DIVERSITY IN THE DIGITAL AGE: INTEGRATING PEDAGOGY AND TECHNOLOGY FOR EQUITY AND INCLUSION

by

Kathryn de Groof Kaiser

Dissertation Committee:

Professor Ellen Meier, Sponsor
Professor Marie Volpe

Approved by the Committee on
the Degree of Doctor of Education

Date 22 May 2019

Submitted in partial fulfillment of the
requirements for the Degree of Doctor of Education in
Teachers College, Columbia University

2019

ABSTRACT

DIVERSITY IN THE DIGITAL AGE: INTEGRATING PEDAGOGY AND TECHNOLOGY FOR EQUITY AND INCLUSION

Kathryn de Groof Kaiser

This qualitative dissertation explores the perceptions of how and why teachers might integrate technology to support their goals of equity and inclusion with a group of teachers who identify as culturally responsive in their pedagogy and describe themselves as fluent in the use of technology in school. Teachers working with students of diverse backgrounds were chosen purposively using an "extreme case sampling" method in order to interview experienced and pedagogically aligned participants. Drawing on in-depth interviews, a review of class artifacts and documents, and a focus group, this study provides critical insights into how self-identified culturally relevant teachers use technology. Discussion of the findings focused on two areas. The first examined how the unique affordances of technology lend themselves as a critical resource for teachers engaged in culturally responsive pedagogy. The second looked at how the self-directed approach of participant teachers led them to seek learning opportunities through informal means, in particular with peers they saw as aligned with their own thoughtful practice in service of their beliefs and values for equity and inclusion. Participants provided evidence that technology can be an active dimension of their work toward equity and inclusion. Thus, this research expands upon existing literature on pedagogical practice in both technology in education and diverse classrooms.

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DEDICATION

In loving memory of Frank Moretti

My journey in this doctoral program began nearly two decades ago with a workshop led by Columbia University and Teachers College professor, Frank Moretti. Through his encouragement for me as a student and a thinker as well as his enthusiasm for technology in education, I entered the world of full time working parent and part time student. Frank's sudden death in 2015 was devastating. My progress halted and my commitment faltered. I have since discovered that the greatest gift a student can give to their teacher is to take up the mantle and confidently march ahead. I offer gratitude to Frank for opening the door and I step through to the other side with this dissertation.

ACKNOWLEDGMENTS

So many people made this entire process possible. Thank you to my advisor, Ellen Meier, for your advice, your ideas, and for signing the many forms that came our way from the Office of Doctoral Studies.

Thank you to Marie Volpe. Your commitment to me is unparalleled. From the moment we met, you have shed light on a mysterious process and offered your significant knowledge and experience without limitation. Thank you for the many hours, wonderful meals, and generous love and attention.

I also want to thank my committee members, Drs. Katie Embree and Elisa Perry whose attention to detail and helpful feedback guided me and challenged my thinking. I appreciate your willingness to share your expertise.

Thank you to all the teachers in this study who gave their personal time and shared their perspective. Your dedication to your students and to your own professional growth is inspiring. The children are so lucky to have such a talented and caring leader in their world.

Thank you to my dissertation posse, Sandra and Michelle. Watching you both succeed and overcome obstacles was an inspiration and provided the best motivation every step of the way!

Lastly, to my family who gave me the greatest confidence. To my husband, Paul, I appreciate your encouragement and understanding. It would not have been possible to reach this milestone without your support. To my daughters, Alice and Jane, you never once questioned my goals or my efforts and have always championed me as a teacher, parent, and student – even when it was all happening simultaneously.

K. d. K.

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Chapter I

INTRODUCTION

The Background

This study explored the perceptions of how and why teachers might integrate technology to support their goals of equity and inclusion with a group of teachers who identify as culturally responsive in their pedagogy and describe themselves as fluent in the use of technology in school. Teachers were selected to participate because they self-identified as valuing equity and inclusion in their classes and also considered themselves to be technologically proficient.

Educators purpose tools to reflect beliefs (Fullan, 2013). Fullan tells us, "Teachers in small groups become leaders, designers, and active guides to learning" (p. 47). It was anticipated that participant teachers would evaluate, modify, and adapt what is given or available to them in ways that support their existing pedagogy. Tools are used to consciously or unconsciously reflect beliefs about teaching. Fullan argues that the future compels us to integrate technology, pedagogy and change knowledge. This research further suggests that equity is also an essential component of this integration. To integrate a pedagogy that ignores the needs of many students would further widen the achievement gap and contribute to students' feelings of exclusion.

Chapter I details the background information for this study by describing the context and relevance of this topic. Before the topic of educational technology and diversity in education can be engaged, it is necessary to understand the unique

demographics of students and teachers in the United States, the historical power structures in education, the damaging effects of segregating learners from diverse backgrounds, and the benefits of integrating students from diverse backgrounds in contemporary classrooms and workplaces. This chapter is organized into six sections: Context, Problem Statement, Purpose, Research Questions, Approach, and Rationale and Significance of the Study.

The Context

Contemporary demographics of teachers and students in the United States are rapidly changing as the United States becomes increasingly diverse. Our census shows a growing non-White population, with White students enrolled in public schools decreasing in number (from 25.0 million to a projected 23.5 million between Fall 2014 and Fall 2025) and expected to account for 46% of total enrollment in 2025 (National Center for Educational Statistics [NCES], 2016). The rapidly changing demographics in American classrooms necessitate critical attention and awareness of the diverse needs of students from wide-ranging cultural backgrounds. While the student body is diversifying, teacher demographics in the U.S. do not reflect the changing student demographics (Albert Shanker Institute, 2015; Boser, 2011; Villegas & Irvine, 2010). In the 2011-2012 school year, about 82% of all public-school teachers were non-Hispanic White (NCES, 2013). In 2015, the Albert Shanker Institute produced a report titled *The State of Teacher Diversity in American Education*. This report showed that teacher diversity in the U.S. is currently an area of concern. The report documented how the teacher work force is less ethnically and racially diverse and more female than the student body, adversely affecting students. Nationally, progress toward greater diversity is being made, but it is modest compared to the need for more diverse teachers. The demographics of our teachers currently do not reflect the background of our students in the U.S. (Albert Shanker Institute, 2015). This

ratio is likely to remain imbalanced in the future as the number of potential teachers of color decreases at numerous points in the teacher pipeline, including college acceptance, teacher preparation, graduation, workforce entry, and teacher retention (U.S. Department of Education, 2016). “If we are to meaningfully increase the diversity of the teacher workforce, more must be done, starting with preparation and completion, to recruitment and selection, and then placement and retention” (p. 31).

Approaches to educating students from diverse backgrounds have taken different forms over the last 20 years. Overall, the American education system has been experiencing an increasing stratification of students (White/Black, high/low income) due to economically segregated housing communities, neighborhood-based school catchments, and academic tracking policies that divide low socio-economic (SES) minority students from higher income White students (Carter & Welner, 2013; Cochran-Smith & Zeichner, 2005). There are distinct social and economic disadvantages for children living in high concentration low-income communities, including diminished access to health care, food deserts, high stress, and poor sleep. These factors negatively impact school performance and contribute to measurable differences in student achievement.

Test score, attendance, and graduation rate statistics for low-SES African American and Latino students show a widening achievement gap from White and Asian peers (Burris, 2014; Carter & Welner, 2013; Sirin, 2005). Concentrating students in racially and economically homogeneous schools worsens this documented achievement gap between student groups in U.S. K-12 schools (Burris, 2014; Carter & Welner, 2013).

There are positive effects of heterogeneous student grouping and negative impacts of homogeneous grouping in U.S. K-12 schools (Burris, 2014). Studies reflect the damage of tracking for at-risk students, and research does not show heterogeneous grouping negatively impacting high achievers (Burris, 2014; Carter & Welner, 2013; Heubert, 1999). In fact, there is evidence of the benefits of universal acceleration with

heterogeneous grouping in school districts (Burris, 2014; Burris & Welner, 2005; Carter & Welner, 2013). Integrating lower income students into schools where higher income students predominate can narrow the achievement gap and provide cognitive benefits to all students (Burris, 2014; Carter & Welner, 2013). Evidence is especially impressive for long-term outcomes for adolescents and young adults who have attended integrated schools (Guryan, 2001; Reardon & Owens, 2014).

In an effort to understand and change how culture and race interact in the educational system, scholars have written about the relationship or connection between and among race, racism, and power in critical race theory (Chapman, 2008; Dixson & Rousseau, 2006; Howard, 2008; Ladson-Billings & Tate, 1995; Lynn, 2004; Lynn & Parker, 2006; Milner, 2008; Paris, 2017). Critical pedagogy (Giroux, 2010) shifts the purpose of school from "training" students to cultivating voice and agency in students, where the ideology of the teacher is of central importance to the purpose of education. The critical pedagogy of teachers can influence the establishment of effective strategies for positive teacher impact on students of diverse backgrounds. Research has shown that the approaches teachers take can have a positive impact on students of diverse backgrounds (Ladson-Billings, 2014; Paris, 2017). Specifically, teachers who acknowledge the home-community culture of the students (through sensitivity to cultural nuances) and who integrate these cultural experiences, values, and understandings into the teaching and learning environment show greater success in closing the achievement gap (Ladson-Billings, 2014).

Twenty-first Century skills such as critical thinking, problem solving, and creativity in the workplace and school are increasingly valued. The benefits of diversity in workplace outcomes have been well documented (Galinsky et al., 2015; Page, 2008; Phillips, 2004). Empirical evidence reveals that diversity—heterogeneity in race, culture, gender, etc.—has material benefits for organizations, communities, and nations. However, because diversity can also create heightened forms of conflict and resentment

in groups, its benefits are not always realized (Galinsky et al., 2015; Page, 2008). This power of diversity has important implications for how we educate our students and prepare them for work in the 21st century. Teachers can provide learning environments that challenge students to work in diverse groups where they develop essential skills such as critical thinking and problem solving while negotiating conflict and consider different perspectives respectfully. Teachers first need to recognize that students bring a range of perspectives to their learning environment and have strategies for building equitable learning communities.

Increasingly, standards such as the Common Core State Standards focus on collaboration and flexibility in thinking, following workplace needs. Contemporary schools are charged with preparing all students for changing areas of expertise, such as the ability to collaborate effectively, show flexibility in thinking, and use critical thinking strategies to solve problems rather than recall and repeat learned information (International Society for Technology in Education, 1998; Lemke, Coughlin, & Reifsneider, 2009). Scardamalia and Bereiter (2006) stress the importance of creating environments where students can build their knowledge. In knowledge-building environments, shared knowledge is valued along with individual achievement and understanding. This model reflects many 21st century workplaces in the sense that contemporary work is creative and collaborative and relies on rapidly expanding expertise. Many workplaces emphasize creative problem solving in teams. These teams are informed by the work of previous teams. The future problems of the working world are not yet defined, so knowledge and expertise are continuously being developed rather than being trained ahead of time in schools. Information Communication Technology (ICT) has been an integral part of the rapidly changing nature of work and needed skillsets for success.

An important development in education is the potential for Information Communication Technology (ICT) to provide powerful learning experiences for students

(Rienties, Tempelaar, Van den Bossch, Gijselaers, & Segers, 2009). Many ICT tools exist that can support the development and application of creativity, problem solving, critical thinking, and collaborative processes valued in contemporary workplaces (Buckner & Kim, 2013; Ruggiero, 2015). While many students are fortunate to have significant technology resources in their schools, only some students have teachers who challenge them in creative projects and critical thinking tasks using technology resources (Hargittai & Walejko, 2008). Unfortunately, research shows that many low-SES schools often use technology for repetitive tasks and simple memorization (Barron, Walter, Martin, & Schatz, 2010; Gomez, 2014; Resnick & Rusk, 1996; Wenglinsky, 1998), whereas high-SES schools most often use technology as a tool for students to problem solve and develop original work (Becker, 1999; Dimaggio, Hargittai, Neuman, & Robinson, 2001; Wenglinsky, 1998). The disparity in low- and high-SES student opportunities for the creative production with ICT is often described as a "participation divide" (Hargittai & Walejko, 2008; Warschauer & Matuchniak, 2010). Facer (2011) calls schools practicing critical pedagogy in concert with the development of technological fluency in students' "future-building." These classrooms are driven by student passions and provide them with the tools to critique the current socioeconomic, political, and environmental conditions (Blikstein, 2008; Facer, 2011).

In summary, to understand the context of this research, a number of factors must be considered. First, teacher demographics in the U.S. do not currently match student demographics (Albert Shanker Institute, 2015). This creates a cultural divide between students and teachers. Additionally, many of our students are stratified and grouped by socio-economic and racial differences (Carter & Welner, 2013). There are damaging effects of segregating learners from diverse backgrounds, and there are benefits to all students when integrating students from diverse backgrounds in contemporary classrooms (Burris, 2014). A skilled teacher can have a positive impact on students of diverse backgrounds (Ladson-Billings, 2014; Paris, 2017). Pedagogical approaches in

classrooms have important implications for developing 21st century skills, such as critical thinking and collaboration, that are valued in the contemporary workplace (Wells, Fox, & Cordova-Cobo 2016).

Problem Statement

An important development in education is the potential for Information Communication Technology (ICT) to provide powerful learning experiences for students (Rienties et al., 2009). Originally the term “digital divide” was coined to describe inequitable access to hardware and software (Hargittai & Walejko, 2008; Warschauer & Matuchniak, 2010). Though increased access to hardware and software has improved in most communities, the proliferation of technology both in and out of schools may have, in fact, widened the “digital divide” (Dimaggio et al., 2001; Van Dijk, 2005; Warschauer, 2003). Warschauer (2003) explains that the way in which our students use technology is often divided by socio-economic differences. In other words, our current *use* of educational technology in communities is substantively different and therefore inequitable.

Integrating learners from varying socioeconomic and ethnic backgrounds is essential for preparing students for a more global society where skills in critical thinking and problem solving are necessary (Wells et al., 2016). Technology has the potential to play an important role when used as thinking tools in collaborative groups in the pursuit of these 21st century skills. In order to develop critical thinking and problem-solving skills in heterogeneous learning communities, teachers need to be aware of diverse student needs and strategies for authentic technology integration. Not enough is known about the deliberate choices teachers might make to pursue equity and inclusion within their classrooms regarding the use of technology.

Purpose

The purpose of this qualitative study was to explore with a group of teachers who identify as culturally responsive in their pedagogy and fluent in the use of technology their perceptions of how and why they might integrate technology to support their goals of equity and inclusion.

Research Questions

1. How do teachers who identify as culturally responsive characterize the use of technology in their practice?
2. When incorporating technology, how do teachers describe the extent to which they feel they are achieving equity and inclusion with their students of diverse backgrounds?
3. What factors and conditions do teachers report as helping and/or hindering their learning regarding technology use that supports equity and inclusion efforts in their classrooms?

Approach

This research project was designed to explore how teachers who hold particular values describe their experience when using technology in their efforts to create inclusive and equitable learning communities. A purposive “extreme case sampling” approach was used to select teachers working with students of diverse backgrounds for this study. They were chosen from conferences, workshops, and professional learning communities focused on equity and inclusion. The participants all described themselves as proficient technology users. A “snowball” approach, in which participants recommend like-minded colleagues, was utilized in order to interview experienced and pedagogically aligned

participants. The research questions sought to discern if teachers with firmly held underlying pedagogical values would apply this philosophical lens when a new opportunity in ICT was presented to them.

In-depth interviews with teachers were the primary data collection method. These interviews were augmented with a focus group. Class artifacts and document review provided data on each participant's use of technology. Examples of technology projects and applications, as well as background and environmental factors that may have influenced the participants' technology use, were reviewed.

Rationale and Significance

The rationale for this study is that while U.S. classrooms are becoming increasingly diverse, this diversity is not reflected in the teachers (Albert Shanker Institute, 2015; Boser, 2011; Carter & Welner, 2013; Villegas & Irvine, 2010). Teachers need tools and practices that help them create inclusive and equitable learning communities where children of diverse backgrounds can collaborate and communicate effectively. Technology is a powerful tool for learning in classrooms, but not enough is known about how well-intentioned teachers leverage these tools to support their efforts to achieve equity and inclusion in diverse classrooms.

The significance of the full study holds particular value for all educational stakeholders, including administrators, students, parents, professional development specialists, and the faculty themselves in diverse schools where 21st century skills are valued. Improvement in educational outcomes for low-income Black and Latino students in the U.S. is imperative. This study has the potential to offer an important contribution toward this national goal. Teachers with experience, knowledge, and a commitment to achieving equity and inclusion in their classroom are an important voice in this effort.

Chapter II

LITERATURE REVIEW

Introduction

The purpose of this qualitative study was to explore the perceptions of how and why teachers might integrate technology to support their goals of equity and inclusion with a group of teachers who identify as culturally responsive in their pedagogy and describe themselves as fluent in the use of technology in school. The literature review will examine the current research in two major areas that are deemed most relevant to this study: (1) educational technology and (2) diversity in classrooms. Additionally, the literature review provides baseline of information to explain and situate the research problem.

The researcher made extensive use of online databases, such as Google Scholar, JSTOR, ProQuest, and EBSCO, which were accessed through the Teachers College Gottesman Library. In order to identify articles on educational technology, the researcher relied heavily on a variety of academic research journals, including: the *Journal of Computers and Education*, *Journal of Educational Technology, Research and Development*, *Journal of Education and Information Technologies, Learning, Media and Technology*, *Contemporary Issues in Technology and Teacher Education* and the *International Journal of Information and Education Technology*. The researcher retrieved articles on diversity in education from the following academic research journals among others: *Journal of Child and Family Studies*, *Journal of Youth and Adolescence*,

Diaspora, Indigenous, and Minority Education, *Ethnic and Racial Studies*, *Pedagogy, Culture & Society*, *Race Ethnicity and Education*, *Journal of Research in Childhood Education*, and *Discourse: Studies in the Cultural Politics of Education*.

Bibliographies extracted from the academic research journals above were also accessed to locate additional articles related to both educational technology and diversity in education. Keywords used to identify articles on educational technology included *education technology*, *computers in education*, *educational innovation*, *information technology*, and *educational research*. The following keywords were used to locate articles on diversity in education: *minority student education*, *Black education*, *multicultural education*, *culturally responsive pedagogy*, and *opportunity equality*.

Rationale for Topics

Integrating learners from varying socioeconomic and ethnic backgrounds is essential for preparing students for a more global society where skills in critical thinking and problem solving are necessary (Wells et al., 2016). Technology has the potential to play an important role when used as thinking tools in collaborative groups in the pursuit of these 21st century skills. In order to develop critical thinking and problem-solving skills in heterogeneous learning communities, teachers need to be aware of diverse student needs and strategies for authentic technology integration. Not enough is known about the deliberate choices teachers might make to pursue equity and inclusion within their classrooms regarding the use of technology.

This literature review examined the current research in two major areas that are determined to be most relevant to this study. Topic I will review the literature encompassing the potential for educational technology to enhance classroom learning, with specific emphasis on the integration of new technologies and changes in pedagogical practice. Topic II will examine diversity in education, including the changing

demographics in classrooms and successful pedagogical approaches found to increase inclusivity and equity in learning environments. A synthesis of the two topics looks at current research in the intersection of diversity and technology in the classroom.

The themes discussed as part of the review of the literature provide an overview of educational technology uses in diverse classrooms. The first topic specifically explains the history of educational technology and technology use in classrooms, including the TPACK model for integrating technology into teaching. Influences on teachers' use of technology and obstacles to integrate educational technologies into classrooms are also explored. Topic 1 covered the following areas: (1) History of Educational Technology; (2) Technology Initiatives; (3) Technology Integration.

Topic II examined diversity in education. The following areas of diversity in education will be explored: (1) Changing Demographics; (2) Historical Approaches; (3) Pedagogy Matters; (4) Difference is Better. A key assumption is that critical pedagogies hold the promise for successful technology integration for teachers working with students in diverse classrooms.

This chapter concludes with a synthesis of the two topics and a chapter summary, followed by a description of the Conceptual Framework developed for the study. The Conceptual Framework was developed and informed by the literature reviewed and the research questions:

1. How do teachers who identify as culturally responsive characterize the use of technology in their practice?
2. When incorporating technology, how do teachers describe the extent to which they feel they are achieving equity and inclusion with their students of diverse backgrounds?
3. What factors and conditions do teachers report as helping and/or hindering their learning regarding technology use that supports equity and inclusion efforts in their classrooms?

Topic I: Educational Technology

History of Educational Technology

An important development in education is the opportunity for the integration of Information Communication Technology (ICT) that, if used effectively, provides a powerful learning experience for students (Rienties et al., 2009). Many educators lack the knowledge and skillset for technology integration to meet students' needs in order to "capitalize on the learning potential of technology" in the 21st century (Boss, 2011, para 12). Teachers are working in new learning environments, adding to the complexity and pressures faced when teaching increasingly diverse students (Alvarez, Guasch, & Espasa, 2009).

Educational technology has evolved in recent decades. This overview begins in the 1980s and describes technology tools, standards, and adoption literature until present day throughout the United States. The personal computer was introduced in the late 1970s and early 1980s. The Apple II was released in 1977, followed by the IBM PC in 1981, and the first Macintosh in 1984. These personal computers provided access to computing to many people.

Programming tools in classrooms provided an "educational emphasis on learning programming language and using 'programmed instruction' such as drill-and-practice software" (Cennamo, Ross, Ertmer, & International Society for Technology in Education, 2014, p. 5). The Oregon Trail, an early educational video game in classrooms, was also popular. Schools continued to slowly adopt technology into teacher education through the end of the 1980s.

In the early 1990s, the computer began to be used as a communication device and resource tool with the opening of the World Wide Web. In 1996, "the first U.S. National Educational Technology Plan was developed and volunteers helped wire local schools for Internet access and local area network (LAN) infrastructure" (Cennamo et al., 2014,

p. 5); interactive white boards began to replace traditional chalkboards, allowing students and teachers to digitally manipulate lessons such as using pictures for discussion and brainstorming, collaborative writing, shared reading, peer-teaching, and collaborative problem solving (Türel, 2010).

In the 2000s, the computer became both a learning tool and a social tool in classrooms and at home. “Online learning quickly became one of the fastest growing trends in educational uses of technology at both K–12 and college levels” (Cennamo et al., 2014, p. 8). Allen and Seaman (2010) reported that over “5.6 million students had taken at least one online course during the fall 2010 semester” (p. 2). In 2010, the iPad was released and was immediately adopted in classrooms widely. Boss (2011) states, “Today’s learning landscape includes an almost dizzying array of tools, from inexpensive personal computers and handheld devices to interactive whiteboards, digital video cameras, and a constantly expanding suit of Web 2.0 tools” (para 5).

