was given some flexibility to do what she wanted because the expectation was that her highly capable classroom would be "different than a gen ed [general education] classroom". Yet, she was still required to have her students be on the same page of the district curriculum as other students of their same grade. She talked about her principal, the district, and her parents as her pathway but her choices were shaped by a number of considerations: "I try to balance meeting district requirements [while] parents and even students have high expectations, and giving opportunities with making it safe, and that's all a real tough balance."

She first went to her principal, detailing her learning objectives, the partnership she was creating with a university, and the measures taken to ensure a safe and secure online environment for the students. She anticipated that her principal would want to hear about those specific things and that the partnership would be viewed as a positive move since it was an item listed on her teacher evaluation. Her principal backed her venture into online feedback. Her principal explained, "I didn't bat an eye" because it was in a "protected" and "insular" space. She also supported Whitney's creativity because she said she saw possibilities:

There was never a concern as far as the specific program or the specific study. It opens up...broadens the range of feedback and of perspective and of points of view that our kids can bring in and other kids can bring. You know, staying within [geographical

identifiers removed] county, state, country but then let alone, you broaden it out more. You could go anywhere! ...you know the sky is the limit in what our kids can learn and gather from other kids, same age peers.

Still, she was “worried and nervous” about the “rabbit holes [students] can end up going down” when they access the Internet and the potential issues if inappropriate sites were accessed “accidentally or on purpose.” However, she stated that “even kid-only [sites] can be hacked” so nothing is ever completely safe. Additionally, she felt that by explaining the project’s purpose and protections to parents, she could initiate a similar project school-wide:

If we were to roll out [online feedback] next year, this is how we’re going to do things, and every classroom is going to have a pen-pal classroom, across the country, across the globe, these are the protections. So long as I can show them that these are the protections that we are going to take, here’s what you’re going to sign, yeah, I think that they’d be pretty supportive of that.

Whitney saw her principal’s support as an important starting point toward her successful implementation.

Next, Whitney discussed the interactions she had with her district. She said she did not need to go through the district curriculum advisory committee because what she wanted to do was purposely done as an “add-on” to her existing curriculum and she did not describe it as completely “implementing something new.” She explained that she made her creative ideas “fit with the curriculum I’m required to use so that I’m still meeting district and state expectations but also the needs of an ever changing technological world.” Guided by her principal, she went directly to the assistant superintendent, and he was supportive. Whitney explained the research study from within the district curriculum policy, providing the details and researcher information to attend to expected district concerns. As the researcher, I met with the principal to answer questions and participated in an email string to provide forms requested by the vice

superintendent, but by that point, it seemed that both of them had already granted tentative approval.

While Whitney's third step was sharing information about the project with her parents, she felt particularly accountable to their expectations since "kids choose us and are bused from other schools to our program." She felt that an important point toward implementation involved getting her parents on board. She said she carefully considered the amount of information she provided to families around the online feedback project so as to not make them anxious. She described the best approach as presenting goals of the project as well as student safety considerations to her parents during open house and providing the forms for them to sign at that time. At her request, I was also there to share specific information and answer questions. A couple of the parents were hesitant, and she explained the purpose of the research and student safety considerations. Ultimately, she had a couple of students that participated in the activity of the project but did not do the online part. She explained that the concerns her parents had about communicating with other students outside their school extended from other worries: "[even at home] parents don't know what [their kids] are doing online." She compared it to her parents' unease about her as a child, not knowing with whom she was talking to on the phone. She noted that some parents were "super protective" in that those students also did not spend the night at friends' houses.

While the incidences Whitney identified along her implementation pathway steadily advanced her toward her final successful implementation, she considered her pathway within a larger framework of concerns that she called striking "a real tough balance". This balance was required as she navigated a number of considerations including the tension between her desire to do what she thought best for students in uncharted territory without the protection of overarching

district protocols and guidelines. She explained that treading new ground was not without risk. For Whitney, without guidelines, having her students do things online meant “making a lot of judgment calls” and “hoping for the best” if situations were to arise. For example, in a space where there are rarely any “completely safe sites for [students] to go,” she questioned banning a site her students were using to facilitate learning when they identified some images that popped up as “slightly inappropriate”. Her students’ functional solution was to tape paper to the side of the screen to cover up the images, and they continued using the tool. However, because images were on the screen, it could be interpreted that she exposed students to unacceptable content.

She noted that:

Teachers are held to such a high standard—it’s not just enough that I’m doing my very best. And you see these teachers in the news. It’s not just enough and it doesn’t even matter if it in fact happened. We have to be above reproach. So you couldn’t even give the appearance that you allowed something to happen because [my parents] won’t listen to the end whether it happened or not. It will be you’ve been, you’ve been...accused.

Whitney believed in her professional abilities, but she wanted assurance and protection if teachers were to continue to take on risk.

### **Case 3: Megan: “Under the radar”**

**Characteristics and beliefs.** Feedback in Megan’s classroom meant helping her students understand how to engage in the learning process and respond appropriately to support others.

Megan explained that “my incoming little guys have a hard time at first” discussing ideas and learning from each other. Coming from general education classrooms, she said that they were not used to their ideas being challenged:

They are not really even used to constructive criticism; they are always right; they are the gold star kid, so then even someone telling them they disagree with an idea is like ‘I’m going to crawl under my desk now’. I have to teach them that it’s okay—that they have to accept feedback and also give feedback.

She talked about how she “nudge[s] them toward one another,” encouraging them to go ask each

other questions in order to learn from each other. Meanwhile, she was seen constantly monitoring students and their work, asking questions, and checking in on small groups. She asked open-ended questions and encouraged students to consider other possibilities.

She saw online feedback as an extension of the types of feedback students were learning to do with their peers face-to-face. Ultimately, she could see it integrated into a number of other activities, becoming like the technology they used out of school—“almost invisible,” as just one more way a student learns and supports peers. Megan shared that while many jump to the conclusion that technology equates to innovative practice, the driver isn’t the technology itself, but “how you teach and approach [instruction]...creatively.” She explained that some people are good at teaching, planning, and getting results, but additionally, innovative teaching is “constantly inventing and reinventing...assessing and reassessing,” staying in tune with student needs “to keep things new and fresh for them.” For Megan, doing what is best for her students sometimes means “you go off the beaten path; you march to the beat of your own drum.”

**Megan’s implementation pathway.** Megan identified critical points in her implementation pathway that involved her parents, students, principal, and district. While she had principal and district approval, established previously by helping with Whitney’s implementation process the year before, she explained that what helped was using the language of the district to align her rationales to their concerns. She explained, “How much is it going to impact what they consider to be the core instruction? They are big on supplementing. You can supplement, but you can’t supplant.” She also experienced challenges in working with district level technologists, many of whom she felt did not understand instruction or were not willing to problem solve. She talked about the time and research she puts into finding new and appropriate

tools, apps, programs, and wanting to use them in her classroom, but she felt like the approval process was unnecessarily difficult.

...when we want to get our students into something cool like Newsela [non-fiction and current events for students] or even code.org [teaching kids computer programming], I mean all of this stuff, we've had to go through so many loop holes for things that we know are safe—we went to a day training—we understand what is being asked, we know how to go about using student information appropriately, discreetly, only giving what is absolutely necessary. When you have to jump through lots of loopholes, it makes it hard to do.

She described a fairly recent situation where a large number of websites she and her students were once allowed to access became off limits. Almost in disbelief, she said that they were “shut down all of a sudden, and I look at it like, find out who the abusers are with all your mighty IT power and go handle them. Like why? Why cut everyone else off?”

Besides discussing technical access with the district, Megan noted that she was particularly attentive to the needs of her students and parents. Since some travel upwards of one hour each way daily to be in her classroom, they “have high expectations” which places “a lot of home pressure [about what] things go on in here.” She also spoke about having “some flexibility” because of the nature of her program and explained that her general education colleagues had more barriers and stricter processes for explaining direct impact to instruction for things they might want to do. She said that she and Whitney fell into the “that’s okay realm.” This meant that all was good as long as “parents are not complaining and our kids are still achieving.” Yet at the same time, she was part of a school and district. While “we can function within our own space and do some things,” it also caused some tension with her colleagues who were not afforded the same type of space. As the district increased mandated requirements, Megan was aware that while she felt that all teachers should be able to make similar decisions for students, she had flexibility her colleagues did not. In order to do all that she wanted as well

as mitigate collegial relationships, she felt she had to check the right boxes and stay “under the radar.”

Getting her parents on board with the project was the last important step. This happened via specific information sent home and shared during open house, and individual conversations with concerned parents in-person, email, and phone. She described this as a process of assuaging parent concerns about communicating online versus just doing research. Online communication extended the fears they had at home if a child was on email or social media or other places where they have less control. She carefully considered how much information to share with her parents. She said that if it’s too much, “they don’t process all of that information and they don’t see the big picture.” They would “see only the moment” and jump to worst-case scenarios. Ultimately, she said her parents trusted her, and they did allow students to participate, but she said the assumption was that she would “assume all responsibility for what goes down.” While she did not experience any parental issues with students talking online to others, she described potential issues in being held responsible for a child’s poor choices, where guidance toward more respectful behavior would not be enough:

It comes back to it being more about how their child looks. So even if their kid is the one acting out, they’re irritated because their kid looks bad and we allowed the space for their child to look bad. So it’s not even saying, well, Johnny, if you had spoken nicely to that girl, I guess we wouldn’t have an issue. You’re to blame because it’s you who allowed him the online space in order to go and act that behavior. Children assume no responsibility or accountability, and their parents don’t necessarily want them held accountable.

She continued by stating:

Kids can say hateful things to each other but we don't automatically take their speech and not let them speak in class. So they're acting out online, the instantaneous thing and what most parents would say is just don't allow them to do that. But then if that's part of the project, there's that whole re-teaching aspect of appropriate behavior versus just taking away. The thing with the Internet is, is just take it away, but it's becoming such a part of their world, where they actually need training on it and retraining, and you just can't take

it away because that's how you end up with these untrained people in social media sites doing all of this stuff because they were ever taught how...It's just part of the world now, like typing is part of their world. It just is. Online communication is now very pervasive.

Megan's principal also addressed students learning to speak meaningfully to each other. She stated, "Sometimes [it's] hard. I think that's something that we definitely need to teach and spend time teaching kids, how to provide constructive feedback to their peers."

#### **Case 4: Gavin: "Under the magnifying glass"**

As the technology teacher, Gavin commented on his love of technology and emphasis on the importance of feedback to improve work—to help his students create and not just consume. Gavin explained that for all his projects, "feedback is huge" and task specific. Rubrics helped students create quality work by structuring and explaining what needed to be done, and he modeled using the rubric as he commented on students' work. He would then hear students taking up the language in the rubric when they offered help to each other. One example happened as students were commenting on each other's digital photo restoration project, and a rubric item was "realistic colors." One student said to another, "The saturation of that green is way too bright; it's just overkill." As he talked about taking face-to-face feedback online, Gavin said:

Feedback is what we do. That's what we push teachers to do is to get kids to give feedback to each other. Well, this is just an innovative way of doing it. Kids don't even know and maybe don't even see...that this is the way it's working these days.

While Gavin saw technology as "already innovative," he did equate innovation to creativity (his own and what he tried to draw out of each student). Every project he described required a real-world creative component and original ideas. For another student project, he explained that after working with recreating existing magazine covers, his students took on the role of National Geographic photographers, tasked with creating an Earth Day cover, (a cover

National Geographic has never made). He told them, “this has never been done, so you can’t copy off the Internet; it doesn’t exist yet. So you guys create it. What do you think it should look like?” The emphasis was on students learning to create their own ideas and not on something copy-pasted. However, Gavin believed his students needed skills they could apply to future jobs as well as the insight to know what technology could help them accomplish. He explained this to students by helping them connect the skills they were learning to identifying local businesses who charged, for example, \$120 an hour for someone to do the same work. He said, “You guys, look at the skills you’re getting, because you can get paid for doing this fun stuff!”