In November of 2009, President Obama “launched the Educate to Innovate campaign to improve the participation and performance of all U.S. students, including underrepresented groups such as girls and women, in science, technology, engineering, and mathematics (STEM)” (Gray, Thomas, & Lewis, 2010, p. 13), in part to address persistent disparities between technology-rich schools and those that have limited access to outdated equipment. Integrating educational technology approaches in classrooms has been demonstrated to support problem solving, analysis, and other higher-order thinking skills and to have greater positive effects than digital learning that supports basic developmental skills, such as memorizing facts and applying rules (Buckner & Kim, 2013; Ruggiero, 2015). As Web 2.0 tools evolve, teachers and students are transitioning from consumers to creators of online content and knowledge more generally (Scardamalia & Bereiter, 2014). Although schools have been slow to bring social media into the classroom, many students are using digital tools on their own to create and publish content, connect with acquaintances, and pursue their own interests (Boss, 2011).

These digital tools and evolving social media platforms have exponentially expanded opportunities for integrating technology into teaching. Digital tools have been shown to increase individual learning outcomes and foster communication and collaboration among students (Buckner & Kim, 2013; Ruggiero, 2015). Cennamo et al. (2014) provide a summary of digital tools utilized in classrooms, including the current, widely used platform Google Classroom, which permits collaboration between and among students and teachers and others. "Learning happens when people are active and technology simply allows us to provide more of those opportunities … as soon as you give students control over their own education, it's terribly empowering" (p. 84). Previously, the term Web 2.0 tools stood for social networking, allowing people to quickly "post text, images, videos, and other media, which their users can then comment on or add content to" (p. 9). Now cell phone and tablet apps are common and frequent Web 2.0 tools and vary from providing learning through technology-based tutorials to games, including Khan Academy, Edx, Quizlet, TED, and itunesU. Databases, mind and concept maps, Wordles, simulations and animations, website design, digital storytelling, and Web conferencing are additional digital tools frequently used in classrooms. Social-media platforms currently used in classrooms include Facebook, Instagram, Pinterest, Twitter, Youtube, and Weblogs. Social-media learning has led to mobile learning (mLearning), which is the "latest frontier in terms of leveraging information to support teaching and learning. Students can access and create information, whether in or out of class with small portable devices that may utilize web browsers or education-specific apps on the go" (p. 9).

Educational Technology Policy

National Education Technology Plan (NETP). President Obama addressed Congress on February 24, 2009, asserting, "Technology itself is an important driver of change. Technology can enable transforming education but only if we commit to the

change that it will bring to our education system" (as cited in U.S. Department of Education [USDOE], 2010, p. 4). One year later, the U.S. Department of Education's Office of Educational Technology's NETP was released with a vision for leveraging the learning sciences and modern technology to create engaging, relevant, and personalized learning experiences for all learners that mirror students' daily lives and the reality of their futures. In contrast to traditional classroom instruction, this requires that students are put at the center of the learning process and empower them to take control of their own learning by providing flexibility on several dimensions (USDOE, 2010, p. x).

This plan was in response to an "urgent national priority and a growing understanding of what the United States needs to do to remain competitive in a global economy" (USDOE, 2010, p. xv). Page 4 of the plan explains the shift of emphasis on technology for teaching to that of technology for learning, and challenges everyone to leverage technology to create "engaging and empowering learning experiences for all learners" (p. v). The plan included five goals that addressed "five essential components of learning powered by technology: Learning, Assessment, Teaching, Infrastructure, and Productivity" (para. 4).

The NETP also includes a letter to Congress from then Secretary of Education Arne Duncan calling for "applying the advanced technologies used in our daily personal and professional lives to our entire education system to improve student learning, accelerate and scale up the adoption of effective practices, and use data and information for continuous development" (USDOE, 2010, para. 2).

The NETP recognized that technology-based learning and assessment systems will be essential in improving student learning and generating data that can be used to continuously improve the education system at all levels. Technology will help us execute collaborative teaching strategies combined with professional learning that can better prepare and enhance educators' competencies and expertise over the course of their careers (USDOE, 2010, p. ix).

According to the NETP, regardless of the profession students choose later on in life, they should be able to use the Web and related tools such as wikis, blogs, and digital content for research, collaboration, and communication. Using real-world tools creates learning opportunities that allow students to grapple with real-world problems and prepares them to be more productive members of a globally competitive workforce (USDOE, p. xi).

International Society for Education (ISTE). The ISTE organization's mission is to provide "leadership and service to improve teaching, learning, and school leadership by advancing the effective use of technology in PK–12 and teacher education" and "represents a movement" (ISTE, 2008, para 10). ISTE has developed national standards for educational technology use in schools and has continuously updated them.

ISTE standards provide a solid foundation for educators to implement "digital strategies to positively impact learning, teaching, and leading in our technology-powered world" (ISTE, 2008, p. 1). They describe the skills needed to learn and live in an increasingly digital world. The standards now include creativity and innovation, communication and collaboration, research and information fluency, critical thinking, problem solving, decision making, and digital citizenship, along with technology operations and concepts (Boss, 2011).

The ISTE National Technology Standards and Performance Indicators for *Teachers* require teachers to "design, implement, and assess learning experiences to engage students and improve learning; enrich professional practice; and provide positive models for students, colleagues, and the community" (Cennamo et al., 2014, p. 14). The standards provide, clarify, and raise a set of expectations for teachers and students. The teaching standards include five overarching pillars: (a) facilitate and inspire student learning and creativity, (b) design and develop digital-age learning experiences and assessments, (c) model digital-age work and learning, (d) promote and model digital citizenship and responsibility, and (e) engage in professional growth and leadership.

According to Cennamo et al. (2014), the most recent ISTE standards have been updated to include a four-stage continuum—"beginning, developing, proficient, and transformative"—that details how each teacher performs in each standard and substandard (p. 20). Technology is integrated into these authentic problem-based learning experiences. Students identify a problem and use technology to creatively and innovatively determine a solution to the problem while collaborating with peers throughout the learning process. "The overarching goal of the ISTE standards is to enable teachers to create new learning experiences that integrate our understanding of how people learn with relevant technological tools that can support teaching and learning" (p. 18).

By using technology to advance education, we can prepare the children to become informed, engaged citizens (ISTE, 2008, p. 5). The National Educational Technology Standards for Students: The Next Generation summarizes "what students should know and be able to do to learn effectively and live productively in an increasingly digital world" (ISTE, 2008, p. 16). Advances in technology have changed the way adults and students engage with the world, and so it is necessary for students and teachers to understand and use technology to live and learn. The *student* standards have six categories: (a) creativity and innovation; (b) communication and collaboration; (c) research and information fluency; (d) critical thinking, problem-solving, and decision-making; (e) digital citizenship; and (f) technology operations and concepts.

***Empowering Learning*: A blueprint for California educational technology**. The State Superintendent of Public Instruction for the California Department of Education, Thomas A. Torlakson, created this report in April of 2014 as a "call to action for educators, community leaders, and businesses to work together to find solutions to the challenges we face" (Torlakson, 2014, p. 3). Included is a letter addressed to Californians stating,

> Technological advancements continue to change the way we interact with each other and the world. Preparing our students to succeed in the society and the economy they will find when they leave our classrooms means preparing them to use technology effectively, safely, and productively. (p. 1)

The blueprint recommendations also reflect the need for all students, not just a select few, to have access to technology resources, identifying "how diminished resources, difficult circumstances, and shifting policy choices over the years have diminished the opportunities for all students at all grade levels to benefit from science, technology, and engineering education" (p. 2). The report cites inequality for students of color, English Language Learners, and underrepresented groups—specifically African Americans and Latinos—in the STEM fields nationwide.

Torlakson (2014) described this blueprint report as a roadmap containing "recommendations from leading experts in education and technology, a tool and component to be utilized in achieving a world-class education for every child in California" (p. 1). Torlakson claimed that those who have made education our life's work know that we must ensure that students are given the tools and opportunities they need to succeed, both in school and out. Educational Technology—if pursued thoughtfully—is both one such tool and one such opportunity (p. 5).

This report, aimed at educators in California, was written to bring awareness of the importance of meeting the needs of the newer digital generation of student learners by providing the tools and opportunities afforded by educational technologies. "I have visited schools all over California and seen our great state's diversity in all its forms. I have seen how technology can be tailored to respond to the strengths and challenges of each student as an individual." (Torlakson, 2014, p. 6). The report holds important implications for educators in all of the United States, not just California. Increasing diversity of the student body is not just a California phenomenon.

Technology Integration Literature

In 1969, Fuller conducted a series of interviews and research studies to conceptualize teacher concerns. He identified three developmental stages of teacher concerns across time. These stages can be applied to instruction by any teaching professional, regardless of instructional delivery method or modality:

1. Concern about self (teaching adequacy and survival)
2. Concern about task (instructional duties and management)
3. Concern about impact (student learning)

Many researchers continue to examine the developmental and learning dynamics of both pre-service and in-service teachers (Boz, 2008; Conway & Clark, 2003; Watzke, 2007). Fuller's model, with its focus on teacher experience, has greatly influenced ongoing research that investigates aspects of teacher professional development, including the adoption of technology integration for teaching. Mok (2005) states that teacher concerns are context-specific, and different contexts may invoke different concerns.

Wenglinsky (2002) and other researchers have found that the lack of experience using technology results in teachers' failure to adopt it in their classrooms. "With in-depth, sustained professional development in technology integration, teachers are more likely to bring technology into teaching and learning" (Boss, 2011, para 15). Cennamo et al. (2014) claimed that the learning experiences teachers create in their classroom influence the types of technologies they and their students use. This has important implications when working in diverse learning communities. A teacher skilled in creating equity and inclusivity can have a positive impact on students of diverse backgrounds (Ladson-Billings, 2014; Paris, 2017). Pedagogical approaches in classrooms have important implications for developing 21st century skills, such as critical thinking and collaboration, which are valued in the contemporary workplace (Wells et al., 2016).

When integrating technology in classrooms, there can be an imbalance between the technological, pedagogical, and content knowledge of a teacher, sometimes determined

by training available at individual institutions (Lawless & Pellegrino, 2007; Rienties & Townsend, 2012). Learning to effectively integrate technology tools is a challenge for teachers. In order to effectively implement ICT in classrooms, researchers argue that it is important to adjust the content to synchronize with the technology selected and the pedagogical approach used (Alvarez et al., 2009; Lawless & Pellegrino, 2007; Rienties & Townsend, 2012). Several researchers (McCarney, 2004; Mishra & Koehler, 2006; Rienties & Townsend, 2012; Ziegenfuss & Lawler, 2008) have shown that technological knowledge is often independent from content and pedagogical knowledge.

Mishra and Koehler (2006) hypothesized that learning is most effective when an awareness of the complex interplay between pedagogy, technology, and discipline-specific content knowledge. They designed the Technological Pedagogical Content Knowledge (TPACK) model with the aim of providing teachers with a conceptual model to effectively design and implement technology-enhanced learning. This model identifies the type of knowledge teachers must acquire and develop in order to design a powerful and balanced technology-enhanced learning environment. It attempts "to identify the nature of knowledge required by teachers for technology integration in their teaching, while addressing the complex, multifaceted and situated nature of teacher knowledge" (para. 3). According to Mishra and Koehler, TPACK is a "theoretical framework that describes teachers' expertise for information and communication technology (ICT) integration" (Koh, Chai, & Tsai, 2013, p. 793). The model directly applies to technology integration: as a teacher acquires technology skills, pedagogy skills, and content knowledge, self-efficacy should be strengthened.

To incorporate technology into education, Maeng, Mulvey, Smetana, and Bell (2013) conducted a study with the main objective of using educational technologies to support student investigations and demonstrate development of TPACK through technology-enhanced inquiry instruction. Maeng et al. explained that "educational technologies should be situated in a substantial and flexible framework of knowledge of

content, pedagogy, and technology" (p. 840). Participants in the Maeng et al. study, 27 secondary science preservice teachers enrolled in a 2-year Master of Teaching Program in a Mid-Atlantic University, learned about the general guidelines for "integrating technology to support reform-based science instruction" (p. 838). Then the participants completed their student teaching in either middle school or high school, in eight different public school districts. The researchers found evidence of participants developing TPACK through their implementation of technology in their placements. According to Maeng et al., "Educational technologies, including digital media, probeware, modeling tools, computer simulations, and virtual collaborative environments, can effectively support teachers' efforts to integrate inquiry instruction in their science classrooms" (p. 389). The participants used educational technologies in their science instruction through various modes, such as "digital images embedded in PowerPoint presentations, digital videos, simulations, animations, and websites" (p. 845). Maeng et al. claimed the TPACK framework explains how "teachers consider what and how specific technologies might assist students in making sense of complex ideas and phenomena associated with a particular discipline" (p. 840). Educators must understand which instructional practices to use and consider how they may be of value to their teaching and learning before they can develop the TPACK necessary for successful integration of education technologies (p. 840). TPACK knowledge has many components:

- Content Knowledge (CK)—"Teachers' knowledge about the subject matter to be learned or taught. The content to be covered in middle school science or history is different from the content to be covered in an undergraduate course on art appreciation or a graduate seminar on astrophysics…. As Shulman (1986) noted, this knowledge would include knowledge of concepts, theories, ideas, organizational frameworks, knowledge of evidence and proof, as well as established practices and approaches toward developing such knowledge" (Koehler & Mishra, 2009).

- Pedagogical Knowledge (PK)—"Teachers' deep knowledge about the processes and practices or methods of teaching and learning. They encompass, among other things, overall educational purposes, values, and aims. This generic form of knowledge applies to understanding how students learn,

general classroom management skills, lesson planning, and student assessment" (Koehler & Mishra, 2009).

- Technology Knowledge (TK) —Knowledge about certain ways of thinking about, and working with technology, tools and resources. and working with technology can apply to all technology tools and resources. This includes understanding information technology broadly enough to apply it productively at work and in everyday life, being able to recognize when information technology can assist or impede the achievement of a goal, and being able continually adapt to changes in information technology (Koehler & Mishra, 2009).

- Pedagogical Content Knowledge (PCK)—"Consistent with and similar to Shulman's idea of knowledge of pedagogy that is applicable to the teaching of specific content. Central to Shulman's conceptualization of PCK is the notion of the transformation of the subject matter for teaching. Specifically, according to Shulman (1986), this transformation occurs as the teacher interprets the subject matter, finds multiple ways to represent it, and adapts and tailors the instructional materials to alternative conceptions and students' prior knowledge. PCK covers the core business of teaching, learning, curriculum, assessment and reporting, such as the conditions that promote learning and the links among curriculum, assessment, and pedagogy" (Koehler & Mishra, 2009).

- Technological Content Knowledge (TCK)—"An understanding of the manner in which technology and content influence and constrain one another. Teachers need to master more than the subject matter they teach; they must also have a deep understanding of the manner in which the subject matter (or the kinds of representations that can be constructed) can be changed by the application of particular technologies. Teachers need to understand which specific technologies are best suited for addressing subject-matter learning in their domains and how the content dictates or perhaps even changes the technology—or vice versa" (Koehler & Mishra, 2009).

- Technological Pedagogical Knowledge (TPK)—"An understanding of how teaching and learning can change when particular technologies are used in particular ways. This includes knowing the pedagogical affordances and constraints of a range of technological tools as they relate to disciplinarily and developmentally appropriate pedagogical designs and strategies" (Koehler & Mishra, 2009).

- Technological Pedagogical Content Knowledge (TPACK)—"Underlying truly meaningful and deeply skilled teaching with technology, TPACK is different from knowledge of all three concepts individually. Instead, TPACK is the basis of effective teaching with technology, requiring an understanding of the representation of concepts using technologies; pedagogical techniques that use technologies in constructive ways to teach content; knowledge of what makes concepts difficult or easy to learn and how technology can help redress some of the problems that students face; knowledge of students' prior knowledge and

> theories of epistemology; and knowledge of how technologies can be used to build on existing knowledge to develop new epistemologies or strengthen old ones" (Koehler & Mishra, 2009, p. 66).

Summary of Topic I

This section of the literature review first summarized a brief history of educational technology. Beginning with the introduction of the personal computer and spanning to internet access and the proliferation of social media, technology has increasingly been used in American classrooms. As Web 2.0 tools continue to evolve, teachers and students transition from consumers to creators of online content and knowledge more generally (Scardamalia & Bereiter, 2014). Some key educational technology policies were discussed in this chapter. These include federal policies such as Obama's National Education Technology Plan focusing on personalized learning and state plans such as California's Blueprint for Educational Technology focused on equity and opportunity for students. Finally, a sample of technology integration literature was reviewed. In order to effectively address learner needs, the research recommends that instructors have a sufficient combination of content knowledge, pedagogical knowledge, and technological knowledge. The TPACK model indicates that technologies have to be systemically and meaningfully integrated with pedagogy and content in order to produce an effective learning experience (Koehler & Mishra, 2009). However, if the pedagogy of the teacher does not address essential aspects of equity and inclusion in diverse classrooms, then the learning experiences could further widen the achievement gap between White students and students of color. The next section addresses the specific pedagogical knowledge needed to address the imperative context of a diverse student body.

Topic II: Diversity in Education

Changing Demographics and Dangerous Perceptions

One out of every two students enrolled in elementary and secondary schools in the United States is estimated to come from a racial or ethnic minority background (NCES, 2014). One in five children under the age of 18 lives in poverty, one in five children between 5 and 17 speak a language other than English at home, and almost 35% of all students have limited English proficiency (NCES, 2014). In this research, students of diverse backgrounds are students from culturally, racially, and economically varied backgrounds (Gay, 2007). This includes people of color and low-socioeconomic students who may or may not speak a primary language other than English.

Preparing teachers to teach children of diverse racial, ethnic, social class, and language backgrounds effectively is an urgent need in teacher education now and in the future (Howard, 2016; Villegas & Lucas, 2002; Wells et al., 2016). Research indicates that schools across the United States serve increasingly diverse student populations while our teaching force is predominantly White and female (Albert Shanker Institute, 2015; Howard, 2016; Mercado, 2001; Nieto, 2004). This ratio is likely to remain imbalanced in the future as the number of potential teachers of color decreases at numerous points in the teacher pipeline, including college acceptance, teacher preparation, graduation, workforce entry, and teacher retention according to the U.S. Department of Education, Office of Planning, Evaluation and Policy Development, Policy and Program Studies Service, State of Racial Diversity in the Educator Workforce report (2016).

Data from the U.S. Census Bureau (2014) state that of the 3,385,200 reported new teachers entering the field, 264,100 are Hispanic, 231,100 are African American, and 2,773,200 are White. The national teaching force remains about 84% White (Sleeter, 2008; U.S. Department of Education, 2016). Researchers have outlined the demographic divide existing between students of diverse backgrounds and the predominantly White,

female, middle-class teaching force serving them (Howard, 2013). Researchers and teacher educators have also drawn attention to how difficult it is for teachers to alter dispositions toward diversity that are developed over a lifetime and maintained systemically within society (Delpit, 2012; Sheets, 2003). In many schools, African American, Latino, and low SES students do not perform as well in school as White students, for many reported reasons. These reasons include the differences that exist between teachers and students relative to educational factors that are influenced by race, culture, and class (Anderson & Cowart, 2012; Delpit, 2012).

Historical Approaches

The discussion and empirical research on cultural difference and discontinuity emerged with Woodson and Bethune in the 1930s and during the Civil Rights and Ethnic Studies movements (Aldridge, 2009; Banks & McGee Banks, 2004; Carter & Goodwin, 1994; Watkins, 2001). Activists marched and litigated to bring attention to the denial of access to quality schools for all students' as well as the alienation experienced by a curriculum that omitted the history and contributions of all (Aldridge, 2009; Watkins, 2001).

In 1954, the Supreme Court handed down the landmark decision that segregated schools were unconstitutional in *Brown v. Board of Education*. Until this time, "separate but equal" had been the prevailing doctrine. Successful integration of schools has been 65 years in the making and has still not fulfilled its promise. Derrick Bell (2004), in his book *Silent Covenants*, called *Brown* a decision that "promised so much and accomplished so little" (p. 2).

Black Education refers to both the "systemic efforts to teach Black children in the US" and "the quality of education the African American community historically organized itself around while considering cultural responsivity and community political empowerment" (King, 2005, p. 46). Black families and communities sought to educate

their children first, illegally after their forced arrival in the U.S. and then systematically after Reconstruction. Du Bois wrote about the "Negro" community efforts to establish public schools in the 1800s with the support of the Freedman's Bureau and missionaries (Bell, 2004). In the 1930s, Carter Woodson questioned the "Mis-education of the Negro," where Black students were being told rather than taught and in which there was no inclusion of Black identity development as part of learning (Woodson, 1933). Woodson asserted, "We should not take the position that a qualified white person should not teach in a Negro school." He cautioned, however, that "the emphasis is not upon the necessity for separate systems but upon the need for common sense schools and teachers who understand and continue in sympathy with those whom they instruct" (p. 16). Both Woodson and Du Bois documented the violence directed at Black Americans in White communities and at Black children in schools organized by White adults, and both questioned the quality of education possible in such hostile environments (Du Bois, 1935; Woodson, 1933).

In her historical overview of the view of the Black child in education literature, Carol D. Lee (2005) examines how the cultural deficit orientation and Eurocentric bias in American education research ignores Black students' cultural assets. She explores how the state of research knowledge on learning intersects with the cultural orientation of many researchers of color. She also explores ways in which the conceptions of race inform how education researchers consider the education of Black youth (King, 2005). "Historical and contemporary racism are symbiotically linked to institutions of schooling and the institutions that shape and support educational research" (p. 50).

Lee (2005) shows how contemporary views of the Black child are skewed and not supported by research but rather influenced by bias and outright falsehoods. Infant developmental scales and tests of verbal memory in preschoolers show that African American students arrive at school prepared to learn despite the reported perception of teachers who say low-income Black children are not ready. Research also shows that

Black children are precocious in motor and intellectual development (Bayley, 1965; Delpit, 2012; Geber, 1958; Leiderman, 1973). A national longitudinal survey established that there was no significant difference between motor, social, and verbal memory abilities between Black preschoolers and a total sample. While the Peabody Picture Test showed disparities in vocabulary knowledge of Black preschoolers, that measure is the most culturally influenced. The longer Black students remain in school, the worse their achievement becomes relative to their White counterparts according to national education statistics. Lee (2005) highlights theoretical frameworks that position patterns of culture at the center of Black education. Theoretical conceptions from the perspective of "culture-systemic" with socio-cultural learning theory ("learning sciences") contrast with a deficit perspective that ignores a literature of rich and complex experience in communities of color.