**Gavin’s implementation pathway.** Online feedback aligned with Gavin’s CTE program standards, curriculum, and beliefs for what his students needed. While he felt he was able to rationalize and justify his plans in light of his standards, Gavin’s implementation pathway did not lead to success. He discussed a number of incidences that ultimately became barriers involving resources, the principal, and the district. On Gavin’s implementation pathway, resources and physical classroom space posed continual challenges. While he described that he tried to be resourceful, coming up with a number of solutions to his problems, the challenges remained. For example, while he had planned to do online feedback around robotics, the “kits” he was eventually able to obtain were just piles of unorganized parts, taking him weeks to put together one kit for functional student use. Soliciting student help did not significantly speed up the process. He also sought out help and visited another teacher in his district. He found his colleague’s setting to be “perfect” with shelving, equipment for every two kids, laptops (not his computer desk tops), and the space of two classrooms to afford an open floor area for testing. He considered this setting significantly different from his “little room 30x30, wall-to-wall computers, desks, monitors, no shelving space at all.” Since the district also wanted him to do

robotics, he asked his director to visit the classroom and help problem solve. While he felt his director was empathetic, the result was the possibility of one shelf.

Practical limitations increased his frustration as he further tried to problem solve the issue of not having physical classroom space. He attempted to find a portable (that had been a solution for colleagues in other schools). Despite having a number of roaming teachers without their own classrooms in his building, Gavin said his principal explained, “We’re not putting portables in *this* school.” He retold what he called the “backstory” underlying this position, as he understood it from a number of seasoned colleagues who were there from before the new building:

The community was up in arms about the size of the school when it was being built and they looked at it and said this is not going to be big enough. You’ve got all these kids in these neighborhoods; it’s not going to be enough classrooms. [They were told] it will be fine. Well, it wasn’t enough, so if you put a portable in, [the district] wouldn’t want the backlash of “We told you! Now you got to put in portables!” So politics.

Gavin talked about a number of attempts to solve his resource issues, but he explained that they were not his real roadblocks.

Gavin felt the more important issues were the dynamics between his principal, school status, and other administrative layers. He felt he had reached out to his principal a number of times and she did not have time to listen to his creative ideas. While he initially thought he could get her on board, Gavin felt that the pressure of “being under the magnifying glass every day by [state officials]” imposed on her time. As an underperforming SIG school, Gavin explained:

Sometimes it’s big groups of [state] people walking through the school, walking into classrooms, and in fact, [my principal] was saying that if they walk into your classroom and something like [online feedback] going on, what is that, and did they know about it?

Gavin’s response was “Well, maybe they’d love it!” While he described the principal as “solid still,” he interpreted her reaction, as

She didn’t have time to talk about it, like they’re poking their noses in our business. They’re not poking their noses in our business, they’re doing a little study about, a really

cool study about, and she just didn't have time for it. [She's] under a lot of pressure.

Additionally, Gavin was not initially aware that his district had a research approval board. When I spoke to the district office administrator responsible for research, he described the board as “informal and paranoid.” The formal message from the district stated, “the committee expressed concerns about how the monitoring of the social media site [was] through the Canvas Learning System [and] not part of our district student management system.” [Appendix C-3: District Email]. Despite the fact that the district administrator believed in the value of the integration, calling it a “valiant cause,” he could not think of a way where anything could be added, changed, or revised to find a way to implement; students talking to each other online was just too risky for the board. Trying to make sense of things, Gavin noted that the amount of students using devices for social media was “a huge source of cyber-bullying” in his district. Ultimately, he also expressed his opinion that considering their viewpoint, he did not believe that any amount of safeguards “would ever be enough” for his district. He concluded:

That's a tricky proposition, but it could be done. Kids will say what they want to say, even if it's inappropriate, very common at my school. But the academic potential of meaningful communication cannot be understated, so it would be great if someone created a digital environment that was completely safe, and I think [ours] really was, but no one was able to see it and understand it. That's the unfortunate part of this whole journey.

In the next section, I report the findings from the cross-case analysis.

### **Findings: Across-Case**

Miranda, Whitney, and Megan were all successful in implementing the online feedback project; Gavin was not. In my cross case analysis, I examined ways in which the cases were both common and unique (Stake, 2006).

## Characteristics of the Teachers

All four teachers shared similar beliefs about feedback, technology for learning, and creativity. Feedback held an important and ongoing position in the classroom that included students evaluating their own learning and supporting others. While this included the use of multiple techniques (modeling the feedback process, classroom charts, verbal and written comments and questions, individual and group work), all the teachers used rubrics. Rubric use was not just to guide students in identifying the criteria of quality work, but a way to help students learn the language of feedback in order to engage, respond, and support each other. Miranda saw feedback as “integrated” and “happening all day long.” Whitney connected feedback to the multiple ways students learn. Megan described “nudging [her new 4<sup>th</sup> graders] toward each other” as they experienced learning to interact, and for Gavin, feedback was specific to each technology project but seen as just part of what teachers and students do in order to facilitate learning.

These teachers also believed that technology was a valuable part of the teaching and learning process, linking technology to pedagogy as a means of building skills and mindsets students needed for the future. Technology was seen as a means to an end and not the end itself. Whitney and Gavin specifically talked about technology skills as helping prepare their students for their futures after schooling, to get jobs or to be “global citizens”. Miranda and Megan saw the need for technology to be part of learning in the classroom because it was already “part of their world”. Yet the presence of technology was not enough. Students needed “training on it” since what they know how to do is not always “academically favorable”.

Taking feedback online capitalized on technology to extend the feedback teachers already deemed as essential. It also matched these teachers’ definitions of innovative practice as a

creative way to do so. All four teachers saw innovation as a creative approach—with or without technology. Miranda described innovative practice as “something amazing” that could be done ‘in every classroom every day in any environment in any school in a thousand ways.’ Megan echoed this by mentioning creativity “to keep things new and fresh for [her students]”, and Whitney talked about “looking at what is cutting edge that I can get my hands on and expose them to.” Gavin continually explored new technology tools to use with students and shared examples of the things he and his students were creating because technology was fun for him, even out of his classroom. These teachers believed in the necessity of creativity, yet in different ways, external influences were associated with their ability to carry out their ideas.