> Implicit in much of the literature is a univocal voice, a voice of homogeneity that does not take into account the ways that history, conceptions of race, ethnicity, language use, gender, and socioeconomic class weave inside and around individuals, groups, modes of reasoning, and so on. (King, 2005, p. 69)

Within the past 20 years, much attention has been drawn to the "achievement gap" present between students of color, specifically African American and Latino students, and White and some Asian students. The achievement gap describes the discrepancy in educational outcomes for students based upon their racial/ethnic background and/or socioeconomic status. The difference in educational outcomes between students of different ethnic and SES backgrounds has been framed historically in various ways—often as an achievement gap, but also as an opportunity gap, or an education debt faced by students of color and students from under-resourced communities (Cuban, 1989; Darling-Hammond, 2004; Ladson-Billings, 2007; Milner, 2012). Cuban (1989) argued that the ways in which reforms are constructed and students are labeled speak more to the values of the decision makers than to the apolitical qualities inherent in the groups of

students these reforms are intended to help. African American, Latino, and lower-SES students face additional obstacles that hinder their access to opportunities to learn (Noguera, 2003).

Darling-Hammond (2004) focused the problem on resources rather than student and family deficiencies. Many schools in urban communities that educate students of color are staffed by underqualified or inexperienced teachers, receive inequitable funding, and lack a challenging curriculum that enables students to develop and demonstrate their true academic abilities (Darling-Hammond, 2004, 2017). Ladson-Billings (2007) described this disparity in resources as a cumulative educational debt that continues to accumulate. Milner's (2012) opportunity gap framework helps researchers identify the ways in which colorblindness, cultural conflicts, the myth of meritocracy, low expectations resulting from a deficit mindset, and context-neutral mindsets and practices contribute to opportunity gaps for students of color.

One example of the way in which the "achievement gap" has been addressed unsuccessfully is the *No Child Left Behind Act*. While the act addressed teacher quality and accountability, it measured success through high-stakes assessments of students' content knowledge instead of measuring the pedagogical knowledge of the teachers (Darling-Hammond & Youngs, 2002).

The disparities in education faced by students of color continue to reflect ongoing social inequity (McKown &Weinstein, 2008). These disparities include teacher biases, perceptions, and attitudes as they relate to different ethnic and cultural groups. Numerous research studies have found that most White teacher candidates bring deficit-oriented stereotypes about children of color and little cross-cultural background, knowledge, and experience (Delpit, 1995; Ladson-Billings, 1995; Sleeter, 2008; Valdes, 1996; Valenzuela & Dornbusch, 1994). Biases towards particular students affect teacher expectations, regardless of actual student achievement history (McKown & Weinstein, 2008). McKown and Weinstein found that in homogeneous classrooms, where the

teacher and the student backgrounds align, the same biases are not present. Only when classrooms are made up of learners who differ from their teacher were these deficit-oriented stereotypes and damaging biases noted.

Teachers have been shown to stereotype urban, lower-socio-economic students and their families as “lacking values” (Smith & Smith, 2009). When low expectations exist for low-SES, African American, and Latino students, they receive lower levels of instruction, are held to lower expectations compared to other students, and are targets of negative stereotypes about their ability, compared to other groups of students (McKown & Weinstein, 2008, Rist, 2000). Negative teacher expectancy effects have been found with stigmatized groups of students and therefore play a role in the relatively lower academic achievement of diverse students (van den Bergh, Denessen, Hornstra, Voeten, & Holland, 2010).

The cultural divide between students of color and their White teachers impacts student achievement. There are different philosophies and schools of thought for educating students of color, but all seek to improve the educational outcomes of students by acknowledging the role that their racial identities, prior knowledge, and learning styles play in educational experiences. Teachers who recognize the positive attributes of their students are more successful (Rubie-Davies, 2010). High teacher expectations foster positive student attitudes and social relationships, leading to success in school, regardless of disparate factors that could affect student achievement (Rubie-Davies, 2010). In *Dreamkeepers*, Gloria Ladson-Billings (1994) researches the practice of successful teachers of African American students. She explores the teachers’ successful practice through the use of alternate research paradigms that include the voices of parents and communities in non-exploitative ways. She profiles the eight teachers through storytelling and data collection and finds commonalities in their practice despite fundamental differences in their race and gender as well as teaching and learning strategies. She calls the practices that are shared across the teachers “culturally relevant”

teaching, where teachers work with the unique strengths a child brings to the classroom (pp. 139-140).

Pedagogy Matters

Sociocultural theory in psychology looks at the important contributions society makes to an individual's development. Learning is largely a social process, an interaction between students and the culture in which they live (Vygotsky, 1978). Lave and Wenger (1991) have also contributed to an understanding of the influence of cultural practices and identity on cognition. In early conceptions of this interactional model, culture was viewed in a broader, apolitical sense. More recently, scholars have added a critical component of "power" in an attempt to acknowledge the differential dynamics that exist in social interactions (Lewis, Enciso, & Moje, 2007). Learning is still viewed as a social activity, but the opportunities to learn are different for different students as a result of their social position in the classroom. Sociocultural Theory is comprised of poststructuralist theoretical perspectives on identity, power, and agency. There is an interplay among pedagogy, identity formation, and academic achievement (Holland, Skinner, Lachicotte, & Cain, 2003; Lewis et al., 2007). These conceptions of sociocultural theory emphasize the power wielded by the "institutional, historical, and cultural contexts within which individuals are constituted" (Lewis et al., 2007, p. xi). The notion of opportunity to learn is founded on the idea that academic achievement is contingent upon (a) the recognition and acceptance of students' identities and subjectivities as valid within the classrooms, and (b) the need to support students in the work of making and remaking themselves and their subjectivities as they engage with one another, the curriculum, and discourses they encounter in the larger social world (Lewis, et al., 2007).

Carol Lee presents learning as dynamic, where no single group or class of humans can be classified as being unable to learn, versus traditional conceptions of IQ and fixed

capacity (King, 2005, p. 52). This is contrasted with books like Herrnstein and Murray's *The Bell Curve* (1994), where persistent notions of Black inferiority are presented in the face of extensive research negating these ideas. Pseudo-scientific constructs about learning limitations in Black students continue, despite strong evidence to the contrary.

Another theory, the cultural deprivation model, posits the belief that the oppressive social and economic conditions of poor families and families of color have created deficiencies that prevented their children from succeeding academically (Murrell, 2007). The model posits that with proper socialization, poor students and students of color can learn more appropriate linguistic practices and behaviors that would enable them to achieve academically. This model mistakenly draws on the notion that African American children grew up in a deficit culture (Bereiter & Engelmann, 1966). Delpit (2012) dispels this perspective and instead encourages a viewpoint of "infinite capacity" (p. 27). She urges educators to believe in students instead and to consider how students' prior knowledge (students' cultural assets) can be related to the knowledge to be learned in school contexts. Research shows that prior knowledge influences learning (DiSessa, 1982). Therefore, teachers in classrooms need to draw on cultural funds of knowledge (Moll & Greenberg, 1990). This conception of cultural assets is not reflected in persistent folk beliefs (not scientific) of U.S. public education.

Black Psychology research argues that prior knowledge, cultural artifacts, and belief systems, together with the interactions within social constructs, are a central foundation to learning (King, 2005). These social contexts of learning can include apprenticeship, guided participation, and participatory appropriation. U.S. education is in desperate need of new metaphors for complex processes. There is an emerging science of learning and important intersections between culture and cognition where culture is considered to have a strong influence over some aspects of thinking while other cognitive practices are universal across cultures and have limited variation (Watson-Jones & Legare, 2015).

In her book, *The Silenced Dialogue*, Delpit (1988) warns of a lack of Black perspectives being valued and encouraged. She describes the limitations experienced by African American researchers and scholarship in tenured faculty at major research institutions, in the low percentage of articles published in major journals by these researchers, and in the limited funding by private and public agencies for their work. We do not yet fully understand the sociocultural paradigm, and it is essential to exercise caution to avoid stereotyping African Americans as having a unitary experience or language (Heath, 1999; Pollock, 2004).

During the 1950s, concern over the discrepancies in educational achievement and between poor students of color and White, middle-class peers resulted in educational policies and programs connected to the larger "war on poverty" programs. Federal grants were used to develop new education programs aimed at developing values, beliefs, and cultural ways of being that were valued in American schools (Tyack, 1974). Head Start was an example of one of these programs (Du Bois, 1973).

Instead of working from a perspective of education as a bank with the teacher narrating information to students and the students memorizing and absorbing the information without questioning, Freire's (2000) concept of critical pedagogy encourages students to ask questions on the basis of their experiences. Freire maintains that "apart from inquiry, apart from the praxis, individuals cannot be truly human. Knowledge emerges only through invention and re-invention" (p.72). Giroux (2010) writes that Freirean critical pedagogy is "the educational movement, guided by passion and principle, to help students develop consciousness of freedom, recognize authoritarian tendencies, and connect knowledge to power and the ability to take constructive action" (p. B15). This practice, in which "personal experience becomes a valuable resource" (p. B15) and personal knowledge is leveraged, engages students in a "questioning that demands far more competence than rote learning and the application of acquired skills" (p. B15). It is through such dialogue that "knowledge is not simply received by students,

but actively transformed, as they learn how to engage others in critical dialogue and be held accountable for their own views ... [ensuring] that the future points the way to a more socially just world" (p. B15). Teachers committed to social justice have often praised critical pedagogy as a "pedagogy of possibility," which challenges the power and stability of societal injustices (Ellsworth, 1989, p. 301).

The cultural divide of students of color and their teachers influences student achievement. Ideally, all teachers would seek to improve the educational outcomes of students of color by acknowledging the role that their racial identities, prior knowledge, and learning styles play in educational experiences. Culturally appropriate, culturally congruent, culturally compatible, culturally synchronized, and culturally responsive approaches all examine the ways in which teachers may support students in their acquisition of school knowledge and dominant cultural capital by connecting to the students' own cultures, namely, their linguistic patterns, cultural practices, and cultural ways of knowing (Carter, 2005; Ladson-Billings, 1994, 2001).

In Culturally Relevant Pedagogy, knowledge and practices valued in schools are based on notions of cultural hegemony that must be challenged and, in the case of cultural relevance, transformed to be inclusive of the various perspectives, histories, and knowledge outside of a Eurocentric perspective (Ladson-Billings, 1995a).

> Culturally relevant pedagogy rests on three criteria or propositions: (a) students must experience academic success; (b) students must develop and/or maintain cultural competence; and (c) students must develop a critical consciousness through which they challenge the status quo of the current social order. (Delpit, 1995, p. 160)

Culture is recognized as an essential element of education. Bruner (1996) states that "culture shapes mind … it provides us with the toolkit by which we construct not only our worlds but our very conceptions of ourselves and our powers" (p. x). Gay (2010) notes, "Congruency between how the educational process is ordered and delivered, and the cultural frames of reference of diverse students, will improve school achievement for

students of color" (Culture Counts section, para. 9). She highlights the importance of culture in education:

> Culture is at the heart of all we do in the name of education, whether that is curriculum, instruction, administration, or performance assessment. Even without our being consciously aware of it, culture determines how we think, believe, and behave, and these, in turn, affect how we teach and learn. (Chapter 1, para. 2)

If teachers do not understand the culture of their students, they will find it very challenging to teach their students responsibly (Smith & Smith, 2009). Research further suggests that, even with initial misconceptions that teachers may have, when teachers take responsibility for student learning in light of race, culture, or class, all students are more likely to be successful (Halvorsen, Lee, & Andrade, 2009). Studies have also reported that students of all backgrounds feel more valued when their teachers understand and hold high regard for their history, language, and cultural celebrations (Anderson & Cowart, 2012). When students feel that their teachers respect their culture, they are more inclined to do well in school and ultimately do perform at high levels (Anderson & Cowart, 2012). Classroom teachers must use culturally responsive teaching practices if they are going to teach students of diverse backgrounds effectively (Siwatu, 2011). Research suggests that although culturally responsive teaching has a positive impact on students, it is even more effective when combined with positive teacher perceptions, high teacher efficacy, high teacher expectations, effective teaching strategies, and support in teacher education programs (Bondy, Ross, Gallingane, & Hambacher, 2007; Bui & Fagan, 2013; Hynds et al., 2011; Rubie-Davies, 2012; Shevalier & McKenzie, 2012).

Gay (2000) states that there are five essential elements of culturally responsive teaching: developing a knowledge base about cultural diversity, including ethnic and cultural diversity content in the curriculum, demonstrating caring and building learning communities, communicating with ethnically diverse students, and responding to ethnic diversity in the delivery of instruction. Gay defines culturally responsive teaching as

using the cultural characteristics, experiences, and perspectives of ethnically diverse students as conduits for teaching them more effectively. Culturally responsive teachers draw on the personal experiences and familiar frames of reference of their students to make learning "more personally meaningful, have higher interest appeal, and more easily and thoroughly [accomplished]" (Gay, 2002, p. 106).

In addition to acquiring a knowledge base about ethnic and cultural diversity, Gay (2000) believes that teachers need to learn how to convert this awareness into culturally responsive curriculum designs and instructional strategies and create classroom climates that are conducive to learning for students of diverse backgrounds. Teachers need to know how to use cultural scaffolding in teaching students who are different from themselves. Gay defines cultural scaffolding as using students' own cultures and experiences to expand student intellectual horizons and academic achievement. Building community among diverse learners is an essential element of culturally responsive teaching (Gay, 2000). Gay states that many students grow up in cultural environments where the welfare of the group takes precedence over the individual and where individuals are taught to pool their resources to solve problems. The group members are responsible for helping each other perform and for ensuring that everyone contributes to the task (Gay, 2000). This cultural example shows how teacher awareness could lead to classroom changes: teachers could consider how conflicts between differing work styles may interfere with academics and work to design more communal learning environments when appropriate.

Gay (2000) tells us that effective cross-cultural communication is another aspect of preparing for culturally responsive teaching. She quotes Porter and Samovar (1991), who explain that culture influences "what we talk about; how we talk about it; what we see, attend to, or ignore; how we think; and what we think about" (p. 21). Gay also quotes Montagu and Watson (1979), who describe communication as the "ground of meeting and the foundation of community" (p. vii) among human beings. Carefully assessing

what students know, how they learn best, and what motivates them most is one way for students to see effective communication when these aspects of their learning identity are part of determining what is experienced in the classroom. Ladson-Billings (1994) defined this work as a commitment to building relationships and community with and between students.

Ladson-Billings (1994) studied the teaching practices of teachers identified by their community as successful teachers of African American students. She showed that the instructional approaches varied greatly (structured to informal) in the teachers, but shared beliefs served as the foundation for their instructional practices. These included: (a) a conception of self and others that is marked by the belief that teaching is a noble profession, that one's students are capable of success, and that they are members of the community; (b) a conception of knowledge that is characterized by the belief that knowledge is not neutral nor static, mastery can and should be demonstrated in a variety of ways, and cultural knowledge should be used to scaffold learning; and (c) social relations, which reflects the belief in building a community of learners (teacher included) who interact collaboratively and are responsible for one another.

The tenets of culturally relevant pedagogy, according to Ladson-Billings(1994), include:

1. commitment to academic achievement—intellectual growth as the result of learning experiences;
2. cultural competence—promoting a positive racial identity within students; and
3. sociopolitical consciousness—utilizing school knowledge to identify and challenge social inequities (p. x).

Although the term "cultural relevance" is sometimes used interchangeably with the term "multicultural education" in the research, culturally relevant pedagogy varies greatly from other conceptions of pedagogy aimed at aligning the culture of schools with the cultures of students (Ladson-Billings, 1994; Morrison, Robbins, & Rose, 2008). Banks

(Banks & McGee Banks, 2004), one of the architects of multicultural education, argued that there are four approaches by which multicultural education reform has taken root in U.S. schools—the contributions, additive, transformative, and action approaches. In the contributive approach, heroes and holidays are celebrated of cultural figures during celebrations such as Cinco de Mayo and Black History month but no significant change occurs in the general curriculum. In the additive approach, cultural figures and events are added to preexisting curriculum, such as a lesson on Black inventors during a unit on innovation in science classes. Frequently, the contributions and additive approaches are the most often implemented. In the transformative approach, units are rewritten to provide a deeper understanding by considering multiple perspectives on studied content, such as looking at westward expansion through the lens of immigrant populations, Native Americans, and American citizens. In the action approach, Social Action becomes the learning outcome, and students are taught critical thinking skills and given opportunities to engage in action to address issues of inequity in their own communities. Scholars have called for more transformative and critical approaches to enacting a social justice agenda in schools (Tillman, 2006). Multicultural education alone does not challenge the cultural hegemony rooted in schools and other social institutions (Sleeter, 1995).

Effective strategies for creating inclusive and equitable classrooms are essential when working with students of diverse backgrounds. The next section describes the expanding view of the value in creating effective diverse communities in both higher education and at work.

Difference is Better: Value in Diversity Beyond K-12 Schooling

Scholarly interest in students' engagement with diverse viewpoints is increasing. Studies have described the role of interactional diversity in creating the kind of disequilibrium, discontinuity, or discrepant experience that has been found to lead to increased openness and cognitive complexity, and ultimately to greater ability to take the

perspectives of others (Gurin, 1999; Gurin, Dey, Hurtado, & Gurin, 2002; Hurtado, 2005). In a report developed for the legal defense of the University of Michigan's affirmative action policy, Gurin (1999) stated that "teaching students to think about complex issues from different perspectives is a primary goal of higher education" (p. 39).

Higher education settings. Gurin (1999) describes perspective-taking as knowing "how others think about issues" and essential for participating in civic life (p. 43). Gurin et al. (2002) considered the impact of experience with college diversity on civic outcomes necessary to participate in an increasingly heterogeneous democracy, especially the need to "understand and consider multiple perspectives that are likely to exist when people of different backgrounds interact" (p. 348). In their analysis of the Michigan State Survey, which specifically measured perspective-taking using items from Davis's (1983) scale of empathy (p. 348), Gurin and her colleagues found that students reported significant gains in perspective taking. Gurin (1999) examined the effect of structural diversity, classroom diversity, and informal interactional diversity and found that "students who had experienced the most diversity in classroom settings and in informal interactions with peers showed the greatest engagement in active thinking processes, growth in intellectual engagement and motivation, and growth in intellectual and academic skills" (p. 45). The researchers found that "informal interactional diversity was significantly related to both citizenship engagement and racial/cultural engagement" (Gurin et al., 2002, p. 353).

These findings were further corroborated in Hurtado's 2007 study of 10 public universities, where the previous research was extended by examining the frequency, quality, context, and variety of interactions with diverse peers (p. 191). Hurtado concluded that diversity in the student body at a college provides the kind of experience base and discontinuity needed to evince more active thinking processes among students, moving them from their own embedded world views to consider those of another (p. 189). The researcher found that "students who reported positive, informal interactions

with diverse peers had higher scores on measures of more complex thinking about people and their behavior, cultural and social awareness, and perspective taking skills" (p. 191).

Work settings. Globalization and advancing technology are creating a workforce that is increasingly diverse. McGrath, Berdahl, and Arrow (1995) describe diversity as the differences among the members of some particular groups. Williams and O'Reilly (1998) define diversity as any attribute people use to tell themselves that another person is different. Diversity has been called a "double-edged sword" because it presents risks as well as benefits to teamwork (Milliken & Martins, 1996; Phillips, Northcraft, & Neale, 2006).

Although workplace demographics are changing (Jackson, Joshi, & Erhardt, 2003), the functional value of having more diversity is debated (van Knippenberg & Schippers, 2007). Managers and researchers want to learn how diversity can be managed in ways that minimize its risks and capitalize on its benefits (Phillips et al., 2006). One functional benefit of diversity is increased creativity and innovation for an organization (Cox & Blake, 1991; McLeod, Lobel, & Cox, 1996). Many studies have looked at how increased levels of diversity in groups helps members reach better decisions. When solving a problem, people tend to rely on their prior experience to approach the problem, making implicit assumptions that are guided by mental frameworks they have acquired previously (Bettenhausen & Murnighan 1991). People tend to rely on a limited perspective and are unaware of alternative approaches to a problem. One way to help them see beyond their limited frames of reference is to expose them to alternative perspectives. Increasing awareness of the different views or experiences of others can influence one to explore alternative approaches to a new problem, and subsequently result in better and more novel solutions (e.g., Beersma & De Dreu, 2005; Nemeth, Personnaz, Personnaz, & Goncalo, 2004).

Nemeth and colleagues have found that disagreement is functional for groups in that it stimulates them to be more creative and innovative (Nemeth & Kwan, 1985, 1987;

Nemeth & Owens, 1996; Nementh & Staw, 1989). Groups make fewer reasoning errors and reach better decisions when disagreement arises from thoroughly considering differing perspectives. However, when harmony is more valued in a group, consensus is maintained at the cost of more errors occurring, which results in poorer decision making (e.g., De Dreu & West, 2001; Janis & Mann, 1977; Schulz-Hardt, Jochims, & Frey, 2002; Schweiger, Sandberg, & Rechner, 1989). In-group members involved in a task are concerned about both keeping a positive relationship with group members and being successful at the task (Loyd, Wang, Phillips, & Lount, 2013). Individuals in groups report that they will agree more with their in-group members than with out-group members (Phillips, 2003). However, in-group members were more likely to share a minority viewpoint when they were in a diverse group, as opposed to homogeneous groups that are comprised only of in-group members (Phillips & Loyd, 2006).

The tendency to be cognizant of different perspectives is more likely to be found in the midst of a group that is composed of diverse members, compared to one with homogeneous members (e.g., Phillips, 2003; Phillips, Mannix, Neale, & Gruenfeld, 2004). This is because people generally expect different perspectives when they are interacting in a diverse setting than when they are interacting in one that is relatively homogeneous (Amason & Sapienza, 1997; Jehn, Northcraft, & Neale, 1999; Pelled, Eisenhardt, & Xin, 1999). Therefore, having diversity in groups can be conducive to producing positive outcomes that are related to expectations of differences and sharing divergent perspectives (Adler, 2002; Hambrick, Davison, Snell, & Snow,1998; Milliken & Martins, 1996; van Knippenberg, De Dreu, & Homan, 2004; van Knippenberg & Schippers, 2007; Williams & O'Reilly, 1998). Without diversity in the group, group members can potentially miss out or even be prevented from considering, discussing, and reconciling their apparent disagreement due to the lack of diversity in their environment.

Sommers and colleagues (Sommers, 2006; Sommers, Warp, & Mahoney, 2008) have conducted studies demonstrating some of the psychological benefits of being part of

a diverse group. In a mock jury study, Sommers (2006) found that White participants in racially diverse juries deliberated longer, considered a wider range of information, and made fewer inaccurate statements when discussing the trial of a Black defendant than did White participants in all-White juries.

Summary of Topic II

Topic II examined diversity in education. First the demographics in classrooms and teachers were described. Historical approaches to segregating and integrating students were presented. Prevailing perspectives on students of color and programs addressing the achievement gap between students of color and white students were discussed. Successful pedagogical approaches found to increase inclusivity and equity in learning environments were presented. And finally, the research on the benefits of diversity in the workplace and higher education were shared. The next section will look at the intersection of the two topics, where diversity and integrating technology best practices have been addressed in the research currently.

Literature Review Synthesis

An important development in education is the potential for Information Communication Technology (ICT) to provide powerful learning experiences for students (Rienties et al., 2009). Originally the term “digital divide” was coined to describe the inequitable access to hardware and software (Hargittai & Walejko, 2008; Warschauer & Matuchniak, 2010). Though increased access to hardware and software has improved in most communities, the proliferation of technology both in and out of schools may have, in fact, widened the “digital divide” (Dimaggio et al., 2001; Van Dijk, 2005; Warschauer, 2003). Warschauer explains that the way in which our students use technology is often divided by socio-economic differences. The current use of educational technology in

communities is substantively different and therefore inequitable (Reich & Ito, 2017). Inequitable schools also practice inequitable technology integration. Institutionalized and unconscious bias are broader social forces preventing meaningful integration of technology in diverse schools (Reich & Ito, 2017). Integrating educational technology approaches in classrooms has been demonstrated to support problem-solving, analyzing and other higher order thinking skills and to have more positive effects than digital learning that supports basic developmental skills such as memorizing facts and applying rules (Buckner & Kim, 2013; Ruggiero, 2015).

Integrating learners from varying socioeconomic and ethnic backgrounds is essential for preparing students for a more global society where skills in critical thinking and problem solving are necessary (Wells et al., 2016). Technology has the potential to play an important role when used as thinking tools in collaborative groups in the pursuit of these 21st century skills. There are cultural differences that exist between American students and American teachers. The literature shows positive outcomes for students of diverse backgrounds when culturally appropriate curricula and pedagogies are used.

In order to develop critical thinking and problem-solving skills in heterogeneous learning communities, teachers need to be aware of diverse student needs and strategies for authentic technology integration (UNESCO, 2011). In one four-year study where student maker teams were followed (Tan, 2018), the role of community when using technology was highlighted:

> The shift toward culture is significant from an equity standpoint. Whose voices are valued and who counts as legitimate stakeholders in a community making space impacts how various people are welcomed, positioned, and recognized for what they know and can do as a part of shaping the learning and participation that happens there. (p. 766)

In another study headed by Antero Garcia, conceptions of identity as constructed from cultural experiences and perspectives of students were brought together, detailing how students engaged with technology in relation to sociocultural, school-based, and

interpersonal contexts (Garcia, Kelly, & Stamatis, 2018). This longitudinal study followed three classes of 9th grade English Language Acquisition students and recorded observations and interviews with students on what "counted" as technology use. Several students failed to recognize using their phone, laptops or tablets as technology. The researchers found that "technology mediates student identities and helps students articulate the complex cultural experiences and beliefs that they bring daily into schools" (p. 405). Cultural experiences inform the definitions of technology used in classes; students are involved in a constant negotiation between their experiences with technology and the purposes technology serves within traditional learning environments. Similarly, in exploring how performance and production help mediate student identity formation, the study showed that participation in such communal activities "allows youth to see their stories (and therefore their identities) represented in different ways" (p. 411). The meaning of technology is mediated through the diverse cultural experiences and perspectives students bring to bear on their interpretation of technology.

This study seeks to identify specific uses for technology integration to potentially support equity and inclusion in diverse classrooms from the perspective of teachers who feel they practice culturally responsive pedagogy. By beginning with pedagogy, the researcher sought to learn more about the deliberate choices pedagogically aligned teachers make when integrating technology while pursuing equity and inclusion within their classrooms. This dissertation adds to the body of knowledge on teacher perspectives on using technology to develop inclusive and equitable learning communities for students of diverse backgrounds. Improved awareness of the effective approaches to integrating ICT in the classroom can be achieved by this examination of the perspective of Culturally Relevant Pedagogy (CRP) teachers skilled at using technology. The researcher encourages a pro-active, culturally responsive approach to educational technology and advances the ideal that digital-age educators should be proficient in making decisions about technology integration guided by an understanding of CRP.

Conceptual Framework

The conceptual framework of the integration of technology and pedagogy for equity and inclusion is informed by the results of the pilot test and the selected review of the literature, which were conducted to shed light on the work of researchers and theorists in both the history of technology integration and the diversity in education fields. The development of this framework was guided especially by the work of Gloria Ladson-Billings (2014), Geneva Gay (2010), Lisa Delpit (2012), and Koehler and Mishra (2006).

In addition, the framework provided the basis for the Coding Legend, which can be found in the Distribution Tables in Appendix H. The categories and sub-categories identified in the summative framework below directly correspond to the three research questions. The framework shows the following variables: uses of technology; outcomes of student learning; and factors that facilitate teacher learning and development. Figure 1 is a depiction of the abovementioned categories.

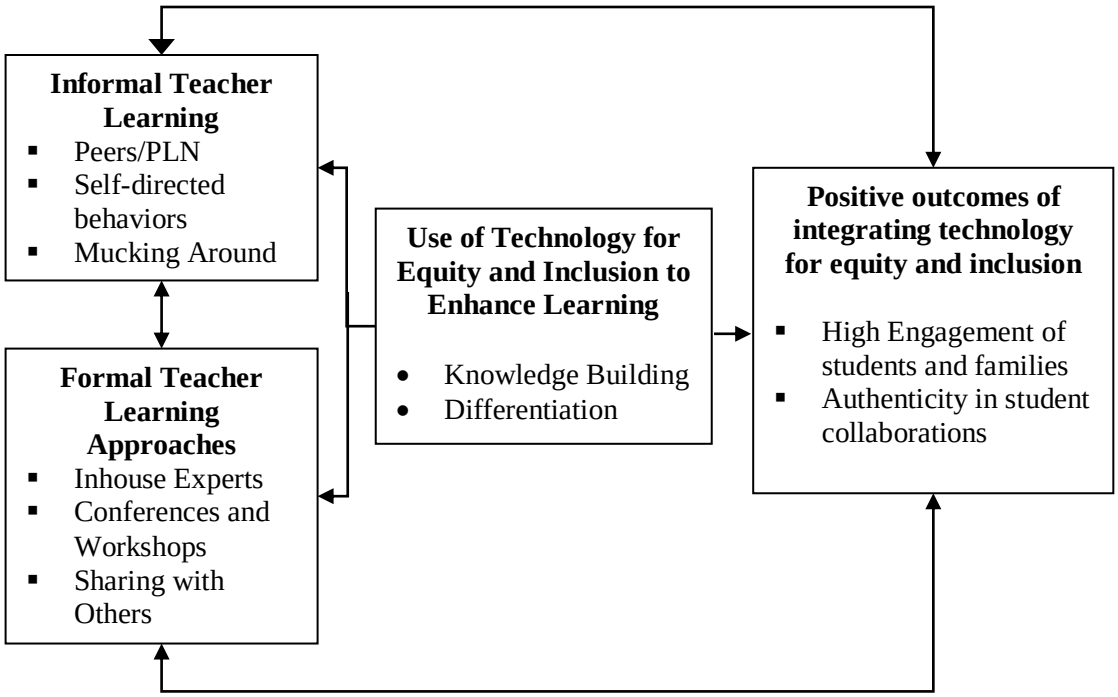

Figure 1. Conceptual Framework for the Study of the Integration of Technology and Pedagogy for Equity and Inclusion

Chapter III

METHODS

Introduction and Overview

This study explored the perceptions of how and why teachers might integrate technology to support their goals of equity and inclusion with a group of teachers who identify as culturally responsive in their pedagogy and describe themselves as fluent in the use of technology in school. Purposeful sampling was used to identify teachers who self-identified as valuing equity and inclusion in their classes and also considered themselves to be technologically proficient.

To achieve this purpose, the following research questions were explored:

1. How do teachers who identify as culturally responsive characterize the role of technology in classrooms, and what uses of technology do they put into practice?
2. When incorporating technology, how do teachers describe the extent to which they feel they are achieving equity and inclusion with their students of diverse backgrounds?
3. What factors and conditions do teachers report as helping and/or hindering their learning regarding technology use that supports equity and inclusion efforts in their classrooms?

This chapter will present the methodology used to explore these questions. The details regarding the Methodological Rationale, Research Sample, Overview of the

Research Design, Overview of Information Needed, Analysis, and Issues of Trustworthiness follow.

Methodological Rationale

In order to understand how teachers perceive the use of technology to help create opportunities for inclusion and equity in classrooms comprised of students of diverse backgrounds, the researcher used a qualitative approach: case study methodology. To collect data, three methods were used: one-on-one interviews, artifact and document reviews, and focus groups.

Qualitative methodology was chosen for these distinct characteristics: (a) it is naturalistic, (b) it draws on multiple methods that respect the humanity of the participants in the study, (c) it focuses on context, (d) it is emergent and evolving, and (e) it is interpretive (Rossman & Rallis, 2003). Case study is a preferred strategy when the researcher is posing "how" or "why" questions, has little control over events, and is focusing on a contemporary, not historical, phenomenon (Yin, 2003, p. 6). Case studies are particularly useful when the researcher is seeking to "illuminate a decision or set of decisions: why they were taken, how they were implemented, and with what result" (Yin, 2003, p. 12). Findings or conclusions in a case study are more useful when derived from several different sources of information (Yin, 2003). As Patton (2002) writes, "Case analysis involves organizing the data by specific cases for in-depth study and comparison." (pp. 447).

By providing an understanding of the lived experiences of the study's participants, case study is the most effective method in which to address the research problem and answer its questions. Qualitative methodologies allow researchers to keep a focus on learning and understanding the meaning that participants hold about a particular problem or issue (Creswell, 2013). Reporting multiple perspectives, identifying the many factors

involved in a context, and illustrating a larger picture that emerges enable qualitative researchers to develop a complex description of the problem or issue under study, developing theories when "partial or inadequate theories exist for certain populations and samples or existing theories do not adequately capture the complexity of the problem we are examining" (Creswell, 2013, p. 48). Merriam (2009) states that "the overall purposes of qualitative research is to achieve an understanding of how people make sense out of their lives, delineate the process (rather than the outcome or product) of meaning-making, and describe how people interpret what they experience" (p. 14). The perceptions and strategies developed by experienced practitioners were of particular interest to the researcher. Qualitative case study design was especially suited to this study as it allows for open exploration of the research questions that address the meaning participants make and their perceptions as they are developing approaches with new tools.

The Research Sample

Creswell (2013) describes one kind of data collection procedure for qualitative research as "purposefully selected sites or individuals" (p. 100). For this research, a purposeful sample was selected to ensure that the research participants were teachers who self-identified as culturally competent and comfortable with the use of technology in their classrooms. A purposeful sample for case study research means that the participants are not randomly selected but are instead are chosen based on specific characteristics. The researcher constructed a set of criteria that participants had to meet in order to become formal participants. These criteria were:

1. Teachers self-identify as culturally competent.
2. Teachers describe their classes as comprised of a diverse student body.
3. Teachers describe themselves as proficient in the use of technology.

These criteria were selected because teachers with skills in both cultural competency and technology usage were needed to answer the research questions. The researcher's interest was in learning how inclusivity and equity can be supported through technology integration in classrooms comprised of students of diverse backgrounds; therefore, an effort was made to include criteria that demonstrate a commitment to both inclusivity and the use of technology resources.

The teachers in this purposeful sample were drawn from professional conferences and workshops focused on diversity and technology throughout the New York area. The researcher shared the research objectives at diversity conferences, technology conferences, and school professional development workshops, soliciting suggestions from participants for potential teachers for inclusion in the study. Professional colleagues of the researcher were asked to recommend teachers they thought met the above criteria. Upon receiving the recommendations, the researcher examined information contained in each potential participant's demographic survey against the researcher criteria to ensure that teachers who had a particular pedagogy and practice were included in the study. The researcher utilized the snowball technique—the act of initial participants referring other potential candidates they consider suitable for the research (Creswell, 2013). The snowball technique is described by Patton (2002) as referrals from prospective participants to generate new participants that could offer rich data to the study (p. 192). This generated an "extreme case" sample of teachers who were not reflective of the general population.

The study sample consisted of 30 teachers representing 17 different schools. The researcher focused on the teachers' perception of how technology is integrated in their classrooms where equity and inclusion are valued. Information was collected from the following sources: classroom artifacts, school documents, interviews, and focus groups.

Demographic information was collected for each participant, and the sample showed wide-ranging backgrounds and experience. Even with the divergent

demographics, participant teachers showed alignment in their perspectives, as shown in the findings chapter.

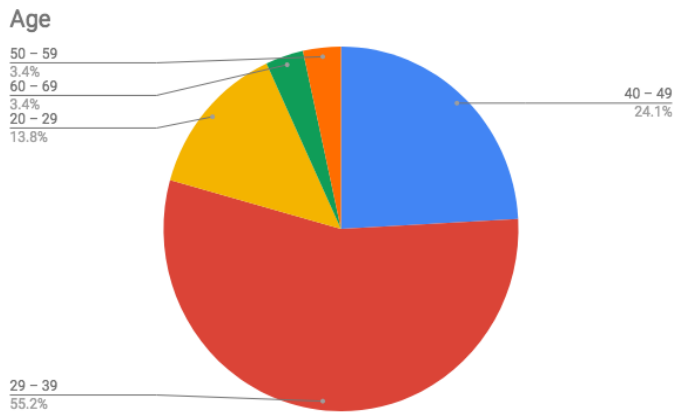

Figure 2. Participants' range in age

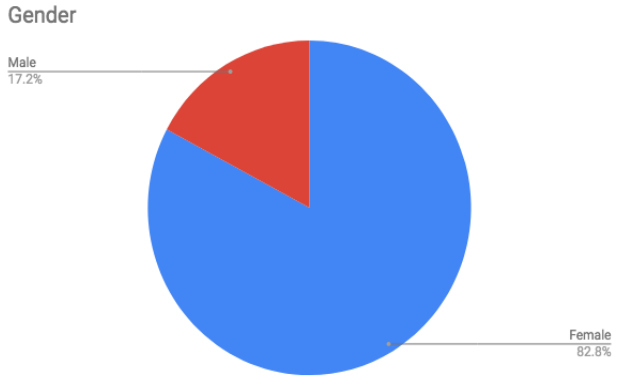

Figure 3. Most participants were female.

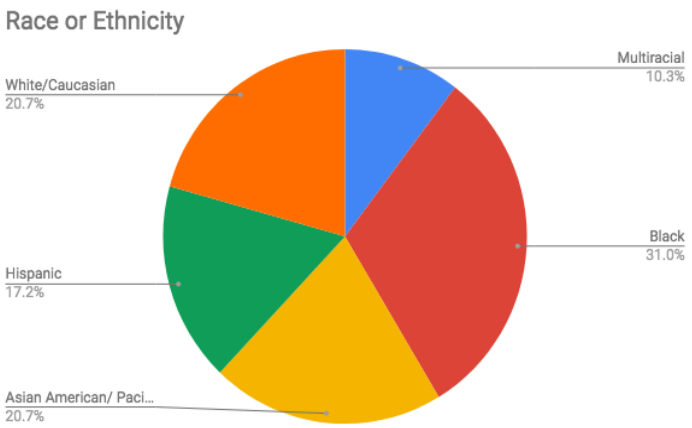

Figure 4. Participants came from a range of race and ethnicities.

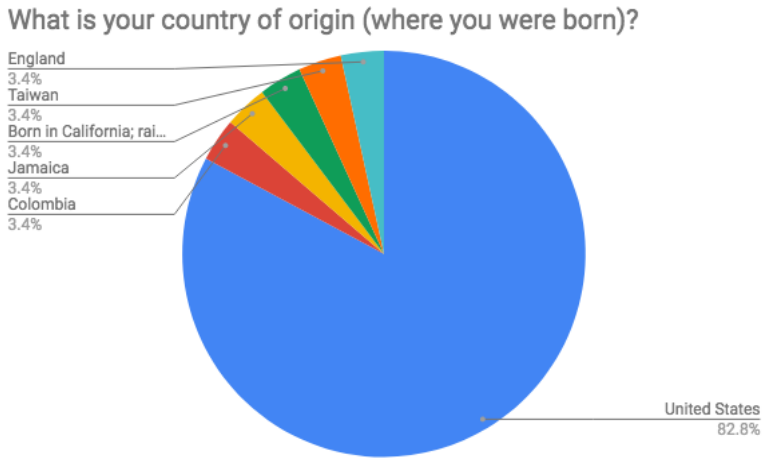

Figure 5. Most participants were born in the United States.

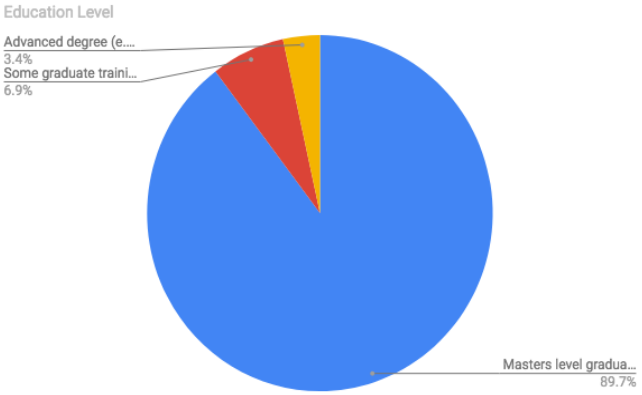

Figure 6. Almost all participants had a graduate degree.

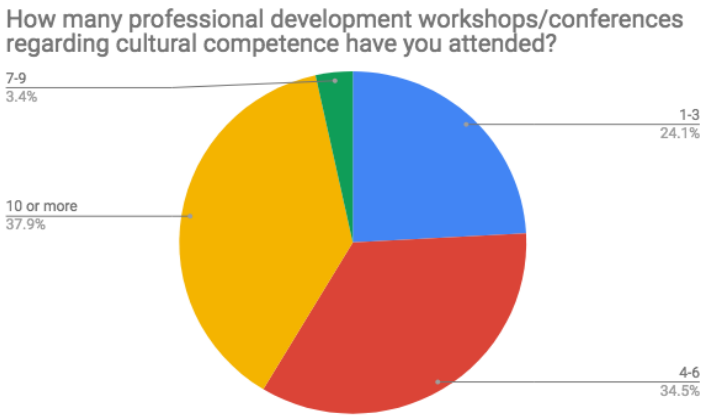

Figure 7. All participants had attended at least one formal conference on cultural competence.

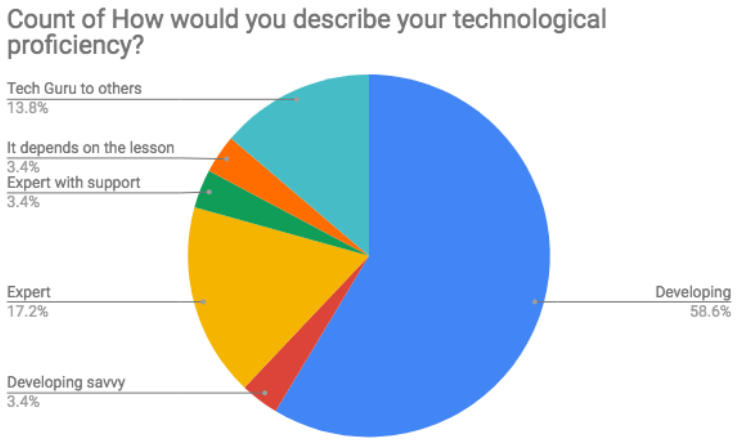

Figure 8. Most participants described themselves as developing technological proficiency.

Overview of Research Design

The following steps were taken to complete this research.

1. The researcher conducted a review of the literature to describe significant contributors to the fields of technology in education and diversity in classrooms to situate this research. The literature review was ongoing and was consulted to frame the problem, develop background knowledge, and guide

data analysis. Existing literature informed the analysis, synthesis, and interpretation of data findings.

2. The first three chapters were submitted, and a pilot study was conducted to see if the research questions elicited useful responses. A proposal hearing was held, and the researcher provided all relevant materials to the Independent Review Board (IRB) for their approval.
3. Participants were identified and then contacted in person or by email to ascertain their willingness to participate. Participants who agreed to participate in the study were sent a formal confirmation letter. The letter provided specifics for the individual interviews (see Appendix A: Consent Letter).
4. A personal inventory survey was administered to all participants to document essential demographic information. This information was analyzed to determine any patterns of the participants' backgrounds and the subsequent findings (see Appendix B: Demographic Inventory).
5. A checklist was administered before the interview to determine how participants perceive themselves as teachers of students of diverse backgrounds. The instrument used was a modification of the one developed by A. Tawara D. Goode (National Center for Cultural Competence, Georgetown University Center for Child and Human Development, University Center for Excellence in Developmental Disabilities Education, Research & Service, June 1989 – Revised 2002, 2004, 2005, & 2009 with modifications) (See Appendix C: Checklist). This checklist is HONcode certified for reliability and usefulness (Laversin, Baujard, Gaudinat, Simonet, & Boyer, 2011).
6. Semi-structured in-depth interviews were conducted (see Appendix D: Interview Schedule). These were transcribed verbatim and then coded. Pseudonyms were assigned to preserve participants' anonymity.

7. Inter-rater reliability was conducted wherein two peers checked codes against actual interviews to determine whether they independently arrived at the same results. Any discrepancies were discussed and reconciled with the coder.
8. School documents and class artifacts were analyzed as part of triangulation.
9. A focus group was conducted with teachers who met the same criteria as the initial purposeful sample group of teachers but who did not participate in the interview.
10. Interview and focus group data were coded, and themes were highlighted (see Appendix H: Data Matrix).
11. Findings were written up and reported in the dissertation. A thorough analysis was conducted of the results of the interview, document review, and focus group.

Overview of Information Needed

The research questions posed by this study were aimed at eliciting the perceptions teachers hold on the ways in which technology is integrated with their goals of achieving inclusivity and equity. The researcher sought the following categories of information: (a) demographic, (b) contextual, and (c) perceptual. These categories are described in further detail below.

Demographic Information

Demographic data are profile information on professional and personal characteristics of participants. Prior to interviewing the participants, the researcher collected data via a pre-interview demographic inventory consisting of age, experience, professional development, and education as well as the use of a cultural competence self-assessment checklist.

Contextual Information

Contextual information seeks to describe the cultural and environmental contexts in which the participants work and learn. This includes artifacts related to the school they work in such as student demographics, faculty demographics, school size, presence of technology resources, and school mission and vision. Artifacts from teachers' classrooms demonstrating their technology uses were examined and analyzed.

Perceptual Data

Perceptual data seek to determine how participants conceptualize their own experience and are collected directly from the participants. Since little information exists on how teachers integrate technology in classrooms where equity and inclusivity are valued, the interviews facilitated the development of the initial codes for the analysis. The data collected from the interviews were used to construct a narrative of perceptions on the use of technology in classrooms where students of diverse backgrounds are led by teachers who value equity and inclusion.