### **Environment and Support**

The environment each teacher taught in established specific conditions around what each felt their students needed and the support that helped facilitate or challenge successful online feedback implementation. Miranda, Whitney, and Megan all taught in highly capable programs where their students met state assessment standards. While those programs differed in structure, what they afforded was the expectation that teachers would provide different opportunities than their general education counterparts. Miranda’s program was a pullout program and completely enrichment. She didn’t teach the district’s “core curriculum,” and she had the most flexibility of all four teachers. Whitney and Megan worked from within a self-contained model, and they were tasked with delivering the district’s mandated curriculum as well as “go[ing] deeper,” not moving at a faster pace. Megan saw this as affording Whitney and her “some flexibility...to function within our own space and do some things.” All three teachers who taught highly capable students saw their role as pushing their students beyond the expected academics. In contrast, Gavin taught technology in a general education classroom, and similarly to Miranda, he did not

teach to a core curriculum linked to state assessments. However, his high poverty SIG school was labeled such for his students' low achievement scores. The results of state assessments along with expectations to adhere to traditional methods to raise those scores were an implementation constraint even though what he wanted to do directly adhered to his national CTE and technology standards. Gavin described his SIG school as "being under the magnifying glass" with regular visitors walking around the school to check on it.

In terms of support for initiating new ideas, Gavin was able to secure very little, Whitney and Megan obtained support from both principal and district, and Miranda explained that she did not deal with typical organizational layers. Upon reflection, Gavin also attributed his school's status to a potential reason why he felt his principal did not have time to engage in new ideas. Since students were not achieving to state standards, "she was being watched by [the state] and could get fired and her superiors were making sure she was dotting her i's and crossing her t's." He felt she might not have had the time to entertain anything "new" or "innovative" until state officials saw what they wanted to see. Yet, he was also not able to obtain much support in solving resource issues nor was he able to get district support to participate in the online project. Gavin described a number of problems he attempted to solve that resulted in ongoing challenges: not having robotics kits, eventually getting unorganized parts of kits, classroom shelves and physical space, and his principal's time. In contrast, Miranda's support was broad in that she "informed" her director about what she was doing versus asking for "permission" for anything, and Whitney and Megan's first approach to their principal was positively received. Their principal was interested because she saw that with technology, "the sky is the limit...and you do what is best for kids." While Whitney and her principal did not discuss their philosophies, they seemed to share similar views around considering safety and providing learning opportunities.

The principal was aware that “even kid-only [sites] can be hacked” and Whitney explained that her principal “assumes best intent.”

### **Proactive Alignment**

All four teachers also responded differently to the resource, administration, and parent situations they faced, and those situations varied in degree of challenge. Miranda identified having only one scanner in the classroom, but students were able to work around this; it just consumed larger quantities of time in the limited one day a week she saw them. She did not attempt to get another scanner. Whitney and Megan saw their students every day and did not mention any resource issues. Much differently, Gavin’s resource issues were ongoing and challenged his ability to move forward. He felt that a number of attempts at actively suggesting possible solutions did not result in practical explanations or a willingness to continue problem solving; they were entwined in district politics. For example, after trying other avenues, he eventually asked for a portable to have the physical space to do robotics, justifying that the move would also help solve other building problems. While this solution had worked for colleagues in other schools, he understood that there were political reasons why the district would not put portables at his particular school.

In dealings with administration and parents, these teachers initiated requests for approval differently. Miranda stated that she didn’t technically have administrative oversight, and she capitalized on the way her parents respected teacher expertise and her relationships with them. She anticipated what information her parents would need and crafted it accordingly. For example, in sharing the online feedback project to parents, she stated, “I requested our class participate” and “I have no reservations regarding this activity.” Similarly, Whitney and Megan constructed the alignment of what they wanted to do to match district language and policies.

They explained that they had learned from previous experiences to work from within the district curriculum policy to “add on” to an existing activity to “supplement” what they were already doing versus “supplant” or “implement something new.” Additionally, they made strategic decisions as to how to approach their parents and frame the information about the project in terms of anticipated parental concerns: the learning students would gain from the project and student safety. Gavin, on the other hand, said, “I didn’t know [my principal] that well” and thought to “just go ask [her].” He did not anticipate there being any issues since what he wanted to do aligned with his standards and what he thought would help facilitate learning for his students. He also did not initially know 1) his district had an approval board for establishing partnerships involving conducting research and that there was an application, 2) what that application process entailed, and 3) any member of the board.

### **Freedom and Trust**

While all teachers mentioned the need for freedom and trust as playing a role in the outcome of their implementation pathway, their ability to implement seemed to impact their attitudes toward it. Miranda, who had the most freedom, felt that she could try anything and make it successful. While she is out of her classroom now and in a district administrative role, she stated that trust is a huge factor if you want teachers to take risks. She explained that she encourages her highly capable teachers to use “their professional judgment” to assess and do what is best for their students. In contrast, Gavin felt the most regulated stating, “Freedom. Freedom is the word, right there. It’s all been taken away.” After a number of struggles, his efforts to implement were ended by his district’s approval board. Additionally, looking back on his pathway, he felt that his “under the magnifying glass” environment constrained any ability to step out of the bounds of “normal school” because “no one was able to see...and

understand...the academic potential of meaningful communication,” even though he believed we had planned it out so that what he saw as a needed experience would be safe. According to the district research administrator, it didn’t matter what safeguards were in place, “getting students to talk across districts [was] too scary for many members of the board.”

Whitney and Megan negotiated what they felt was their scripted curriculum with the bit of flexibility they had, and felt encouraged by their principal. Whitney explained that her principal “knows her teachers are doing their best.” Yet, she still felt that implementing innovative practices required risk because she had to “mak[e] a lot of judgment calls” in a space where, for example, there are rarely any “completely safe sites for [students] to go.” She wanted specific guidelines to follow so that she felt like “I’ve done what I need to do.” Yet, these did not exist in her district. Megan felt similar hesitancy in explaining that “I would say yeah, our parents would say, sure we trust you, yes allow them to do it, but you assume all responsibility for what goes down.” Given their amount of flexibility and support, they both continued to try and implement new ideas. For example, Megan continued to put in time to research new tools, apps, and programs to use in her classroom despite what she saw as an unnecessarily difficult process to gain approval from district level technologists whom she felt did not understand instruction or were not willing to problem solve.

Taken together, these four teachers had similar characteristics regarding feedback as a foundational practice in the classroom, technology as a means of learning, and innovative practice requiring creativity. However, the differences in their environments and amount of perceived support, their knowledge and ability to proactively align their goals to those who might provide support, and their responses to perceived amount of freedom and trust influenced their decisions and the outcomes of successful or unsuccessful implementation. With these

findings, I proceed in the next section to discuss lessons learned.