The Interview Schedule (Appendix D), derived from the literature review, was piloted with three teachers who fit the profile of the proposed study participants. After the formal study began and the interviews with study participants were completed, one focus group with an additional four participants who also fit the criteria but who were not a part of the interview schedule was conducted. The plan was that using findings from the focus group was intended to help triangulate the data.

Table 1 summarizes the demographic, contextual, and perceptual information that was collected. The data collection methods used in this study are further detailed in the following sections of this chapter.

Table 1. Information Collected

Information Needed	**Collection Method**			
	Background Inventory	Interviews	Focus Group	Artifact/ doc review
Demographic				
• Age	X			
• Race/Ethnicity	X			
• Gender	X			
• Technology proficiency	X	X	X	X
• Professional development	X	X	X	X
• Teaching Tenure	X			
Contextual				
• School demographics		X	X	X
• School mission/values		X	X	X
• Classroom Technology Use		X	X	X
Perceptual				
Research Questions				
1. How do teachers who identify as culturally responsive characterize the role of technology in classrooms and what uses of technology do they put into practice?		X	X	X
2. When incorporating technology, how do teachers describe the extent to which they feel they are achieving equity and inclusion with their students of diverse backgrounds?		X	X	X
3. What factors and conditions do teachers report as helping and/or hindering their learning regarding technology use that supports equity and inclusion efforts in their classrooms?		X	X	

Data Collection

Data were gathered using a variety of qualitative instruments including document analysis of class artifacts, interviews, and a focus group. Additionally, descriptive demographic data were gathered. A checklist collected information about teachers' pedagogical values and beliefs.

All of the collected data were coded, analyzed, and compared with the relevant literature in order to identify areas of similarity and contrast. These data provided the basis for addressing the research questions.

Interview

Interviewing provides many advantages for the researcher. When interviewing and considering the results, the researcher can adjust questions, probe inadequate or vague responses, and change the order of the questions (Judd, Smith, & Kidder, 1991). In addition to advantages, there are disadvantages with interviewing, including the influence of the interviewer's identity (such as role, race, sex, and age), the inability to represent adequately the teacher's classroom experience, and the time needed to fully discuss a complex topic with an interviewee (Creswell, 2013; Judd et al., 1991).

The researcher identified the participants through the methods described above and contacted them by phone and email to determine their willingness to participate. Once the participants agreed to take part, a formal confirmation letter was sent to each individual. This letter provided the details of where and when the individual interviews would take place. Upon completion of the surveys, semi-structured in-depth interviews were conducted with each of the 30 participants. The goal of the interviews was to capture the real lived stories of the participants and to associate relevant themes that emerged organically from these stories. The interviews captured the voices and perceptions of the 30 teachers of students from diverse backgrounds who reported a commitment to creating equity and inclusivity in their classrooms, classrooms they felt were well-resourced with ample technology resources.

As a fundamental component of qualitative research, the interview allows the researcher to learn how participants "understand the worlds in which they live and work" (Rubin & Rubin, 2005, p. 3). Through a qualitative interview, the researcher can learn how the person being interviewed thinks and feels, what that person finds meaningful, and how he or she describes their work. The in-depth interview is a conversation that intends to uncover the subject's perspective (Marshall & Rossman, 2006; Patton, 2002). The researcher chose interviews because "qualitative interviewing begins with the assumption that the perspective of others is meaningful, knowable, and able to be made explicit" (Patton, 2002, p. 278). Rubin and Rubin (2005) identify three key characteristics of the qualitative interview. First, the interview is a modification of an ordinary conversation with the distinction that the interviewer listens "so as to hear the meaning of what is being said ... listening carefully enough to hear the meanings, interpretations, and understandings that give shape to the worlds of the interviewees" (p. 7). Second, the interviewer is interested in the knowledge, understanding, and insights of the interviewee rather than in the particular categories of information. Third, the content of the interview changes depending on the interviewee since it reflects what the interviewee knows and feels.

The study's three research questions were used as a framework to create the interview protocol. Each research question served to gather the information needed from the subjects to create an interview schedule of questions. Questions for the interview schedule were developed from a draft constructed by the researcher and five other students of education in other departments of the researcher's college. The draft was critiqued and edited for clarity, relevance, and inclusiveness in conjunction with the researcher's doctoral program advisor.

Once approved, the Interview Schedule (Appendix E) was pilot tested with three teachers. As Bailey (1978) notes, pilot testing is important as it enables the researcher to ensure that the "information being gathered is germane to the concepts being studied

when the concept is multidimensional, lengthy and complex" (p. 70). After each pilot test, the participants and the researcher discussed the experience of the interview. The research questions were shared, and participants were asked if the interview questions allowed them to share fully about their experience. Some pilot participants suggested additional interview questions that would have allowed them to respond with more detail and specificity about their work with students and families. Modifications were made based on feedback from the pilot participants and the researcher's own notes.

A semi-structured format was used for the interviews. A semi-structured format enabled the researcher to make the best use of the time available and make the interviews "more systematic and comprehensive by delimiting in advance the issues to be explored" (Patton, 2002, p. 283). Although each interview began and ended with the same questions, stated in exactly the same words, the researcher attempted to create a relaxed and informal atmosphere by using the interview schedule as a flexible guide. This allowed the same basic information to be gathered from each subject, but permitted the interviewer to explore and probe responses to learn more about each participant's perspective. The disadvantage of this interviewing approach, however, is that issues discussed with some participants were not discussed with other participants. The collected data from the spring and summer of 2018 were coded into groupings related to the research questions and analyzed in the summer and fall of 2018.

Interviews were conducted in person or over the phone/video-conference, depending on the scheduling preferences of the participants and the researcher. The interviews were conducted in a private space where the researcher and the teacher were the only two people in attendance during each interview.

All interviews were audio-recorded with permission, for the purpose of transcription. A recorder was placed in the center of the table within full sight of the participant. When recorded on the phone, the participant was informed when the recorder was being activated and deactivated. Before beginning each interview, the researcher

stated the research purpose and verbally reviewed the interview process. Participants were encouraged to respond to the interview questions openly and fully.

Each interview was scheduled to be approximately one-hour in length. Sometimes the interview was shorter, but it was never longer in respect for each participant's time and prior commitment. During each interview, the researcher made notes of body language, environmental occurrences, and other observations that might add to the accuracy and completeness of the recorded responses afterwards. The interviewer reviewed the recording immediately after each interview, making additional notes. The notes provided support and additional information about the interviews. After the interview, the recording was sent to GMR transcription, a fee-based transcription company, for verbatim transcription. The transcriptions were reviewed by the researcher for accuracy. Sometimes garbled words and misidentified jargon were corrected, and then transcriptions were shared with participants for verification.

Pseudonyms were assigned for each participant to preserve their anonymity.

Focus Groups

As a means of corroborating the findings at the conclusion of the study, the researcher tested the findings in a summative focus group. Four participant teachers from four different schools, who also met the criteria for inclusion in the purposeful sample, gathered for approximately 45 minutes of discussion with the researcher. Participants were asked to discuss questions that were similar to those given to the interview participants. The focus group served to triangulate the descriptions given in the interviews.

Document Review

The review of school documents and class artifacts was beneficial to the study because it provided additional data. Document analysis is "a rich source of information"

(Patton, 2002, p. 152), making it possible for the researcher to "ground an investigation in the context of the problem being investigated" (Merriam, 1998, p. 108).

Numerous class artifacts and documents were reviewed by the researcher prior to collecting any other data, and on a continuous basis throughout the study. Class artifacts and document review additionally provided data on each participant's use of technology, specifically examples of technology projects and applications.

Participant teachers shared family communications, including examples of family engagement sessions, class blogs, emails, and student conference materials. Actual student projects, artifacts, and unit plans were reviewed from participant teachers in a range of grades from kindergarten through Grade 7. Collaborative student assessment tools, including shared Evernote files, Padlet, and other multi-media portfolio-based programs, were reviewed. Additionally, conference and professional learning resources discussed were examined, as were websites and admissions literature for each of the schools represented. Looking in-depth at resources and class artifacts referenced in interviews helped provide a richer and more detailed context for the content discussed in the interviews and the focus groups.

Analysis and Synthesis of Data

Analysis of the data began after each phase of data collection was completed, thus enabling the researcher to draw upon the data and strengthen each subsequent phase (Marshall & Rossman, 2006). Marshall and Rossman describe seven possible analytical steps for data analysis: (a) organizing the data; (b) finding relevant details in the data; (c) generating categories and themes; (d) coding the data; (e) offering interpretations through analytic memos; (f) searching for alternative understandings; and (g) writing the report or other format to present the study.

The Participant Data Inventory forms (Appendix C) were completed as a prelude to the interviews, and the responses were reviewed in order to become familiar with background information. A matrix of the teachers' background was compiled (Appendix G) for reference throughout the study. Class artifacts were reviewed on an ongoing basis as a means of informing other data collection methods.

After an initial reading of the 30 interview transcripts, the researcher re-read the manuscripts of 5 interviews to create a preliminary coding scheme. Data were categorized under words, sentences, phrases, and paragraphs that appear in the transcriptions of interviews, and documents. Each piece was coded, isolated, and placed in a category, providing cross-referencing and convenience in looking for commonalities and discrepancies. This was also an accessible way to identify emerging themes or concepts.

The researcher had two other education graduate students read the same two interviews and apply the coding scheme. After discussing the recommendations with the other two readers and assessing this information, a final coding scheme was developed.

Initial interview coding used an alphanumeric identification code assigned to each participant prior to the interviews and posted on the transcript. Narrative descriptions were then coded according to various categories. The researcher assigned descriptive codes to the raw data that had been transcribed from the recorded, semi-structured interviews. Coding letters for themes and categories to the transcription from the recorded, semi-structured interviews were written along the margins. Through this process, the researcher developed the findings of the study and organized the data in preparation for writing.

After the coding and the assignment of the data to various categories, the researcher used a manual recording and representation system. The data were analyzed through multiple lenses, and the most frequent codes were investigated. The researcher used identified themes to single out concepts that were reflective of the participants'

experiences. As themes emerged, visualizations were created. Displays of data were developed to identify concepts and themes in the data, and also to highlight multiple patterns that were generated and not readily apparent. Although the researcher has access to technological capabilities of computer coding, a manual process of recording and categorizing the quotations from the transcriptions to chart paper affixed to the wall and in notebooks was preferred. This approach allowed the researcher to visualize all the data at once, and it provided easy reference and movement of the coded data.

The researcher used the following process to initially guide the data analysis:

1. Re-read notes from the class artifacts and notes from interviews to gain overall organizational contextual understanding.
2. Review demographic data from the Demographic Inventory Forms.
3. Make new notes from data gathered throughout the collection process.
4. Code data according to emerging categories in the data.
5. Review the data collected from the documents and interviews and the emergent themes against themes in the literature.
6. Analyze all data around categories and identified themes and patterns.
7. Review and write the findings.

The researcher conducted content analyses of the interviews for unifying and divergent themes. The researcher drew some common threads for interpreting the data. A table was constructed that listed each theme and the participant alphanumeric code for each of the teachers who mentioned that theme. Content was then identified and a coding scheme developed according to the research questions:

1. How do culturally responsive teachers characterize the role of technology in their practice, and what do culturally responsive teachers identify as uses of technology that they feel enhance or diminish opportunities for equity and inclusion?

2. When incorporating technology, how do teachers describe the extent to which they feel they are achieving equity and inclusion with their students of diverse backgrounds?
3. What factors and conditions do teachers report as helping and/or hindering their learning regarding technology use that supports equity and inclusion efforts in their classrooms?

In order to gain clarity and consistency of thought during the analysis and synthesis phase of the study, the researcher mapped the meanings of the Research Questions, Findings, Analysis, and Conclusions. These are presented in Table 2, below.

Table 2. Consistency of Research Questions, Findings, Analysis, and Conclusions

Research Question	Finding	Discussion	Conclusion
How do teachers who identify as culturally responsive characterize the use of technology in their practice?	All participants (100%) conceptualized technology as a learning tool that allowed them, as self-identified culturally responsive teachers, to develop and provide knowledge building and knowledge sharing uses that were more relevant to the diverse perspectives of their students.	Pedagogical Content: The unique affordances of technology lend themselves as a critical resource for teachers engaged in culturally responsive pedagogy.	Technology enables engagement of students in a wider sphere, increasing their learning opportunities.
When incorporating technology, how do teachers describe the extent to which they feel they are achieving equity and inclusion with their students of diverse backgrounds?	Participants described both positive and negative experiences related to their culturally responsive teaching goals, but all (100%) most frequently described their positive experiences. They felt these uses supported efforts in cultivating stronger and more confident students and families.		Technology holds the potential to positively impact teacher's goals for equity and inclusion by providing unique resources which enable teachers to act on their goals for inclusivity.

Table 2 (continued)

Research Question	Finding	Discussion	Conclusion
What factors and conditions do teachers report as helping and/or hindering their learning regarding technology use that supports equity and inclusion efforts in their classrooms?	All participants (100%) indicated that they were self-directed and learned about their use of technology resources for culturally responsive approaches through informal means, including from peers who held the same values.	Teacher Learning: The teachers in this study perceived themselves as self-directed learners and sought learning opportunities through informal approaches, in particular with peers they saw as culturally competent and aligned with their own thoughtful practice in service of their beliefs and values for equity and inclusion.	Formal Learning is not necessarily the primary vehicle by which teachers learn to use technology in ways that support equity and inclusion.

The researcher attempted to give meaning to every finding that emerged as part of the process of analysis and synthesis. Some findings and meanings were expanded upon, while others became integrated. This type of data frequently emerges in qualitative studies (Merriam, 1998), and the researcher made provisions both to introduce new categories and to integrate emerging data into existing categories and themes.

The major outcome of an analysis of the data was a thematic description of teachers' characterizations of meaningful uses of technology in their classrooms that value equity and inclusion. Based on this analysis, a series of recommendations was developed for ways that may enhance the use of technology by teachers seeking to achieve equity and inclusion, and suggestions for further research.

Limitations of the interview data exist with both the participants and the researcher. Since the interview was semi-structured, significant issues that might emerge from a less structured interview were not explored. In addition, the researcher's follow-up to responses varied among participants. A third limitation is the fact that the participants volunteered for the interview. Because they were self-selected, the participants may not

accurately represent the general population of teachers with students of diverse backgrounds in technology-resourced classrooms.

Synthesis

The data for this study were analyzed by comparing and contrasting data to identify themes that were subsequently captured in the findings. The literature provided a context for the findings. Conclusions were formulated, and recommendations were developed for teachers, administrators, teacher induction programs, and for future researchers.

Ethical Considerations

Hesse-Biber and Leavy (2006) describe obtaining informed consent as essential, as this allows subjects to determine if they would like confidentiality or not. The researcher must also reveal to the subjects any apparent risks or benefits associated with the study. To insure the researcher maintained ethical considerations, and to adhere to Institutional Review Board practices, she first informed the participants via an informed consent information letter (Appendix A) regarding their participation in the study. In this letter, the researcher outlined her background and research objectives. The researcher also informed each participant of their participant's rights, utilizing the outline in the informed consent form (Appendix A). Each participant completed and signed the document, after which the researcher filed the collected information in a locked file cabinet.

The researcher made every effort to abide by this code of conduct and asked each subject to sign a consent form, also a part of the Institutional Review Board protocol. The purpose of this form was to thoroughly inform each participant of the protocols and limitations of the study. At the conclusion of the research, the researcher also made available the results of the findings to each participant.

Issues of Trustworthiness

This section includes a discussion of the criteria for evaluating the trustworthiness and implications of this qualitative research by discussing aspects of dependability and credibility. Most indicators of validity and reliability do not fit qualitative research (Bloomberg & Volpe, 2008). In quantitative research, defining reliability is different. Qualitative methodology is viewed as a dynamic approach in which findings emerge from the data, and even the research agenda itself can change direction.

Denzin and Lincoln (1998) indicate that in order to establish credibility in a qualitative study, triangulation is helpful. According to Denzin (1970) four types of triangulation are available:

1. Data triangulation: gathering data through several sampling strategies, so that slices of data are gathered at different times and social situations
2. Investigator triangulation: the use of more than one researcher in the field to gather and interpret data.
3. Theoretical triangulation: the use of more than one theoretical position in interpreting data.
4. Methodological triangulation: the use of more than one method for gathering data. (p. 297)

Guba (1981) also describes the use of multiple data collection methods to compensate for the individual weaknesses of each method. Guba refers to this technique as “multi method triangulation” (pp. 224-245). In this study, a methodological triangulation was employed. Triangulation of the data sources was conducted to safeguard against bias and error. To help establish credibility, a degree of triangulation was attempted with the use of multiple data collection methods including Interview, Document Review, and Focus Group.

Inter-rater dependability was established by asking colleagues to code several interviews, and the differences were reconciled between their interpretations. The researcher met with other graduate students not familiar with the study and gave them the coding scheme and the first three pages of five interviews. Subsequently, the researcher met with these peers, discussed any discrepancies in coding, and developed additional codes to address nuanced reading for future interviews. The researcher also consulted with her advisor and other expert professors to examine the research design and foundations. In order to ensure credibility and dependability as the study progressed, the researcher asked the subjects and professionals in the area of culturally responsive pedagogy and educational technology, including professors and doctoral students at Teachers College, Columbia University, to review and comment on the literature review, findings, and analysis of the study. Based on their reactions and comments, the researcher modified and revised the work.

Trapp and Benoit (1987) note, "Interpretive research places more emphasis on the validity of the research and less emphasis on reliability" (p. 419). Qualitative research does not usually cover a broad enough range to provide a reasonable degree of reliability that is required to allow generalization of the findings. Marshall and Rossman (1989) concur that "qualitative research does not pretend to be replicable" (p. 148).

> Case studies, like experiments, are generalizable to theoretical propositions and not to populations or universes. In this sense, the case study, like the experiment, does not represent a "sample" and the investigator's goal is to expand and generalize theories (analytic generalization) and not to enumerate frequencies (statistical generalizations). (Yin, 2003, p. 10)

The assumption of credibility in qualitative research is assured if the subject of the research is accurately described and identified and is credible to those who constructed the original multiple realities (Lincoln & Guba, 1985). Marshall and Rossman (2006) describe credibility as where the researcher "demonstrates that the inquiry was conducted

in such a manner as to ensure that the subject was appropriately identified and described" (p. 251).

The researcher attempted to determine that the multiple realities of the participants in the research are reflected in the findings. The credibility and the dependability of the interview analysis can be increased by doing what Guba (1981) describes as a "final check," or a "phenomenon recognition [which] involves presenting the inquirer's reality to those who live it, and asking them whether it represents their common and shared experience" (p. 80). After the interviews had been initially coded, the researcher provided the information to the participants to see if it fit with their intended message as a way of checking for internal credibility.

The objectivity of the researcher is essential to maintaining the integrity of the study, as the interpretive nature of qualitative study could be impacted by political, historical, temporal, and subjective influences (Denzin & Lincoln, 1998). The researcher is currently the Elementary School Principal for a school that has many technology resources, serving a diverse student population. At this school, her responsibilities include curriculum development with teachers, parent communication, and school administration as they develop strategies to increase inclusivity and equity in their classrooms. The topic of this study was identified based on personal experience. The researcher made every effort to maintain objectivity as data were gathered. Mitigating researcher bias is discussed in the next section on limitations of the study.

Limitations of the Study

This study used a naturalistic approach to focus on teacher perspectives of uses of technology in classrooms that value equity and inclusion. Because of the small sample size and the limited number of schools represented, and the self-reported nature of the data, the findings of the study are not generalizable to the entire school system in the U.S.

However, the findings may provide insights that could lead to further research with other populations.

1. The use of an interview to gather qualitative data can limit the study. The questions selected for the interview schedule may not have solicited the most meaningful perspective on uses of technology in classrooms valuing equity and inclusion. Because the interviews were semi-structured, topics covered in some interviews may not have been raised in others. Although the researcher made every effort to reflect the worldview of those interviewed, in the process of coding the interviews and seeking themes, some of the researcher's own biases and assumptions may have inevitably skewed the analysis.
2. The participants in the interviews were self-selected. Participants who may have relevant and significant experience in using technology in diverse classrooms, but who were unavailable or uninterested, may have chosen not to respond or participate in the interviews. Other teachers with significant experience may have elected to change careers or are retired and, therefore, may have also been unavailable to the researcher.
3. In addition, the results of the study reflected the experience of a set of teachers with some professional privilege. They attended professional development workshops or conferences focused on diversity and technology. The experience of teachers outside these conferences and workshops are not reflected in the study.
4. The interview data reflect the views of only a subset of experienced teachers. Analyzing data from a sample of teachers from other professional strata may offer comparative insights not available from this group.
5. The data were gathered in 2018, following the election of President Donald Trump, when there was significant cultural and political unrest in the U.S. The

results of the study may reflect the current climate of anti-immigration, White supremacy, and misogynistic public discourse.

6. The data is by nature all self-reported and may not accurately reflect the actual use of technology in classrooms.
7. The researcher is currently a school principal in a well-resourced private school and also a student of cultural competence. Her own assumptions may be a limitation to the research. The researcher attempted to minimize bias by actively challenging her own bias and by requesting more experienced colleagues' and mentor's assistance with coding and findings.
8. Because the researcher has prior knowledge and experience regarding developing culturally competent uses of technology in classrooms serving students of diverse backgrounds, this may have been an advantage to establishing rapport and credibility with the participants during the interviews.

Given the restrictions of the previously stated assumptions, together with time and financial constraints of the study, the researcher acknowledges limitations of the research study to include two general areas. First, the lack of research on effective culturally competent uses of technology in classrooms means there is an absence of a comparative base for the findings in this study. Although there is a surge of practical literature on the business advantages of diversity in the workplace, there is comparatively little literature on the positive educational outcomes for all when diversity exists in the classroom. Second, using a small sample of teachers at different schools instead of an analysis of a broad survey response narrows the scope of the study.

Despite these limitations, the research project contributes to the body of knowledge on the use of technology to support culturally relevant pedagogy through a study that provides in-depth information, and also personalizes and humanizes abstractions and generalizations.

Summary

This chapter represents the methodology undertaken in the research study to illustrate how 30 teachers of diverse students perceive their efforts to create equity and inclusivity in technology-resourced classrooms. The qualitative case study methodology was used. The researcher employed three approaches to triangulate the data: (1) interviews, (2) document and artifact review, and (3) focus group. These were all done to increase the credibility and dependability of the study. Participants in the study were 30 experienced teachers working in technology-resourced classrooms who professed a value for equity and inclusion among their students of diverse backgrounds. An extensive review of the literature was also completed to frame the current research related to the questions in this study. In order to understand demographic and contextual information about technology and diversity, the teachers responded to a demographic survey and a pedagogical checklist as an introductory segment to the interview. The researcher gathered data about their professional role and history within their respective schools, as well as personal background information about their age, gender, education, technological competence, and attitudes regarding diversity in school. Interviews were conducted with 30 teachers representing 17 different schools. These methods of data collection generated qualitative data for the research study.

The data collected from the documents and interviews and the emergent themes were reviewed against themes in the literature. A process of analysis and synthesis enabled the key themes from the findings to be identified, and through a comparison with the literature, interpretations were drawn up. Dependability and credibility were tested primarily through triangulation of interview, focus group, and document review.

At the conclusion of this research effort, the literature was re-evaluated for a better understanding of implications for this study and to generate recommendations for future research studies.

Chapter IV

FINDINGS

The purpose of this interpretive case study was to provide a rich description of how equity-minded teachers used technology to pursue their classroom goals of inclusion and culture responsiveness. A group of teachers who identify as culturally responsive in their pedagogy and describe themselves as fluent in the use of technologies in school were interviewed.

Three major findings emerged from the participants' responses to each of the research questions. This chapter will provide a discussion of those findings. As described in Chapter III, supporting comments from focus group participants have been embedded in the chapter under comments from the interviewees to reinforce the findings. A review of relevant documents provided further support to the interview findings.

The first major theme that emerged from the interview analyses was the illuminating perspective participants brought to technology as a learning tool. Culturally responsive teachers explained that the tools allowed them to develop and provide content in a way that is more relevant to the diverse perspectives of their students and more aligned with their teaching goals. They developed individualized uses of technology to support student knowledge building and differentiated instruction.

A second theme that emerged was that the participant teachers uniformly ascribed positive outcomes to their use of technology in the classroom. These outcomes include

developing stronger and more confident students and families, particularly in self-directed school engagement as well as stronger self-advocacy.

The third theme that emerged was that participant teachers described themselves as self-directed learners who used informal learning opportunities in order to develop their current level of technology mastery to support their efforts for student equity and inclusion. They sought out like-minded peers to teach and inspire their culturally responsive work.

The three major findings established through the data collected in this study are:

1. All participants (100%) conceptualized technology as a learning tool that allowed them, as self-identified culturally responsive teachers, to develop and provide knowledge building and knowledge sharing uses that were more relevant to the diverse perspectives of their students.
2. Participants described both positive and negative experiences related to their culturally responsive teaching goals, but most frequently described their positive experiences (100%). They felt these uses supported efforts in cultivating stronger and more confident students and families.
4. All participants (100%) indicated that they were self-directed and learned about their use of technology resources for culturally responsive approaches through informal means, including learning from peers who held the same values.

Finding #1

All participants (100% or 30 out of 30) conceptualized technology as a learning tool that allowed them, as self-identified culturally responsive teachers, to provide and develop knowledge building and differentiated instructional uses that were more relevant to the diverse perspectives of their students.

Teachers were asked to describe their perceptions of the role of technology in their classroom. In order to characterize the role of technology in classrooms where the teacher

espouses a culturally responsive approach and the children come from diverse backgrounds, participants were first asked to describe the diversity in the classroom and to define what culturally responsive pedagogy meant to them. After providing this context, all (100%, or 30 out of 30) participants went on to characterize technology as a tool for learning and to describe uses that supported their efforts to develop student understanding and to increase collaboration in the student community. Teachers provided hundreds of descriptions and examples of various resources, lessons, projects, and strategies where they used technology.

These themes and categories are described in detail below. Additionally, some participant teachers (67%, or 20 out of 30) characterized technology as a life tool and described the essential role technology played in the communication and organization of their classrooms.

Table 3. Outline of Finding #1

Finding #1: All participants (100% or 30 out of 30) conceptualized technology as a learning tool that allowed them, as self-identified culturally responsive teachers, to provide and develop knowledge building and differentiated instructional uses that were more relevant to the diverse perspectives of their students.

Technology Use to Enhance Learning 30/30=100%

- **Knowledge Building Uses**
  - Multimedia Materials
  - Multiple Perspectives
  - Student Projects
- **Differentiated Instructional Uses**
  - Diagnostic assessment tool
  - Collaborative assessment
  - Adaptive Approaches
  - Assistive Approaches

Many participants (67% or 20 out of 30) also characterized technology as a life tool.

Life Tool (20/30=67%)

- Communication
- Organization
- Ubiquitous to contemporary life

Technology Use to Enhance Learning

Participants described knowledge-building efforts and a range of uses for technology in providing differentiated instruction to learners of diverse backgrounds. Some gave specific examples of ways the technology supported diverse learners, and others spoke more generally about technology as a tool for learning. Participant teachers described technology as one more tool in a large and varied toolbox to help students learn in their culturally responsive classroom. These uses are each described in detail below.

Knowledge building uses. Scardamalia and Bereiter (2014) define knowledge building as an educational approach where students make a collective effort to learn and develop ideas together rather than learn only from the teacher (p.36).

> Classroom knowledge building can on the one hand give students experience in a wide variety of ways of contributing; on the other hand, it can help students develop their individual styles and skills of contributing so that each one has something distinctive to offer in any collaborative knowledge-building effort. That is perhaps the surest way of enabling everyone to find fulfilling roles themselves in a knowledge society and to feel part of the knowledge progress that is reshaping the world. (p. 48)

Participant teachers described technology approaches that facilitated student learning from and with each other. For example, Jason, a middle grades teacher shared:

> Here's work that draws you in and not only demonstrates my knowledge, but causes you to learn something as well … [enticing] other people to approach the student's work. I'd rather see the students using the technology as a means to get their work to the next level and to make it not only a demonstration of their knowledge, but also a point of conversation with their peers and with their teachers.

They were eager to engage students through more dynamic mediums than traditional text and lectures by finding videos, interactive tools, audio recordings, pictures, and other resources that could convey a greater range of experiences and voices than the school provided. Children in the classrooms of the participant teachers were able to use technology resources to work with relevant and accessible materials, develop understandings, generate their own content, and share their knowledge with each other and a larger audience. Each of these categories is described below.

Multimedia materials. Participant teachers found multimedia content to be varied and engaging with qualities not present in traditional classroom resources. They described gathering and presenting multimedia content that was accessible to a range of students.

Byron, a third grade teacher, was well aware of the opportunity afforded by technology to enrich traditional classroom resources during project work:

> I'm thinking in particular about one of the big research projects that we do at the end of third-grade around the Harlem Renaissance and so, we do a lot of teaching in the classroom and then we do a lot of centers with different materials in the classroom around that time period. And then, for the research they're given books and given articles, but they also have a component where they can watch videos, they can listen to audio from the time-period, especially if they are researching a performer or a singer. We could have the photographs and the art and the music and the literature that would make those units rich.

When describing the connection between teaching and learning, Leah, a kindergarten teacher, characterized technology in her classroom as a multimedia tool:

> Technology is a way for students to get access to information that I guess isn't as easy to receive from oral but they can use it as a visual, they can use it to communicate, they can use it to record, they can use it to write…. I think technology helps many different students and gives students access to many things ... different cultures.

Priya, another kindergarten teacher, described multimedia as an inclusive feature of technology:

> Technology ranges from just projecting something on the screen to turning their work into an eBook, play music in the classroom … making sure that each one of my students feels seen and heard and represented in the classroom. Just making sure again the students feel seen, heard, welcomed in the space—comfortable.

Teachers were looking for any resource that could improve a child's opportunity to learn and master new skills. Many teachers saw technology resources as augmenting or improving upon their own limitations. The affordances of multimedia were seen as a valuable aspect of technology in culturally responsive classrooms.

Multiple perspectives. In addition to valuable multimedia qualities to enhance learning, teachers also named access to resources that represented a wider range of perspectives as a beneficial use of technology in the culturally responsive classroom. Participant teachers often described their traditional classroom resources as providing narrow contexts and leaving out wide-ranging perspectives. They found technology resources to be a gateway to more meaningful resources than were readily available in their everyday classroom materials. They were intentional about trying to present wide-ranging content and contexts as part of their classroom approach. They found resources online that allowed them to supplement classroom resources and provide a greater range of examples when presenting content to students. Charles, a second-grade teacher, described a project and the advantages of the incorporation of technology resources:

> It also affords us the ability to just find the information that reflects their experience and where they come from, and when we're doing the neighborhood project, that we have the ability to get the resources to put in front of them, and that we're not limited by the books we already have if they're not represented in those resources.

Other teachers used databases and websites to gather content that could provide more nuanced perspectives. Some teachers found their own knowledge and access limited and the resources in their classroom narrow for historical perspectives that could resonate with their students. Terra, an early grade teacher, named a limitation many teachers experience: "There aren't a lot of books that are diverse enough for students for a multitude of reasons." Teachers turned to technology to provide access to greater mentors and resources for students.

Byron used online resources to provide needed background information for an immigration study:

> My class looked at in Puerto Rican migration to the Lower East Side in the mid-twentieth century, which is fairly specific. And we were able to find some books, some oral histories, at the Tenement Museum they had some great resources but a lot of the things that I found for kids and that kids ended up looking at and interacting with came from digital resources.

Jason, an older grade teacher, saw similar benefits to expand, not just reflect, personal experiences: “I can amplify their point of view and their worldview through the use of technology.”

Dierdre, another older grade teacher, used technology resources to compare media with students:

> In advisory we talk a lot about who you see on the screen and representation of different races as well as representation of different identities, whether that is religious identity or sexual orientation. More so even than in the past years because we watch CNN Student News frequently as part of our advisory curriculum, just to be informed and to compare messages between channels. But we talk about what media literacy means. If you look at one news station—that’s what the student news offers—but how do we become a little more dissecting if we’re watching Fox versus NBC versus etc.

Many teachers characterized technology as a tool for bringing multicultural and wide-ranging perspective content to students engaged in collaborative inquiry.

Student projects. In addition to the many ways teachers described technology uses for developing student understanding, they also described the importance of using technology for students of diverse backgrounds to create and share their learning with others. Many participant teachers characterized the role of technology in the culturally competent classroom as a medium for students to convey their understanding and share ideas with each other. Collaborative and collectivist practices were highly valued in these classrooms, and technology was a tool teachers leveraged to develop this community. Teachers were thoughtful about providing students with the opportunity to apply understanding in new ways. “I think we try mostly to use it to have the children create things rather than just look at things,” shared Charles.

Jason found that technology resources could help students communicate their ideas and teach others about their perspective:

> My students use technology to share with us the knowledge that she or he creates around a particular subject … it’s them producing videos or their writing … if the technology is used in such a way to entice other people to

> approach the student's work, to learn something from the student's work, I think that's a great use of technology…. I think the technology needs to be—it needs to be behind and almost obscured by the quality of knowledge the student's able to demonstrate.

Byron described technology as a tool for content creation, not just access to information:

> So, I think, again that technology is one other tool that kids can use to gain more content, more knowledge … providing kids with the tools and the supports to create their own knowledge … [another way] how we include windows and mirrors in our curriculum … how can we make sure everyone feels like they are seen and heard and valued.

Participant teachers took care to not let the technology detract from the task. Jason described this dichotomy of opportunity and caution:

> I think that from a social justice standpoint, that's what we can best use technology to do, is to amplify the individual. use the tools in a way that doesn't hinder his or her ability to express his or herself. I think the technology needs to be—it needs to be behind and almost obscured by the quality of knowledge the student's able to demonstrate.

Winnie, a middle grade teacher, appreciated the amplification of student voice:

> It [technology] highlights students' strengths, especially students who might not feel traditional pen to paper work is where they shine … [where] alternative viewpoints that aren't normally brought forward with a topic are sort of exalted so that a child can see that they're just every issue is multifaceted and they can see experts from many different perspectives and from many different walks of life.

Karen, a teacher of young children, was aware of the power of technology to bring a voice to a child who might not be able to use traditional communication tools effectively just yet:

> That, to me, I think is the biggest benefit and the biggest way to use it as a tool, both for them to feel like they can—I think especially in Kindergarten, but still true in 2nd grade—that they can have all these things to share but they can't write them all down yet, but also for me, I get to hear all those voices … with the iPads, all the dictation and recording things that you can do, I can give children a voice before they have a voice in writing… I just came to see it as this really valuable tool especially in the younger grades.

Kiera also wanted to know more from the students rather than her making assumptions about their unexpressed thinking: “By using technology with students, it gives them power to have their own voice recorded instead of just me recording what I am assuming about them.” Access to this unique student voice and experience was important to many participant teachers. “I think that it is most concrete for me when I see the way kids are able to tell stories and share ideas with the technology,” explained Charles.

Differentiated instructional uses. Another way participant teachers used technology to build knowledge in their students was by leveraging resources to provide better differentiated instruction for their students of diverse backgrounds. Teachers saw technology resources as excellent tools for reaching a range of learners. They found specific tools for gathering assessment information on children as learners to design even more targeted instruction. They utilized other tools to adapt the instruction and to assist students in meeting objectives and learning goals.

Diagnostic assessment tool. Teachers were excited to describe all the ways they used technology resources to collect information on students that could improve their instruction. Many found it challenging to take detailed notes in the moment when they were observing students working but found recording devices to be a real advantage in ongoing record keeping. Audrey, an early childhood educator shared:

> I’ve found that there’s been real benefit in using the technology to keep records because in the moment, the class—the pace of the classroom is so fast that I can snap a quick picture or I can set up an iPad to record a kid reading that maybe I wouldn’t be able to listen to or wouldn’t be able to see in the moment, but then I can go back and listen to it and then make the necessary accommodations or plan next steps.

Another early-childhood teacher, Leah, used organizational strategies to tag student information and keep track of student change over time:

> I also put it onto a computer so it’s easier for me to access and to manipulate and to move things around and to really see things in an easier

> way like using specific colors to highlight. I think it's easy because then I can also, like if I'm using excel, I can go back and create another page where I can look at the beginning of the year, compare it to the end of the year or the middle of the year … to really see how they were in the beginning of the year and what we need to work on … to look at to really inform [my] practice.

Erin also talked about managing essential student information in useful ways:

> When it comes to documenting, as I gather information, if I hold it in one place, I use technology to refer back to it so that I don't necessarily have to hold it all in my head at once but then I can document and look at perhaps trends over time or just a way to practice and look for patterns.

Many teachers had used conferencing with students as a strategy for gathering useful data on their learners. Technology allowed them to better record than traditional notetaking. Charles said:

> We've also done a lot of audio recording of conferences we have with kids about their writing, or a math problem, or reading to us, and having that moment recorded I think we find helpful in assessing kids because then, we don't have to remember the way they responded to a particular question. We can go back and listen to it again, and maybe we have a new perspective on it after seeing what they did in subsequent days. I think those audio recordings of the kids have been really helpful for us.

An early grade teacher, Kiera, found that the iPad allowed children to independently record their problem-solving strategies:

> When working on a number string, I can't hear 25 voices at once, but when they do it independently and dictate it into the iPad. Later on, I can hear all those voices and really know what they're doing and what they're thinking and how they're going about the problem. It helps me plan going forward. So, it helps make groups, it helps show gaps, it helps know what the next step is for each kid, and to see trends in the whole class, like where might there be gaps in the whole class, where might they be ready to go next. I think the same thing in reading and writing, just really helping plan going forward.

Teachers were using the documentation of student work to plan future instruction that was relevant and timely based on current student understanding. They used off-the-shelf products but also adapted tools to suit their needs.

Expedient feedback and evidence of student learning was highly valued by some participants. They connected rigor and differentiation to goals of equity and inclusion. A quick assessment engaged the students but also gave Winnie, an older grade teacher, an assessment of the students' ability to apply concepts and skills in a new context:

> I sent them in real-time a design challenge and they had just the class time to complete it. I think it created a mystique around the challenge and everything and they were really invested in this whole thing. I use it for checking for understanding, for example if I've taught something and I want to make sure that I know where the kids are at with a particular concept. Cultural competency starts with preparedness, empathizing and making sure that as teachers we're really thinking about the child's experience and what they walk away with, making sure that they walk away with the things that we want them to leave with.

Technology resources were often cited as giving valuable quick and "real-time" access to student understanding for the teacher to plan and adapt instruction.

Collaborative assessment. In addition to using technology resources to assess student understanding directly, many teachers noted the value in leveraging technology resources to gather information on students from a range of colleagues. This use of collaborative assessment tools allowed them to expand the viewpoints on a student and not rely on their own limited personal experience. "In terms of sharing, technology offers many different ways to, I guess, record my own thoughts, to gather the thoughts of others when I'm trying to share information about what people need, and then to connect to me so that I can share, maybe, the most appropriate information so they can help their children," described Erin, who worked with students in many different classes. Most participant teachers worked with other teachers and found technology to be indispensable to their shared assessments. Byron described his teams collaborative process enhanced by technology resources:

> I think that Evernote is really important, one of the things that we've found is that having a single place to put all of our notes is really helpful, especially for those of us that teach with another teacher in the room. I have an associate teacher, but then also how we can—if we're sharing those

> folders or documents with learning specialists and our literacy and math liaisons, we can all be on the same page where all of our information is in one spot.

One collaborative team member, Karen, found it essential: “I think it allows us to do best practice. It allows us to support kids at a different level because you have all this information.”

Another group of teachers found the multimedia aspects to be particularly useful when collaborating. “We can see the way a teacher is conferring with a read-a-loud or have just the audio of it and seeing—and then having them compare, ‘What you’re seeing is that different from what you heard?’ You couldn’t do that with any other thing or it wouldn’t be as exciting. So, I think technology allows that,” explained Terra.

Karen described one such tool: “We use Seesaw and it’s an app and each kid has like you can tag them and so we’ll note-take in there and tag the kids that we talked about and then also tag is it math, is it reading, is it writing, is it character, is it social studies so it’s easy to sort.” Digital portfolios were also commonly described by participant teachers like Kiera:

> We’ve tried to develop ongoing portfolios of the students, both things they have created and have uploaded or that we have seen them create and upload for them. So it helps paint a whole picture of a student, and it’s not always paper and pencil and then picture of the paper and pencil, but it’s also audio recordings or movie recordings, videos, that show the children engaging in different activities, but how we sort of show their change over time is captured digitally so that it’s a full picture and not just a snapshot.

Teachers collected audio, visual, and video to document student progress, and sometimes they even had the students collect it on their own for the teacher to review later.

Adaptive approaches. Teachers referred to many adaptive uses of technology to better teach the students as unique learners. Teachers noted that students were acutely aware of how they were grouped or what material they were given to work with, yet also benefitted from differentiation. Using the assessment data, teachers could see that

students had wide-ranging skill sets and that one lesson or resource would not meet the needs of all their students. Teachers found technology to be a useful tool for adapting lessons individually without revealing obvious differences for the group. Ronnie described adaptive technology approaches in her math class:

> I think the inclusion piece is the big one because I can make everybody do the same thing when we're in fact completely not doing the same thing. And kids will be less aware than if it's physically clear. Kids are starting to feel really aware of being different and embarrassed and any different number of things. So, I think that can help minimize it. We talk a lot about all of those things, but I think it still makes people feel bad when they're doing different things. They see everybody working on a Chromebook. They see everybody going to a number of different websites. It feels much more like everybody's doing the same thing. And they can even talk about—but I can provide significantly different things that look on their faces to be somewhat similar and that will allow me to be more inclusive.

Teachers had many examples of tools that helped them differentiate in whole group lessons. Sarah also talked about adapting reading material: "Newsela differentiates—Newslea has articles around different topics. So, for instance, during our social justice research—And you can actually differentiate the article in different ways." Sharonda described a virtual workspace where students employed choice:

> Now I'm using Blendspace by Tes, T-E-S. You can create a menu of classes. You can scaffold, and you can have extensions or challenges based on your topic. It encourages students to work at their own pace and can also provide opportunities for extended exploration of particular topics that doing a traditional lesson might not allow for.

Some teachers referred to the advantage for the teacher in these situations. Teachers were aware of the enthusiasm children had for technology resources when doing school assignments that were self-directed: "The way they're presenting it is personalized in some way, that's the hook," explained Sharonda. One described individualized worktime as a "classroom management style of everyone is working on this thing and I then have the time to go around and talk with each kid. It can be a device to allow me to get all the kids that I need to get to talk to."

Assistive approaches. The final differentiation approach was an often-cited opportunity to employ technology as an assistive tool for students who needed support or an alternative approach to content. Charles found technology to support many students, but

> especially kids who struggle academically and would have a hard time writing it out with a pencil, but they share more when they're talking, or they're making a video on their iPad, or whatever it might be that just more comes out, and I find we find out more about what those kids are thinking and what they understand in that way.

Audrey gave the same example: "There was a child who had difficulty writing so I used technology as a way to be—to tell his story as opposed to write his story. So that was one way that I was able to meet his needs." Cory, another middle grades teacher, also used tools to focus the task on the aspect she was most concerned about:

> I've tried apps that create lists for them and that have the timer on them. [For] the students who really have a hard time getting their ideas down on paper and they really need to—it's easier for them to either interact one-on-one with someone else or when that person isn't there. They're talking to the computer and the computer is writing for them. It's putting them on the same playing field as someone who can readily just write down their brainstorm or who doesn't need that help.

Reading tools were also often found to be supportive to students not yet reading fluently with their peers. Byron described a student who was able to fully engage because of adaptive technology:

> We provided her with an iPad and with an app because she didn't have material at home she could access this app so we allowed her to bring home an iPad and an app that had the book, an audio version of the book. So, she was able to participate in book clubs at the third-grade level for having the comprehension conversations even though she was also working on her decoding skills at the first-grade level.

Mira found that, at times, all of her young readers benefitted from the model of a computer partner:

> We have them read leveled books to their partner. There are different things that they can do with physical books, but there's also benefit of

> having Listening to Reading [a technology resource] where a voice is reading to you in a fluent way, where they could follow along with a text that lights up. So, getting that fluency exposure that they might not necessarily get from reading partner who is at their grade level.

Overall, teachers emphasized the power of technology to allow them to better meet the needs of their students or to separate skills in assessments of understanding.

Summary. All participants characterized technology as a learning tool where they accessed meaningful content that was not readily available in their classrooms. They found technology resources to be a productive tool for students of diverse backgrounds to generate their own content and share their knowledge with each other and a larger audience. They also found that technology tools allowed them to differentiate instruction in effective ways to meet the needs of their disparate students.

Life Tool

In addition to the unanimous perspective of the learning potential of technology resources, many teachers also characterized technology as a life tool (67%, or 20 out of 30 participants). This included systems usage such as organization, communication, and acknowledging the ubiquitous nature of technology to all aspects of life and work in a culturally responsive teaching environment.