### **Discussion**

In this study I examined four master teachers' experiences while implementing online feedback as a classroom practice. All teachers in this study saw feedback as an integral part of their daily work with students as well as important for the learning students did with each other. Taking feedback online equated to a creative innovative practice that leveraged technology to provide valuable learning experiences and built transferrable skills. Observation, artifacts, and interviews offered insight into supporting technology integration as innovative practice. While these teachers had similar characteristics and beliefs, their implementation pathways varied. This variation could at least partially be attributable to external factors. Specifically, the three successful teachers had support from somewhere within the system, whether that was from the structure of district highly capable programs and/or from an administrator. Their positive initial efforts encouraged them to feel that they had enough space to innovate. The teacher who was unsuccessful had his own beliefs and content standards but was unable to find external support. A number of unproductive steps along his pathway discouraged his feelings of agency.

#### **Re-conceptualizing First and Second-Order Barriers**

Brickner (1995) and Ertmer (1999) first categorized barriers to technology integration as first and second-order, depending when whether the factors were internal or external to the teacher's control. First-order include resources and support and second-order include teacher characteristics. Reconsidering that first-order barriers were seen to be less of an impact in schools than in the past (Wood et al., 2005; Ertmer et al., 2012), the present findings suggest that they are still challenges and that just targeting teacher beliefs as second-order barriers are not enough. Each incident a teacher identified along his/her implementation pathway was comprised

of the interplay between internal and external factors that changed the conditions under which decisions were made. Decisions were not just the result of external forces interpreted by internal beliefs, but an interaction between teacher beliefs and factors outside their direct control that impacted teacher choices to respond in a particular ways. These teachers' incidences suggest a need for a more transactional model that includes knowledge creating the capacity for action (Giddens, 1979).

Giddens (1979) discussed structure in societies and organizations, proposing that social phenomenon are the result of social structures and how humans act within those structures. Developing this idea further, Sewell (1992) emphasized human agency as a means of changing structure. The amount of agency each teacher felt seemed contingent upon having the knowledge, skillset, and perceived space to strategically influence change. For example, Miranda, sitting on one end of a possible spectrum, did not need to negotiate with administrative layers above her. She felt she had complete autonomy to dictate how she ran her program, and she actively made decisions and worked to make the learning opportunities she chose successful for her students. Her deep relationships with her parents and knowledge about how they viewed her decisions supported her in composing the information on the research project to send them.

Whitney and Megan, sitting in the middle of the spectrum, required additional strategizing skills. They knew their principal and district well enough to know that they had to present their ideas in certain ways to increase chances of adoption. They also anticipated what their parents would need to hear and strategized accordingly. They felt that they could negotiate within the system to influence change because they were encouraged by their principal who saw endless learning opportunities with the online feedback they proposed, and they were afforded some flexibility from within the structure of their a highly capable program. Their initial efforts

were also rewarded with forward movement toward their goal of implementation; their principal approved, so they felt they had some space to maneuver. On the far end of the spectrum, Gavin felt more constrained.

Gavin recalled a number of incidences that resulted in little to no forward gain. While he was motivated by what he saw as the educational value of online feedback, he became increasingly frustrated when his practical attempts to problem solve were blocked by what he saw as externally defined political barriers (i.e. the portable). These impacted his beliefs about his own capacity and sense of agency. Additionally, because the online feedback project was tightly reflective of his goals and standards, he didn't anticipate having to intentionally convince others of the value he saw in having his students participate, even in his SIG school. He also did not know the environment at the district level, (the research approval process or the board members who he felt didn't see the academic potential of what he wanted to do), or the history of his school that he later understood shaped district attitudes. In retrospect, minimal knowledge of rules potentially affected his capacity for action (Sewell, 1992). From within a theory of structure and agency, it is unlikely that even Miranda would have been able to implement given Gavin's situation and knowledge. Increased understanding might have led to different moves on Gavin's part to purposely present his plan in ways to assuage the concerns of the board whose formal denial was his pathway's dead end.

### **Revisiting Freedom and Innovation**

Teacher perceptions regarding their ability to do what they thought best for their students also involved seeing freedom as a benefit. Increased freedom was seen as the vehicle toward an ability to be creative which they equated to innovative practice. Creativity was "something amazing", "new and fresh", "cutting edge", and "fun". Lack of freedom was seen as a constraint

that devalued their professional judgment to try new things. While these teachers could be considered early adopters (Rogers, 1995), they were also experienced teachers, each with more than 10 years of experiences and some with significantly more. They talked about frustration when they felt there was not a way to demonstrate potentially different ways to get the job done or a space where they could prove that that they could responsibly innovate.

Regarding freedom and innovation, Miranda seemed to sit outside the system. She was allowed to do her own thing, her parents trusted her, and no one else seemed to scrutinize her. A visionary principal backed Whitney and Megan, but they cautiously managed the space between limited flexibility and student, parent, principal, and district expectations. Whitney felt confined by broader policies that she felt didn't trust her to be able to provide instruction that would meet standards. Megan felt discouraged when the district arbitrarily revoked access district-wide to apps and programs she felt she and her students were responsibly using. She assumed this was in response to the actions of a few teachers, and this furthered her thought that the district chose to sacrifice freedom and innovation for all teachers in lieu localized structure and control. While this instance left Megan frustrated, Gavin felt that *all* freedom had been taken away and that multiple administrative layers directing his struggling school prevented new ideas that might help students. Yet, it appears that the issue is not necessarily a desire for unmitigated freedom or a refutation of comprehensive policy implementation, but a view that a mechanism to responsibly innovate should be more apparent. Providing a pathway to demonstrate professionalism and competence with technology could be a means of supporting (and encouraging) innovation while providing necessary overall structure.

### **Implications**

In looking at how to increase successful technology integration in schools, such as the

online feedback project, it seems helpful to re-conceptualize first and second-order barriers into a more transactional model, specifically focused on the issues related to agency on the part of the teacher. While teacher beliefs were motivating factors and resources may have been challenges but not barriers for these experienced teachers, these findings suggest that having the knowledge to interact with the social and structural conditions and being armed with the skills to do so influenced successful outcomes. Success was not necessarily about the technology but about a teacher's ability to find and amplify nodes of alignment. Technology aside, could they articulate a connection that aligned what they wanted to do with the interests of others; could they mediate those relationships and political dynamics; and was there enough actual and perceived space to do so? Miranda was not challenged by alignment, Whitney and Megan strategically tended to it, and Gavin did not have enough knowledge or the realization that it had to be addressed. The three successful teachers believed they had enough space to implement change, Gavin eventually felt he did not. Having met what he saw as impractical barriers a number of times along his pathway could lead to a level of externalizing responsibility for issues he felt he had tried to deal with without success. In other words, unable to move forward in the ways he expected likely impacted feelings of agency and therefore his responses to the difficulties encountered in light of perceived diminishing returns.

With regard to technology integration, Bull and colleagues (2016) state that, "preparation of the teacher by far outweighs any other factor in this system." These findings suggest that a focus of teacher professional development might be on how to construct alignment between what teachers see as being valuable for their particular students and the agendas expressed in school and district policy. This involves more than proving effective use of instructional time by aligning instruction to standards, a typical expectation for all teachers (The Education Trust,

2016). It means considering alignment in not just the language of various school, district, and state policies, but with the attitudes and concerns of other people (parents, colleagues, principal, district administrators). Knowing how to assess the context they work within and understanding those social dynamics and policy conditions can help identify the spaces to directly address in attempting implementation. This could lead to practical and productive activities around constructing a parent memo, district approval application, or administrator conversation.

From a research perspective, it would be valuable to explore how different implementation pathways and subsequent results over time affect the likelihood of technology integration in the future. What will teachers with differing pathways, like the four in this study, continue to do? How do pathways change, stay the same, or address technology as overarching district, state, and national structures exert more or less influence? Gavin, as a negative case in this study, was important in making sense of a “failed” pathway in light of similar teacher characteristics and beliefs. What helpful patterns might be revealed through specifically studying failed attempts at technology integration? And while these findings suggest that the onus is on teacher agency and action, even with firm pedagogical beliefs, a teacher needs to have some support mechanism (Zepeda, 2006). There is potential value in developing clearer policies and supports for innovation so that teachers can benefit from guidelines rather than feel like creativity with technology requires risk or discreet action. More is also needed on identifying not just that administrative support is necessary for technology integration (e.g. Groff & Mouza, 2008; Ertmer, et al., 2012) but in identifying administrative philosophies and alignment structures that can support innovation within current evaluative environments.

### **Limitations**

This study is limited in several ways. The scope of the study involved only one project;

four experienced teachers; and limited data on school, district, and state policy and practice.

While the method of CIT uncovered valuable self-reported data of critical incidences related to job tasks, its immediate analysis with participants to identify themes made it difficult to stay focused on each teacher's individual process as well. It is also a reflective method, and so resulting data could be skewed by how individuals see past events. Additionally, the fact that I am a former teacher led me to be sympathetic to the struggles of the teachers in this study, and I framed the incidences along their pathways as them trying to do their best. Listening, participating, and supporting their attempts to implement, I also came to feel that I knew them well. The relationships that were developed with these teachers played a large role in the project and led to overlapping roles as both the researcher and a collaborator, limiting the clarity of a researcher lens but also potentially extending the depth of the what the teachers were willing to share. I also did not build the same relationships with principals and district administrators. The kinds of relationships I developed (or did not develop), as well as the fact that this was a research endeavor, likely impacted the findings.

## References

- Becker, H. J. (2000). Findings from the Teaching, Learning, and Computing Survey: Is Larry Cuban Right? *Education Policy Analysis Archives*, 8(51).
- Bereiter, C., & Scardamalia, M. (2006). Education for the knowledge age: design-centered models of teaching and instruction. In P. A. Alexander & P. H. Winne (Eds.), *Handbook of educational psychology* (2nd Ed) (pp. 695–713). Mahwah, NJ: Erlbaum.
- Bichelmeyer, B. (2005). Status of instructional technology in elementary-secondary and higher education in the United States. *Asia-Pacific Cybereducation Journal*, 1(2), 49-63.
- Borman, K. M., Clarke, C., Cotner, B., & Lee, R. (2006). Cross-case analysis. In J. L. Green, G. Camilli & P. B. Elmore (Eds.), *Complementary methods in education research* (pp. 123-139). Mahwah, NJ: Erlbaum.
- Bransford, J. D., Brown, A. L., & Cocking, R. R. (2000). *How people learn: Brain, mind, experience, and school*. Washington, D C: National Academies Press.
- Brickner, D. (1995). *The Effects of First and Second Order Barriers to Change on the Degree and Nature of Computer Usage of Secondary Mathematics Teachers: A Case Study*, unpublished doctoral dissertation, Purdue University, West Lafayette, Indiana.
- Bull, G., Thompson, A. D., Schmidt-Crawford, D., Garofalo, J., Hodges, C. B., Spector, J. M., Ferdig, R. E., Edyburn, D., & Kinshuk (2016). Evaluating the Impact of Educational Technology, *Journal of Digital Learning in Teacher Education*, 32(4), 117-118.
- Carlisle, K. (1986). *Analyzing jobs and tasks* (Techniques in training and performance development series). Englewood Cliffs, N.J.: Educational Technology Publications.
- Carvin, A. (1999). Technology Professional Development for Teachers: Overcoming a pedagogical digital divide. *The Digital Beat*, 1(16), 1-5.

- Collins, A., & Halverson, R. (2010). The Second Educational Revolution: Rethinking Education in the Age of Technology. *Journal of Computer Assisted Learning*, 26(1), 18-27.
- Cuban, L. (2001). *Oversold and underused: Computers in the classroom*. Cambridge, Mass.: Harvard University Press.
- Cuban, L. (2008). *Frogs into princes: Writings on school reform*. New York: Teachers College Press.
- Cuban, L., Kirkpatrick, H., & Peck, C. (2001). High access and low use of technologies in high school classrooms: Explaining an apparent paradox. *American Educational Research Journal*, 38, 813-834.
- Daniel, T. (2012). Educational Technology Integration and High-stakes Testing. ProQuest Dissertations and Theses.
- Darling-Hammond, L. (1985). Valuing teachers: The making of a profession. *Teachers College Record*, 87(2), 205-218.
- Dexter, S. L., Anderson, R. E., & Becker, H. J. (1999). Teachers' views of computers as catalysts for changes in their teaching practice. *Journal of Research on Computing in Education*, 31, 221-238.
- Education Trust, The (2016, November). *Our eyes on the horizon: How strong standards, implemented equitably, can help all New York students*. Retrieved from [https://newyork.edtrust.org/wp-content/uploads/sites/5/2016/11/Standards-Brief\\_digital-1.pdf](https://newyork.edtrust.org/wp-content/uploads/sites/5/2016/11/Standards-Brief_digital-1.pdf)
- Ely, D. P. (1999, February). *New perspectives on the implementation of educational technology innovations*. Paper delivered at the Association for Educational Communications and Technology Annual Conference. Houston, TX.