Communication. Participant teachers found technology resources indispensable to everyday life in the classrooms. They used it for communication with colleagues, families, and students. They saw this usage as critical to an effective practice as a teacher. Ingrid found technology resources critical to her organization and communication:

> [I'm] using it as a tool to share information about what I'm teaching, to collaborate with teachers, and to organize my information … organizing data that relates to their progress and helps me collaborate with others … you're understanding that you're coming with a certain background and they're coming with a certain background too.

Organization. Organizational uses were also named as particularly beneficial to students and teachers in the learning environment. Kiera, the Grade 1 teacher, described

how technology resources help her keep track of all the information she is documenting about her students in order to design collaborative culturally responsive instruction and communicate effectively with families of diverse backgrounds:

> I think technology—it allows you to record and to capture all of these things that you're observing … Evernote for more detailed notes and recordings. We've also shared when we've done audio recordings that the students have produced or that we have produced with the students, we've shared those recordings through Dropbox as well … when you think about instruction with a child or the content that you are presenting in the class and what you are displaying in your classroom and how you're communicating, keeping all of those aspects in mind and valuing them as essential parts of the children in your classroom.

Strategies for shared data collection was often described by participant teachers. Tools for organization also helped students manage assignments, learning resources, and other important information related to many different classes, as Cory shared earlier.

Ubiquitous in Contemporary Life

The essential role of technology in life was noted by many of the participating teachers. Terra stated:

> I think it's really important so students are literate in all sorts of ways because this is a technologically literate world we live in…. We want that to just be one way to teach, one way to learn, and one thing to have. But there are other things that we use as well.

This idea of technology having an essential presence in the world and the responsibility of the teacher to support all of their students in being fluent with the tools was a recurring perspective shared.

Summary

Some participant teachers characterized technology as a life tool. They felt their students had to become fluent in technology tool use in order to have access and opportunity for learning going forward. Some participant teachers described the essential role technology played in communication and organization of their culturally responsive

classrooms. They saw the technology as supporting their efforts at equity and inclusion by streamlining their individualized systems for record keeping and communication.

Finding #2

Participants described both positive and negative experiences related to their culturally responsive teaching goals, but all (30/30 or 100%) most frequently described their positive experiences. They felt these uses supported efforts in cultivating stronger and more confident students and families.

Teachers were asked to explain how they perceived the value or quality of their use of technology in their culturally responsive classrooms. They described how they knew if students were benefitting or were having a meaningful experience or not when they chose to integrate technology resources into their teaching practice. Participants described the evidence they used to make this determination. They gave examples of both negative and positive outcomes of using technology with their students of diverse backgrounds. These outcomes are described in detail below.

Table 4. Outline of Finding #2

Finding #2*:* Participants described both positive and negative experiences related to their culturally responsive teaching goals, but all (100%) most frequently described their positive experiences. They felt these uses supported efforts in cultivating stronger and more confident students and families.

Positive Outcomes of Using Technology in Classrooms 30/30=100%

- **High Engagement 26/30=87%**
  - Increased Student Participation
  - Student Ownership
  - Motivation and Enthusiasm
  - Increased Parent Engagement

- **Authenticity 24/30=80%**
  - Collaboration with Peers
  - 21st century Skills

Table 4 (continued)

Negative Outcomes of Using Technology in Classrooms

- **Inauthenticity 15/30=50%**
  - Bells and Whistles
  - Assumptions
  - Isolation
  - Loss of Human Relationships
- **Confusion 7/30=23%**
  - Lacking Exploration Time
  - Misunderstanding
  - Distraction
- **Barriers 6/30=20%**
  - Access
- **Poor social choices online 3/30=10%**

Positive Outcomes of Using Technology in Classrooms

Every participant described specific positive outcomes they attributed to their use of technology in the culturally responsive classroom. They described high engagement of their students when incorporating technology, especially student ownership, self-motivation, and enthusiasm. They also saw as an additional benefit an increase in family awareness and engagement in school.

In addition, teachers noted greater authenticity in their work with students of diverse backgrounds. They saw more authentic collaboration between students and increased confidence in 21st century skills for students. Each positive outcome that was attributed to the use of technology resources in classrooms will be described in greater detail below.

High engagement. Eighty-seven percent of participants (or 26 out of 30) interviewed described an increase in student and family engagement from wide-ranging backgrounds as a positive outcome of using technology resources in their classrooms. The examples provided as evidence of engagement included increased student effort,

greater student ownership, student expressions of motivation and enthusiasm, and improved parent engagement and awareness of school events. These behaviors were all described as essential to the teachers' culturally responsive practice and philosophy.

Increased student effort. Many participant teachers appreciated the active engagement of students when they were interacting with technology resources on class lessons. Jason echoed a common refrain from interviewees where the technology immediately engages students: "If the technology's used as a hook to get the students really involved in the assignment, I think that's a good use of technology."

Byron described a lesson where students were conducting researching on their own using online resources and began to offer classmates tips and tools they came across pertinent to their topic:

> One of the most exciting parts of that unit, in particular, was seeing kids getting up, showing a new website, or a new video that they found. Saying, "Oh, aren't you doing this person, I found a video about them."

He was aware that they were actively engaged in their own work but also in the work of their classmates, doubling their learning opportunity and expanding the equity and inclusion in the classroom community.

Student ownership. Technology use that increased student independence was frequently mentioned as a positive outcome. "Independence is my marker for things," said Cory, an older grade learning specialist. Greg described this increased independence and ownership as evidence that the technology approach was succeeding in his goals:

> All the students are able to internalize the class goals, then you see children actively communicating, you see children sharing information, collaborating, and you see them regulating, appropriately, for their developmental age, regulating their emotions in a way that allows them to continue to do their work…. I try to create a space where children understand that they have the abilities to have conversations, negotiations, and even pushback on anything that's presented in the classroom.

Teachers were careful to select tools that were accessible in order to foster this independence and ownership. For example, Kiera cautioned that too much complexity for young students did not encourage independence:

> We think about the interface and we think about how easy it is for students to navigate that independently. If it's something that relies a lot on reading or requires a lot of steps that might be hard for children to have the memory to go through all of the steps, that doesn't seem appropriate, necessarily. So, we sort of think about how well they can navigate that independently and feel empowered with that technology.

Other teachers described student autonomy to differentiate as an indication of the usefulness of technology. "They get to take it to their comfort level," described Sharonda.

Empowering students to pursue learning on their own was frequently mentioned as a positive outcome. For example, Mary said, "Each child feels ownership over the technology. They feel like it's something that they all have access to, it's not for some." Teachers leveraged this access to allow students to monitor and design their own learning plans.

Motivation and enthusiasm. Teachers frequently highlighted the engaging and multi-sensory quality of technology resources as increasing motivation and a positive outcome of their integration of technology resources. Teachers described technology as a resource to help students get needed practice in rote skills necessary for further learning in their culturally responsive classrooms. They described some of the more rote practice as dull but necessary and students didn't practice enough to master skills that were needed to progress. "If there something that I just need kids to do a bunch of times, this can help them have that road to practice when it's necessary," reflected Ronnie. They found many engaging tools that motivated their students to practice skills that they were less successful motivating children to practice in more traditional mediums. Byron used a range of applications to provide much needed practice:

> I think one other way to also look at applying skills, so thinking about – kind of you can play math games with manipulatives, you can play math

> games with digital manipulatives, you can do practice things online… or to practice skills that they've learned in school…. So that's one way in which she was able to access the curriculum through technology, through the ways in which we provided it to her…. So I think, again that technology is one other tool that kids can use to gain more content, knowledge.

Sharonda thought about the need to offer a variety in her class and was intent about keeping students and herself motivated and applying effort:

> I think the challenge for me on a daily basis is walking in that classroom and making it as exciting for me as I want to make it for them. It can't be lima beans every day. Who wants to have a steady diet of lima beans? You gotta (sic) mix it up. You want to get them in the mix. You want them to be on task. If I do [the same thing] all the time, I'm habituating, and it will lose its luster. In other words, it won't the ju-ju or the gizmo; it won't be as attractive and as exciting. When they get to use [the technology resource], they're saying – Wow!"

Teachers had a "by any means necessary" approach to planning instruction. If something motivated and engaged students to push through challenges, they wanted to use it. Though not a particularly high-level application of a valuable resource, time on task and repeated practice do impact learning, and teachers were aware of the disadvantage to students who did not effectively engage in much needed practice. Technology motivated some students to work longer and harder, and participant teachers saw benefits to this increase of effort and engagement on their success in school.

Increased parent engagement. Teachers found technology resources to be an empowering tool when connecting and engaging with families. Delivering effective family engagement is a continuous struggle for teachers. Such engagement improves student outcomes and empowers families to have a positive impact on their child's school success (Mapp & Kuttner, 2013). Family engagement efforts that build trust between home and school and support families in academic socialization, where families can connect student learning in school to family values and aspirations, lead to the strongest positive outcomes (Mapp & Kuttner, 2013).

Some teachers found that multimedia tools allowed them to better show, rather than tell, what children were doing in their learning so the family and the teacher could

work together on next steps to support learners. Priya explained how the images were better able to convey than her words and led to a stronger partnership with families:

> It was hard to explain to a parent what math time looked like for their student and where the struggles were. And so, I recorded the math and at the conference I was like, "So, this is—" They were able to see it and it wasn't until then that they were like, "We get it" and got some support. Because it was just hard to put into words what it is that was giving their child a challenge and they saw it for themselves with the prompting and the questioning and the support—the scaffolding—they were like, "Whoa, thank you for this."

Some teachers also used these tools to share positive accomplishments, not just challenges, about individual students. Dierdre found sending home evidence of student work particularly beneficial:

> But I have communicated with families differently just showing them some of their student's work. Sharing a particular family, the young lady did a very nice job—this was in my gym class—on a presentation and the mom wanted it shared so she said she wanted to show it to some friends at work. Something that can be fruitful and enhancing to the parent, child, and teacher relationship especially where there's data records and you can see, check in and, "How are you doing?" It's a conversation starter.

Some teachers leveraged technology resources to bring school into the home instead of families into school. Charles described setting up a class Instagram and sending out tutorials for sign up:

> We did do a how-to sign up curriculum night, and we sent out a little video with a whole tutorial about how to do it, and I think we found a lot of families that signed up specifically this year to see our Instagram, and I think people liked it … to teach people how to get on there, and they did it. The only account they were following was ours … and we posted maybe two or three photos or videos a week from the classroom, and the feedback we got was that it just is a window into what goes on in the classroom that doesn't always come through in the emails we send or the descriptions we give at a conference or something like that. Being able to see what the class looks like when they're sitting there together, families liked that.

Kiera described a first-grade study that engaged families similarly:

> When we're doing the family study, we talk about music in families, and for some families' music is a very big thing to them. It's very important.

> It holds a lot of cultural significance. It's a way to bring people together. It's a way to pass on traditions. So, thinking about how you record your family singing at home and allowing that to be played in the classroom even if the family can't be present, technology can sort of provide that bridge and show the rest of the students what's important to the student and the family.

Another noted usage was for communicating with families in equitable ways. Many teachers used technology resources for most of their family communication but were aware of the dynamics in school where families vie for limited resources like teacher time on conference days. Erin made sure to communicate in a range of mediums:

> If parents don't have the time to sit and meet with me, I reach out to all the parents of kids I support, and some parents don't have the time, that they say, "Can I call you during my lunch hour?" And so I say, "Okay, I'm going to send you an email about what we'll discuss, and then just try to have it in front of you when we discuss it." Just the use of email and PDF images and things like that can be helpful, in terms of equity, access to materials.

Teacher time is a precious commodity in schools, and teachers found some of these technology uses to improve their reach to a greater range of families.

Effective family engagement was an active goal of many of the teachers interviewed. Participant teachers had found many ways to use technology resources to connect families to school and to their child's learning experience, an essential component of their self-described efforts to create equitable and inclusive learning communities.

Authenticity. Participant teachers described authenticity as a positive outcome of technology use in their classrooms. They saw authentic collaboration between students, a stronger and broader sense of identity in students, demonstrated confidence in 21st Century skills, and an expanded reach for individual student ideas. They also found greater authenticity in their own work as educators; they felt they could target instruction more authentically and had expanded their network of educators through the use of technology resources in their practice.

Collaboration with peers. Teachers sought collaborative opportunities between students and between themselves and students. Some described an increase in this

collaboration through the integration of technology. Some described the opposite, as will be described in the negative outcomes section. Cory looked for evidence that her use of technology influenced peer connection. “[Did it] facilitate a conversation between them and someone else? I think that for me that’s the marker that the technology worked.”

Other teachers described successful projects where they felt the technology use had sparked inspiration between peers and allowed deep collaboration to occur. Byron talked about another historical research project where students connected their topics:

> I think that that gives them a lot of freedom to explore and if they’re comfortable in that exploration then they’re able to kind of reach out and make the connections between what they’re learning, what they’re friends are learning and support each other in that learning. “Oh look! Our people are in the same … this is a song about both of the people that we’re studying.”

Projects leveraging technology resources were described as authentic collaborations where students could learn and influence each other.

21st Century skills. Participant teachers were focused not just on class goals but also on life readiness when describing technology use outcomes. Teachers wanted their students to be successful in the classroom and confident in life skills. Jerry thought about her resource selection beyond what her colleagues were using:

> I feel like it’s appropriate for the age group as well as where we are right now, like what needs to happen and what kids need to learn math, but so much more than math needs to be taught…. I also know that it’s something that—technology changes so frequently that it’s important to makes sure that students aren’t stuck in one set of workflow where they have to save everything in this one place and then they have to move it to this one file because as systems change they need to be able to adapt to all of that.

Karen, who worked with much younger students, also thought beyond her class goals when making resource decisions:

> I think there is the piece of that part of our job as teachers is to prepare students for what’s in front of them and I think that it’s a very digital world that’s in front of them and giving kids who might not get this exposure at home, might not have an iPad, might not have a computer, might not learn how to type otherwise, things like that, does speak to the equity discussion in

> that those are skills that they will need … understanding that one child's or one family's experience is going to be very different than other families or other children based on what they're bringing to the table.

These early grade teachers were mindful of the importance of student fluency with technology tools. In addition to encouraging all of her students to gain 21st Century skills, Greg thought deeply about the current demographics of the STEM field and the opportunity she had to change the landscape through her teaching. She described her commitment to use technology with the youngest students: "Technology in the lower grades is so important is because it's an opportunity to get children of color and girls very interested in technology in a very level playing field." She went on to describe her impact:

> Coding is a place that is predominantly White and male, but we have girls that are very good at coding and boys who actually respect them for being wonderful at coding. And we have kids of color who are also extremely marginalized in this [STEM] community, who have an opportunity.

Teachers recognized that it wasn't enough to provide equitable opportunities to use resources, but also to have access to those tools through guided instruction instead of assumed fluency. "Now I don't just assess them for no reason. I usually create videos—tutorial videos—to teach them how to use the technology. They have to learn how to use the technology, too. So, in that sense, it's part of the assessment," mused Hera. Jason cautioned, "I think that I do a good job of not assuming any technology competencies necessarily and am able to scaffold the lessons so that everyone is able to get up to speed."

Summary. Participant teachers described how they knew if students were benefitting or having a meaningful experience or not when they integrated technology resources in their teaching. They saw multiple ways their use enhanced their curricular, pedagogical, and community goals. Every participant gave examples of positive outcomes they felt were the result of specific uses of technology in their classrooms.

These included high engagement of their students of diverse backgrounds, increased student effort, student ownership, self-motivation, and enthusiasm for learning. They also saw an increase in family awareness and engagement in school. Teachers noted greater authenticity in their work with students when incorporating technology purposefully. They saw more authentic collaboration between students and increased confidence in 21st Century skills for students.

Some teachers also identified specific negative outcomes of some of their technology use. Specific examples of these negative outcomes are described below.

Negative Outcomes of Using Technology in Classrooms

Some participants found that some technology uses created negative outcomes in their classrooms. In those circumstances, technology use could lead to inauthentic learning experiences, confusion for the students, barriers to authentic learning, and poor social choices online as examples of negative outcomes. Each will be described fully below.

Inauthenticity. Participant teachers held themselves, their colleagues, and their students to high standards. Authentic engagement and learning were a priority in their culturally responsive classrooms. Sometimes technology use led to negative outcomes and a feeling of inauthentic learning in their classrooms. Technology use that functioned as “bells and whistles” rather than for a meaningful purpose, assumptions users made when integrating technology, isolation from other students, and a loss of personal human relationships were all described as examples of negative outcomes when technology resources were used.

Bells and whistles. Though certain uses of technology may be touted by the community, in actual application teachers may deem them meaningless: decorative rather than substantive. This “bells and whistles” mentality was frowned upon by the participants in the study and something they looked out for when incorporating

technology resources into their planning. Karen said, “I think thinking critically about does this actually enhance the lesson or are we using technology just to use technology and always saying no when we’re just using technology to use technology.” Jason concurred and was aware that not all uses were created equally:

> I personally try not to use technology for technology’s sake, but rather it’s you know, the phrase I use is it’s what makes the magic happen…. But technology just to you know, otherwise spiff up what’s a flashcard or a PowerPoint, that’s not exciting.

Winnie thought not only about purpose, but also if the technology was actually preventing a child from developing the intended skill:

> I think one of the downfalls of technology can be when it’s used as a crutch instead of being honored for what it actually can do for a child … if you want to teach reading skills like annotating, main points, or having questions associated with different parts of a text, chunking text, things like that, technology can be a bit of an impediment…. How to know it and not overuse it?…. I really just want to honor it as its own modality or its own platform and not have it become something like a textbook that’s online…. I want there to be really discreet reasons why I’m doing something with technology.

Dierdre considered the difference between doing something online or in person, especially for her youngest learners. She found developmental considerations to be an important aspect of her decision-making process:

> I feel for the younger students I think they tend to value both. But I do think that for the younger students I tend to—and by younger, I mean I usually teach first or second grade—I tend to do the physical demonstration because I feel it’s really—this might be the first time they’re ever seeing it—so I think it’s really important to keep that authenticity of this is a human doing it right here in front of you. They have the questions. We can kind of break the skill down that way.

Participant teachers were actively thinking about whether their use of technology resources was meaningful for their students beyond engagement. They sought to incorporate technology that also supported their learning goals, and if not, they left it out.

Assumptions. Some participant teachers reflected on assumptions they made initially about families' access to technology. They became more thoughtful after realizing their assumptions led to misunderstandings. Charles talked about knowing that all of his families had access to email, but that didn't necessarily mean they received his messages. Access is only one aspect to consider; use is also critical to strong communication:

> There has been sometimes where I feel like it would've been better not to communicate with particular families by email because they didn't check their email frequently or have constant access to it, and I think that was an assumption that we made that they would. And so, sometimes, I think it gets in the way, the reliance on technology to communicate with families.

Priya used to work in one kind of school environment and then moved to another. She found that making assumptions and transferring one set of understandings to a new setting would not be successful:

> There are times when I'm—like I kind of know my families now but with other, and the population that I'm working with—where they have access. With my other peers that are teachers in the public school, there are times that sending an email or this email might not be working. They might not have access to a computer at this time. So, making that assumption that everyone is tech savvy or everyone has the technology is something I really haven't thought about until a conversation came up and I'm like, "Oh, wait. What?"

Participant teachers were careful about making assumptions regarding access to technology resources at home. They were aware that access and use varied among families and that they needed to know how families preferred to receive school communications in order to be effective.

Isolation. Another example of inauthenticity came from a teacher who was thinking about the use of social media. Brad found many positive outcomes in his use of social media but was critical of the way he saw some others engaging with it: "I think it suffers from the problems of social media that have been talked about a lot since the last election of sort of siloing with people who you agree with." Many teachers valued

students having exposure to multiple viewpoints. This teacher worried about technology providing a narrower point of view for some users.

Loss of human relationships. The final form of inauthenticity described when leveraging technology resources was the potential for technology interactions to replace human interactions. Teachers valued the interpersonal connections they made with families and students, and some worried that technology would get in the way of that relationship.

Ronnie described her concern and approach to choosing face-to-face over technology communication tools:

> I really see the value in relations being face-to-face. Certainly, I have times when kids are writing responses on their Chromebooks or I'm—the email is definitely a way that I'm making relationships, but in terms of like—the vast majority of those relations I really want to be in person because I think you can get a whole lot more out of it. And when I'm talking with a kid who's struggling or who's thinking through something, I think it's more important that I be physically sitting there. So, I try not—I don't think I use technology too much in those relational moments.

And Brad, too, worried aloud that "I feel like really that the relationships in the classroom, that's an age-old business and we shouldn't get so swept away with, 'Oh, well. There's been this research in pedagogy or there's been this research in or there's this development in technology.'"

Confusion. Participant teachers also described some forms of confusion that arose in students as a negative outcome of technology integration. They found that confusion existed when there was not enough exploration time with new tools, evidence of misunderstanding when using a tool, or distraction with the technology rather than in-depth learning of the goals.

Lacking exploration time. Many teachers were observed giving students time to explore technology tools they were using for the first time. One teacher, Byron, talked about the importance of the exploration:

> I think that what's really important and that we try to do is kind of give a lot of exposure to kids, or give kids a lot of time to be exposed to these digital tools…. I think that there needs to be a little bit of play time, explore like, "this is exciting" but then being really clear that while a computer or an iPad can be a play thing, it can also be a learning thing and it can also be a school thing that you use with a purpose.

Byron knew from experience that if children didn't have exploration time, it was harder for them to use the tools effectively for the purpose he intended. Students needed unstructured use before structured use could be leveraged.

Misunderstanding. Participant teachers were careful to see that students were using resources in ways that increased learning goals rather than diminished them. In talking about tools that didn't effectively replace traditional resources, Winnie remarked, "Some students don't read as well when they're looking at something on a screen." She made sure to see if there was a negative impact before replacing a traditional resource with a digital one.

Distraction. The final form of confusion described by participant teachers was distraction. Many teachers cautioned that technology resources were a frequent source of distraction for students and had the potential to take away focus from the original goal.

Byron thought that just as with "any other tool … technology can be a distraction, just as blocks might be a distraction."

Sarah had to think about when to offer technology resources and when to ask students to use traditional tools:

> I mean, it's tricky because sometimes kids can get very distracted with technology, so, sometimes I prefer them to be taking notes and starting their writing in their writers' notebooks. So, I know that they're on task. That is sometimes when kids are on their computers, you don't really know.

And Winnie worried that if she sent material over the internet, instead of distributing hard copy, students might become quickly immersed in unrelated tasks:

> If there's an article that I want students to read thinking about should I email it to them or should I print it off and photocopy it and have them do something different with it depending on what I'm trying to teach using the

> article? And sometimes it's easiest just to put a link up but I think sometimes that lead to distractions.

There are so many other personal uses of technology resources for students that teachers were sometimes wary of bringing the tools into the classroom.