- Ertmer, P. A. (1999). Addressing first- and second-order barriers to change: Strategies for technology integration. *Educational Technology Research and Development, 47*(4), 47-61.
- Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher Technology Change: How Knowledge, Confidence, Beliefs, and Culture Intersect. *Journal of Research on Technology in Education, 42*(3), 255-284.
- Ertmer, P. A., Ottenbreit-Leftwich, A. T., Sadik, O., Sendurur, E., & Sendurur, P. (2012). Teacher Beliefs and Technology Integration Practices: A Critical Relationship. *Computers & Education, 59*(2), 423-435.
- Flanagan, J. C. (1954). The Critical Incident Technique. *Psychological Bulletin, 51*, 327-358.
- Foon Hew, K., & Brush, T. (2007). Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research. *Educational Technology Research Development, 55*, 223–252.
- Fox, R., & Henri, J. (2005). Understanding Teacher Mindsets: IT and Change in Hong Kong Schools. *Educational Technology & Society, 8*(2), 161-169.
- Fresko, B., Kfir, D., & Nasser, F. (1997). Predicting teacher commitment. *Teaching and Teacher Education, 13*(4), 429-438.
- Giddens, A. (1979). *Central problems in social theory: Action, structure, and contradiction in social analysis*. Berkeley, CA: University of California Press.
- Groff, J., & Mouza, C. (2008). A framework for addressing challenges to classroom technology use. *AACE Journal, 16*(1), 21-46.
- Hemric, M., Eury, A. D., & Shellman, D. (2010). Correlations between perceived teacher empowerment and perceived sense of teacher self-efficacy. *AASA Journal of Scholarship*

*and Practice*, 7(1), 37-50.

- Henriksen, D., & Mishra, P. (2015). We Teach Who We Are: Creativity in the Lives and Practices of Accomplished Teachers. *Teachers College Record*, 117(7).
- Herlod, B. (2015, June 10). Why Ed Tech Is Not Transforming How Teachers Teach. *Education Week*. Retrieved from <http://www.edweek.org/ew/articles/2015/06/11/why-ed-tech-is-not-transforming-how.html>
- Hermans, R., Tondeur, J., Valcke, M. M., & van Braak, J. (2006). Educational beliefs as predictors of ICT use in the classroom. Paper presented at the convention of the American Educational Research Association, San Francisco, CA.
- Hew, K. F., & Brush, T. (2007). Integrating technology into K-12 teaching and learning: Current knowledge gaps and recommendations for future research. *Educational Technology Research and Development*, 55(3), 223-252.
- Hickey, D., Moore, A., & Pellegrino, J. W. (2001). The motivational and academic consequences of elementary mathematics environments: do constructivist innovations and reforms make a difference? *American Educational Research Journal*, 38(3), 611-652.
- Johnson, L., Adams Becker, S. Cummins, M., Estrada V., Freeman, A., Ludgate, H. (2013). New Media Consortium, The NMC Horizon Report: 2013 K-12 Edition. Retrieved from: <http://redarchive.nmc.org/publications/2013-horizon-report-k12>
- Kagan, D. (1992). Professional growth among preservice and beginning teachers. *Review of Educational Research*, 62, 129-169.
- Kain, D. L. (2003). Owning significance: The critical incident technique in research. In K. DeMarrais & Stephen D. Lapan (Eds.), *Foundations for Research: Methods of Inquiry in Education and the Social Sciences* (pp. 69-85). Mahwah, NJ: Erlbaum.

- Kennedy, R. (2016, March 29). Is Technology the Answer to Our Educational Problems? *About Education*. Retrieved from <http://privateschool.about.com/od/educationaltechnology/f/solution.htm>
- Kleiman, G. M. (2004). Myths and Realities about Technology in K-12 Schools: Five Years Later. *Contemporary Issues in Technology and Teacher Education (CITE Journal)*, 4(2), 248-253.
- Kozma, R. B. (2003). Technology and classroom practices: an international study. *Journal of Research on Technology in Education*, 36, 1–14.
- Marcinkiewicz, H. R. (1993). Computers and teachers: Factors influencing computer use in the classroom. *Journal of Research on Computing in Education*, 26, 220-237.
- McGrail, E. (2005). Teachers, technology, and change: English teachers' perspectives. *Journal of Technology and Teacher Education*, 13, 5–24.
- Merriam, S. B. (2009). *Qualitative research: A guide to design and implementation*. San Francisco: Jossey-Bass.
- Mueller, J., & Wood, E. (2012). Patterns of Beliefs, Attitudes, and Characteristics of Teachers That Influence Computer Integration. *Education Research International*, 13.
- Mueller, J., Wood, E., Willoughby, T., Ross, C., & Specht, J. (2008). Identifying discriminating variables between teachers who fully integrate computers and teachers with limited integration. *Computers and Education*, 51, 1523–1537.
- Newmann, F. M. and Associates (1996). *Authentic Achievement: Restructuring Schools for Intellectual Quality*. San Francisco: Jossey-Bass.
- Newman, F. M., Lopez, G., & Bryk, A. S. (1998). *The Quality of Intellectual Work in Chicago Schools: A Baseline Report*. Chicago Annenberg Research Project.

- Okojie, M. CPO, Olinzock, A. A., & Okojie-Boulder, T. C. (2006). The Pedagogy of Technology Integration. *Journal of Technology Studies*, 32(2), 66-71.
- Ottenbreit-Leftwich, A. T., Glazewski, K. D., Newby, T. J., & Ertmer, P. A. (2010). Teacher Value Beliefs Associated with Using Technology: Addressing Professional and Student Needs. *Computers & Education*, 55(3), 1321-1335.
- Patton, M. Q. (2003). *Qualitative research and evaluation methods* (3rd ed.). Thousand Oaks, CA: Sage.
- Pelgrum, W. (2001). Obstacles to the integration of ICT in education: Results from a worldwide educational assessment. *Computers & Education*, 37(2), 163-178.
- Reiser, L. J. (2002). Professional Development and Other Factors that Contribute to the Ability To Integrate Technology into Curriculum. *Journal of Educational Technology Systems*, 30(4), 437-60.
- Richardson, V. (1996). The role of attitudes and beliefs in learning to teach. In J. Sikula (Ed.), *Handbook of research on teacher education*. New York: Macmillan.
- Roehrig, G. H., Kruse, R. A., & Kern, A. (2007). Teacher and school characteristics and their influence on curriculum implementation. *Journal of Research in Science Teaching*, 44, 883-907.
- Rogers, E. M. (1995). *Diffusion of innovations* (4<sup>th</sup> ed.). New York: Free Press.
- Sewell, W. (1992). A Theory of Structure: Duality, Agency, and Transformation. *American Journal of Sociology*, 98(1), 1-29.
- Shear, L., Gallagher, L., & Patel, D. (2011). ITL 2011 Findings: Evolving Educational Ecosystems. Menlo Park, CA: SRI International.
- Somekh, B. (2008). Factors affecting teachers' pedagogical adoption of ICT. In J. Voogt & G.

- Knezek (Eds.), *International handbook of information technology in primary and secondary education* (pp. 449-460). New York: Springer.
- Snoeyink, R., & Ertmer, P. A. (2002). Thrust into Technology: How Veteran Teachers Respond. *Journal of Educational Technology Systems, 30*(1), 85-111.
- Stake, R. (2006). *Multiple case study analysis*. New York, NY: Guilford Press.
- Sternberg, R. J., & Horvath, J. A. (1995). A Prototype View of Expert Teaching. *Educational Researcher, 24*(6), 9-17.
- Stillman, J. (2011). Teacher Learning in an Era of High-Stakes Accountability: Productive Tension and Critical Professional Practice. *Teachers College Record, 113*(1), 133-180.
- U. S. Department of Education (2002). The no child left behind act of 2001. Retrieved April 2, 2017 from <http://www.ed.gov/policy/elsec/leg/esea02/107-110.pdf>
- Vannatta, R. A., & Fordham, N. (2004). Teacher Dispositions as Predictors of Classroom Technology Use. *Journal of Research on Technology in Education, 36*(3), 253-271.
- Walker, T. (2015, June 12). How Teachers Stay Creative in the High-Stakes Testing Era. *neaToday*. Retrieved from: <http://neatoday.org/2015/06/12/how-teachers-stay-creative-in-the-high-stakes-testing-era/>
- Watson, D. (1998) Blame the technocentric artefact! What research tells us about problems inhibiting teacher use of IT. In G. Marshall & M. Ruohonen (Eds.), *Capacity Building for IT in Education in Developing Countries*, (pp. 185–192). Chapman and Hall, London.
- Watson, D. (2001). Pedagogy before Technology: Re-thinking the Relationship between ICT and Teaching. *Education and Information Technologies, 6*(4), 251-266.
- Watson, D., & Tinsley, D. (Eds.) (1995) *Integrating Information Technology into Education*. Chapman and Hall, London.

Whitby, T. (2016, August 8). 'Teachers must be encouraged to innovate - even if that means failing'. *TES*. Retrieved from: <https://www.tes.com/us/news/breaking-views/teachers-must-be-encouraged-innovate-even-if-means-failing>

Wood, E., Mueller, J., Willoughby, T., Specht, J., & DeYoung, T. (2005). Teachers' perceptions: Barriers and supports to using technology in the classroom. *Education, Communication, & Information*, 5, 183–206.

Yin, R. (2003). *Case study research: Design and methods* (3rd ed., Applied social research methods series; v.5). Thousand Oaks, Calif.: Sage Publications.

Zepeda, S. (2006). High stakes supervision: We must do more. *International Journal of Leadership in Education*, 9(1), 61-73.

Appendix C-1  
Teacher Interview Questions

1. What is the community context like for you? Who is the community? [Mostly 2 parent households, guardians, non-traditional homes]. How involved is the community?
2. When you have new ideas to try or want to integrate technology [the feedback project we did/wanted to do], what is the overall atmosphere like that you work in? How receptive or supportive?
3. What does appropriate peer-to-peer feedback look like in a tech-based environment? [Mental model for what should be going on there? Is that the same model used when working with students F2F]
4. How does integrating technology support the work you do? [Is this an innovative practice?]
5. As you review and think back on the process, what types of incidences did you experience as you began planning for online peer feedback?
6. What dynamics or issues did you consider? [Accountability? Support?] Were there specific things you thought about or did to improve the probability of successful application of technology?
7. Can you pinpoint specific situations, conversations, or incidences that were crucial in your ability to actually do (or not do) the online peer feedback work with your students?
8. Other issues? What do you see needs to be done IF we want to support teachers implementation?

Appendix C-2  
Additional Interview Questions

1. What role does feedback plan (or should feedback play) in the classroom?
2. How do teachers ensure that all students receive feedback, assistance, encouragement, and recognition? [How do students get feedback on their work? What sorts of feedback do they try to give? Do you need to directly support that?]
3. What does appropriate peer-to-peer feedback, in a technology-based environment, consist of or look like?
4. What do you and your teachers need to think about when this work goes online?
5. What dynamics come into play when we think about integrating technology for these purposes? [Is this innovative practice?]

Appendix C-3  
District Email, spring 2016

Our research review committee met two weeks ago and discussed your application. At this point the committee expressed concerns about how the monitoring of the social media site through the Canvas Learning System which [*sic*] is not part of our district student management system. There were apprehensions that monitoring and approving of the threaded discussion with student from other districts may be problematic. We understood that analyzing the content of student posts is an important part of the study but there were expressed safety concerns that the technology system was not under the district control. Therefore, at this time, your application was not approved.

If you have any questions then I would be glad to discuss this with you... I am sorry this did not work out.

Thank you.