Barriers. Having barriers to technology use at home was cited as a negative outcome of technology use in the classroom, especially when it came to communication with families. When students lacked access at home, it set up inequities in the students.

Access. Participant teachers noted that some students had frequent access to technology resources at home while others had limited or no access. Byron said, "I think one of the barriers to using technology in the classroom can be access." And Ingrid reflected, "I think what happens sometimes is not everybody has access to technology."

Sarah took care to consider equity when using resources for family communication:

> It definitely is tricky for the kids that don't have access to their computers at home for different reasons…. I know the equity point that I think in that regard, is that—like I try to really think about that equity piece when I send out signups…. I try to give advance notice that I'm going to send it out first thing Saturday morning, or something like that. Or like 5 p.m. Monday.

Considering access helped teachers prevent barriers to full participation of the students and families in the classroom.

Poor social choices online. Some participant teachers specifically named students' poor social choices online as a negative outcome of their use of technology in the classrooms. They showed examples of inappropriate messages in public forums that led to disciplinary action. Jason reported that "on the counter side, what I see in my advisees with their use of technology is not always making the best choices, but as eighth graders, that's par for course." Sharonda admitted that "because they're seventh graders, they're going to do some naughty stuff."

Summary. Some participants found that technology uses created negative outcomes in their classrooms. They described ways technology created inauthentic learning experiences, including technology use as bells and whistles rather than for a meaningful purpose, assumptions users could make about equitable access, isolation from diverse ideas, and a loss of personal human relationships. Additionally, confusion for the students, barriers to access, and poor social choices online were given as further examples of negative outcomes.

Finding #3

> *All participants (100%) indicated that they were self-directed and learned about their use of technology resources for culturally responsive approaches through informal means, including from peers who held similar values.*

Teachers were asked to describe how they learned to use technology proficiently in their practice and how they kept themselves up to date in their pedagogy and practice. They described how they learned best and where they developed confidence. Participants described the specific strategies they found most beneficial to their development as practitioners. They gave examples of both formal and informal approaches that supported their learning. Some also described impediments to their learning. These perceptions are described in detail below.

Table 5. Outline of Finding #3

Conditions that Facilitate Learning

- **Informal Learning Approaches 30/30=100%**
  - Students as experts
  - Peers/Professional Learning Network
  - social media, online resources
  - Asking for help, asking questions
  - jump in and muck around – self, curiosity

- **Formal Learning Approaches 25/30=83%**
  - Workshops, conferences, reading
  - Presenting and sharing with others
  - In house experts

Conditions that Impede Learning

- **Access to resources (including time)9/30=30%**

Conditions that Facilitate Learning to Use Technology in Ways that Support Culturally Responsive Pedagogy

Every participant shared informal learning approaches that supported their learning to use technology in ways that aligned with their pedagogy. They described learning from their students, learning from their peers, and learning from professional learning networks. They also found strategies through social media and online resources. They learned by asking for help, asking questions, being curious, and "mucking around" with tools to see how they could be leveraged in classrooms.

Some participant teachers (25 out of 30, or 83%) described formal approaches that supported their learning to use technology resources in ways that supported culturally responsive approaches to instruction and community building. They noted particular workshops, articles, and conferences where they developed skills. They described in-house experts in their schools who supported their learning.

Additionally, a small number of participant teachers (9 out of 30, or 30%) described impediments to learning to use technology resources in ways that supported their pedagogy. These included the teacher, family, or student lacking the access or skills, there not being enough time for exploration or play with resources, and their competing responsibilities hindering learning successful integration strategies.

Each will be more fully described below.

Informal learning. Every teacher interviewed described informal learning means that supported their development of practice. People who supported them included students as experts, peers, and professional learning networks. Places that supported them included virtual spaces and online resources. Behaviors such as asking for help, curiosity, and trying things out independently were reported also. Each is described below.

Students as experts. Teachers frequently cited students as their teachers when it came to technology integration, especially those who taught in the middle grades. For example, Cory said:

> And the kids; the kids actually teach me. They kinda (sic) tell me the tricks. They know them better than I do, so…. Michael [a student] gave us a cheat sheet on all the ways to use—like how to use like your Google, so the Apple C, the Apple Paste.

Sharonda praised the students' skills when it came to tech support:

> They're the techie in the room. I ask who can help me? They point to two or three people maybe it's one, or in the course of a class if someone is having trouble and it's a tech problem, they know who to go to…. I'm counting on a kid in the class to say help me this isn't working.

Teachers described their students' knowledge in glowing terms and reflected their appreciation and curiosity for the students' suggestions to improve learning strategies and tools.

Peers and professional learning networks. Participant teachers named other teachers as a tremendous resource to their learning. They appreciated hearing from peers and colleagues and watching others to continue their learning. When Jason thought about

how he kept up with new approaches, he remarked that "to stay relevant is having the conversations with people." Charles was also inspired by his community, where teachers were familiar with technology and modeled open sharing:

> I think it also definitely helped that I worked with a teacher very early in my career who was really comfortable with the technology, so having a model for using technology in the classroom was definitely helpful for me…. I think there's a lot of word of mouth involved. I have a network of other teachers in school and outside school who I talk to and find out about what they're doing with technology and share what I'm doing, and I think there's just a lot of informal networking about it…. I think it is actually mostly just informal conversation with other teachers who also use technology.

Ingrid and Karen, elementary school teachers, found that sometimes even formal structures lent themselves to informal learning opportunities. Ingrid talked about "after-school professional development as teachers [where] we'd meet together in the library" as fruitful. Karen found graduate school peers sometimes more critical to her development as an educator than the formal coursework she was signed up for:

> I think a huge benefit for me recently was at graduate school and talking to people from 50 different schools and talking about these issues of diversity and equity and how it's handled and approached in different schools, at different grade levels.

Informal learning with peers was a critical strategy for participant teachers in learning to use technology resources in ways that aligned with their values as teachers.

Online resources, social media. In addition to in-person relationships, many teachers also described online resources and social media as a fruitful learning opportunity. Some teachers employed technology resources to find better tools, resources, content, and approaches to develop stronger lessons and pedagogy. Social media was one place educators went for strategies. "I might do a lot of research about iPad apps that can be used at home and in that, I have to think about which apps work best and which apps wouldn't be so beneficial," reported Ingrid. Similarly, Charles looked for inspiration in online platforms: "The thing I use my Twitter for is to talk to

other teachers who are doing technology things." And Kiera looked for peers online who could invigorate her practice:

> A lot of social media, I follow a lot of other educators on Instagram who are often posting about cultural competency in their classrooms or new digital learning or technologies that they're trying, so trying to sort of develop my personal learning network through social media.

Jason, too, reported having some of his best professional encounters online: "I find a lot of those conversations for me happen on Twitter." Mary was committed to her online communities and "staying active within education networks." Erin talked about turning to the internet when she sought ideas:

> I guess, more recently, it's being in the Twitterverse. It's knowing some of the experts to follow who are constantly writing or researching or trying out new techniques and writing about them. It's trying to keep up and follow and read.

Sarah followed a number of online resources to support her selection of classroom materials for students that reflected her goals:

> There's Teaching Tolerance, you know, online … literature is trying to make sure that my library feels diverse and represents different—Even within the curriculum. Like, you know, the fourth-grade curriculum. A big chunk of it is like colonial—the colonialist, the colonists. And so, within that though there is a lot of space to think about perspective, and different perspectives. And so, just kind of like—I guess, in thinking about diversity in that way. Kind of like highlighting the different perspectives, even with in that time period. Like the perspective of the slaves, you know?

Overall, many teachers found online resources and social media to be a useful place for professional growth and support as they sought to integrate technology into their diverse classrooms.

Asking for help/asking questions. In addition to peers and online resources, participant teachers described behaviors that supported their learning. Asking for help and asking questions were strategies teachers found particularly conducive to their learning to leverage technology resources. Audrey described her strategy for learning as one of inquiring actively: "Constantly asking questions." Jerry, too, found that this active

inquiry was conducive to his growth: “Going and watching other people. Asking questions, asking for help. People who are really into technology are normally also really open to sharing it.” Winnie also found actively reaching out to her peers to be a great resource, “most of all, colleagues. Speaking with colleagues about new ideas and asking them for their thoughts on activities and philosophical issues and education.”

Cultivating networks and proactively engaging them through direct questioning was frequently mentioned as a learning approach. Greg said she didn’t hesitate to reach out to people in other school communities for support: “I was very good at asking for help to the greater larger community of technologists.” This led to quick success for her.

Jump in: Curiosity and “mucking around.” Another behavior that supported lifelong learning was risk taking. This included trying things out without any formal training, “mucking around” with tools, and experimenting. Teachers used these strategies to learn new approaches and resources that might support their curricular and pedagogical goals. Karen found her learning to often be serendipitous, where she was in the right place at the right time and received exposure to new tools:

> I think that the availability of it … part of it was just trying it out…. I also think timing was just a benefit that I came in as a teacher the year iPads were introduced at school so there was a lot of talking about how to use the iPads that year. So, I think I benefitted from that timing also.

Mira saw the kids’ willingness to take risks and try things out as supporting her own risk taking:

> Let’s say I’m developing a lesson plan, and I want to use something I’m not really sure of, this might be a great workshopping time to see how that applies in the classroom. And generally, the kids, because they have such great exposure to technology, are really patient with how that comes out. They understand that we’re all working on something, so this is something that needs to be workshopped. They’re very flexible with it.

The notion of being self-taught came up for many participant teachers. Hera saw herself as her own main teacher when it came to technology integration:

> I am self-taught. I've always been using technology way before—I'm a very early adopter. I'm just very fascinated with technology. I didn't really have any teacher training in technology.

Sharonda also immersed herself in the resources and found ways to make tools available and meaningful to her students:

> And it was birth by fire…. For me, technology happened when I came to teaching. I had it at the graduate level, but it was birth by fire in teaching, let's try this, let's do this.... I think I'm a work in progress with the technology.

Some teachers described their mindset as critical to their learning. The notion of risk taking and openness were essential mental approaches when working with technology resources. Audrey shared that her mindset and those of her colleagues influenced her use:

> There was just an openness and a willingness to just learn and that, that was something that was valued. By using technology in a meaningful way, was really valued.

There were many informal learning approaches described by the participant teachers in this study. Teachers found that students, peers, social media, and behaviors and mindsets contributed to their learning to successfully integrate technology resources in their classrooms.

Formal learning. In addition to informal learning strategies, 69% of participant teachers also described formal learning strategies that supported their successful integration of technology resources in the classroom. These formal approaches included conferences, articles, workshops where teachers both attended and formally presented, as well as in-house experts and learning facilitators and formal roles and responsibilities that gave them confidence in their schools. Each is described more fully below.

Workshops, conferences, published articles. Participant teachers named consistent workshops, conferences, and journals and publications as supportive learning strategies when seeking to integrate technology resources into their classrooms. Charles mentioned conferences as a strategy for his learning: "I certainly have gone to conferences, and

workshops, and things like that about TWT, or I went to the Tech Teacher conference."

Mary found a mix of both content and tech conferences to be the best approach for her:

> I try to attend PD's that provide opportunities for me to learn about best practices, new practices…. Attending conferences when possible…. I try to attend the teaching with technology workshop. I find that helpful…. As far as conferences, I have not attended ISTE, but it's a goal. And I have—I've been able to attend the People of Color Conference (POCC), which doesn't focus on technology, but there are times that I've been able to take workshops that fall under the umbrella of integrating technology into classroom work.

Jason did not enjoy the didactic workshops he had participated in but rather appreciated the project-based workshops, where participants got to use tools to make things and guide their own learning:

> I'm not a huge fan of going to conferences and sort of sitting and listening to how it sounded rather going to like an institute where I get to work on something and have tangible results.

Jerry described the benefits of discussion and reflection while belonging to a sustained formal group that met regularly at her school and had a facilitator:

> This year I did this thing called PedTech, which is Pedagogy and Technology. It was a yearlong workshop. And we would just sit after school on Tuesdays, have some wine, and discuss whatever we were doing in our classrooms with technology.

Winnie attended a conference specifically for teachers of color in independent schools. This affinity space she saw as supportive to her learning:

> Things like the conference in Anaheim, the People of Color conference was really just a very eye-opening opportunity to hear from people all over the education sphere and learn language around how to talk about race and diversity…. And then you kind of gain the tools and language to talk about those things, so I'd say conferences are really helpful.

Teachers looked to experts and published material to inspire and challenge them. Winnie described published articles and books as very meaningful to her ongoing learning:

> I read a lot. So, I read all of the newsletters we get for example from the Independent School association or anything relating to topics in education I find I'm immediately drawn to. I recently put in a big order of books for something that I'm teaching about genetics and race because I found that kids have really wanted to talk a lot about race when we're discussing genetic differences amongst people.

While peers and informal learning were the most frequent and authentic learning strategies for the participating teachers, formal learning strategies were also named by many participants as beneficial to their learning.

Presenting and sharing with others. In addition to attending conferences, reading published material, and other formal approaches, a number of participant teachers found that stepping outside their comfort zone and sharing with other teachers in structured workshops helped them to learn and to grow as technology users.

Ingrid went from an informal gathering with colleagues in her own school to collaborating on a presentation to share her discoveries with a larger and unfamiliar audience of independent school teachers:

> We were sharing information. And then I went to Teaching With Technology and did a workshop for that but also was able to observe my other participants and other teachers sharing information about technology.

Edwin had a number of formal groups he belonged to, and actively engaging in these groups gave him the opportunity to learn and lead at the same time:

> Weekly affinity group meetings. Not just with the faculty but also with students. There are several others, like the students of color organization; there is the GSGA that I'm also involved with…. We have several…. We've also had the opportunity of having several speakers come in and talk to us related to, again, issues of equity and that for the most part—yeah, it's been mostly about equity, and race, and culture, and they've also provided, again, resources.

In addition to participating in leadership groups, many teachers also looked to the people in their schools with formal roles and titles for inspiration and learning opportunities.

In-house experts and facilitators. Technology integrators and educational technologists employed in private schools were appreciated and valued by participant teachers. They named these and other in-house experts as guides and inspiration to their practice. Some teachers understood the role right away, and others had to connect with that person over time. For example, Erin knew right away that the role provided her support: "I feel that we're in an environment with many people who can help." And Sharonda remembered wondering about the purpose of the position when she first arrived, never having worked with one before: "What is a tech person, what do they do? Do they fix my copier or my printer? Or are they going to help me teach a lesson about whatever I'm working on?" It took a little while for her to realize how essential this role would be to her development as a teacher.

Participant teachers described these staff members with formal roles as incredibly easy to work with and supportive of their lack of knowledge. Priya liked how proactive the technology staff were at her school. They didn't wait for you to come to them; they came to you. They co-taught, dropped in, and sent out suggestions with an offer to follow up on any of interest:

> What works for them might not work for me and just take little pieces and year-after-year just remembering and what was nice our technology integrator would come in with ideas too and I would always invite her to—She would tell me, "Well, how about you come in and show us."… I really didn't have to put much effort into that because our curriculum coordinator she just sends emails all the time about workshops that are happening and then you'll just read through and see what sparks your interest and what you're excited about and some of them were mandatory. So, you just keep on going … our tech integrator, would teach us new games or devices that we can use to like eBook and how to record and things like that just like one away.

The technology experts used different approaches in different schools, but participant teachers were openly appreciative of their knowledge and skill and often took them up on offers of support and ideas.

While most participants talked about ways they were supported and developed as educators integrating technology uses that were aligned with their practice, some participants named impediments to integrating technology successfully. These will be discussed in the following section.

Conditions that Impede Learning to Use Technology in Ways that Support Pedagogy

In addition to the many conditions that supported teachers in successfully integrating technology, there were a few participant teachers who reported time and access as impediments to the successful integration of technology resources in classrooms. Each will be described more fully below.

Access to resources. Some teachers found that limited access to resources came up in their attempts to integrate technology into their classroom practice. For some, it was a lack of access for the teacher, while for others it was a lack of access to resources for the student or family. For example, Mira found that the lack of experience in her own life made it challenging for her to authentically integrate technology initially:

> Growing up, I don't think I had a computer in my household until middle school, so I think in elementary school, we had typing class and things like that…. In high school and college, there was a need for everyone to have an individual computer, and so I'd feel uncomfortable with accessing programs that you'd need for college.

Priya thought about access in relation to her student population and felt the different experiences and opportunities the children might have had would definitely impact their opportunities to use the resources:

> Recognizing the population that I'm working with where they have access to technology. So, you know, I would share like each student would get a password and login for like Reading A to Z so that they can practice at home and stuff. And really, I've never a second stopped to think like, "Wait. Maybe someone doesn't have access to login to this."

Hera felt that the school limited the opportunities through the allocation of resources:

> They only want you to use the school-purchased software. So, for example, if you want to do an add-on—Let's say you found that add-on on Chrome and you want to add the add-on to Chrome…. They don't even have support for that. They'll say, "Well, you figure it out." They're afraid of any new thing because they have limited support. So, faculty is kind of on their own devices trying to figure out what to use. So, there is support, but very, very limited to their enterprise software.

Time. Time was another factor that impeded the successful integration of technology in the classrooms of some teachers: time for students, but also time for teachers to learn and explore before jumping in. Byron wanted to be sure that students had the opportunity to openly explore tools and resources before being asked to apply them in learning contexts:

> I think that that's something that maybe has felt like its hindering in the beginning, but I think that by front loading the exposure to technology and other tools that we can kind of get through that quicker.

Greg was more concerned about her own time. She described some of the distractions her job placed on her that prevented her from developing to her potential:

> The first place that I worked at, it was incredibly difficult to stay relevant and current mostly because I had too many jobs…. I don't have all these competing responsibilities that take me away from having the ability to innovate now.

Overall, participant teachers named many factors that facilitated their learning to integrate technology resources in school, including informal and formal learning strategies. Some teachers also experienced impediments to integrating technology, namely, time and access.

Chapter Summary

This chapter presented the findings from the interviews, focus group, and document analysis. These three data collection methods helped provide a more complete understanding of how teachers who self-reported as culturally responsive perceived and used technology resources in classrooms. The three key findings that corresponded to the

three research questions are summarized in the chapter using the participants' own words to illustrate the findings.

The primary finding from the interviews was that participant teachers used technology as a tool for learning in ways that allowed them to provide and develop content more relevant to the diverse perspectives and goals of their students than is available in traditional classroom resources. This finding arose from the descriptions of 100% of the participants. As they characterized the role and uses of technology in their classrooms, they provided examples of knowledge-building and differentiation activities. These uses supported their efforts in cultivating stronger and more confident students and families.

The second finding was that participants indicated both positive and negative outcomes of their use of technology. Everyone described some positive outcomes (30/30, 100%). Many participants (26/30, 87%) described increased self-directed school engagement among students of diverse backgrounds. Additionally, authenticity in a range of learning opportunities that included the use of technology where students could advocate for their own rights as well as the rights of others was also discussed. At the same time, some teachers (20/30, 67%) provided some cautions: inauthentic experiences, confusion, barriers to access, and poor social choices by students online.

The third finding was that all participants (30/30, 100%) indicated that they learned about the use of technology resources for culturally responsive approaches through informal means. These included people such as students, peers, and professional learning networks. Virtual places and online resources were also named. Teachers described specific behaviors they learned about, such as posing questions and risk taking. Some participants also cited formal learning approaches, including conferences, journal articles, and in-house experts in their schools. A few participants mentioned barriers to learning, such as lack of access and time.

The researcher began this inquiry with a question: What are the deliberate choices that self-reported culturally responsive teachers make regarding the use of technology when pursuing equity and inclusion within their diverse classrooms? In order to better understand these choices, the researcher went back to align the three research questions with the major findings.

The teachers in this study—purposely selected for their self-identified qualities of culturally responsiveness and technological proficiency— have important perspectives on technology as a multi-faceted learning tool, one that allows students of diverse backgrounds to experience access to academic resources that reflect their lived experiences and therefore engage them more directly in the academic work at hand. The discussion chapter will present two key insights that emerged from the findings. First, the unique affordances of technology lend themselves as a critical resource for teachers engaged in culturally responsive pedagogy (Analytic Category 1). Second, the teachers in this study were self-directed learners who sought learning opportunities through informal approaches. In particular, they turned to peers they saw as culturally competent and aligned with their own thoughtful practices in service of their beliefs and values for equity and inclusion for advice about inclusive resources and strategies (Analytic Category 2). Findings were aligned with the research questions, the discussion, and the conclusions, as shown in Table 6.

Table 6. Consistency of Research Questions, Findings, Discussion, and Conclusions

Research Question	Finding	Discussion	Conclusion
How do teachers who identify as culturally responsive characterize the use of technology in their practice?	All participants (100%) conceptualized technology as a learning tool that allowed them, as self-identified culturally responsive teachers, to develop and provide knowledge building and knowledge sharing uses that were more relevant to the diverse perspectives of their students.	Pedagogical Content: The unique affordances of technology lend themselves as a critical resource for teachers engaged in culturally responsive pedagogy.	Technology enables engagement of students in a wider sphere, increasing their learning opportunities.
When incorporating technology, how do teachers describe the extent to which they feel they are achieving equity and inclusion with their students of diverse backgrounds?	Participants described both positive and negative experiences related to their culturally responsive teaching goals, but all (100%) most frequently described their positive experiences. They felt these uses supported efforts in cultivating stronger and more confident students and families.		Technology holds the potential to positively impact teacher's goals for equity and inclusion by providing unique resources which enable teachers to act on their goals for inclusivity.
What factors and conditions do teachers report as helping and/or hindering their learning regarding technology use that supports equity and inclusion efforts in their classrooms?	All participants (100%) indicated that they were self-directed and learned about their use of technology resources for culturally responsive approaches through informal means, including from peers who held the same values.	Teacher Learning: The teachers in this study perceived themselves as self-directed learners and sought learning opportunities through informal approaches, in particular with peers they saw as culturally competent and aligned with their own thoughtful practice in service of their beliefs and values for equity and inclusion.	Formal Learning is not necessarily the primary vehicle by which teachers learn to use technology in ways that support equity and inclusion.

Chapter V

DISCUSSION

Introduction

Purpose

The purpose of this interpretive case study was to explore the perceptions of how and why teachers might integrate technology to support their goals of equity and inclusion with a group of teachers who identify as culturally responsive in their pedagogy and describe themselves as fluent in the use of technology in school.

It was hoped that this study would uncover intentional uses of technology by teachers seeking to realize goals of inclusivity and equity in diverse classrooms. This study asked self-reported culturally aware and technologically proficient teachers to share their perspective and reflect on their decision making when extending and deepening their established practice of inclusivity and goals of social justice with diverse student groups through the leveraging of technology resources.

Research Questions

The following research questions guided this study:

1. How do teachers who identify as culturally responsive characterize the use of technology in their practice?
2. When incorporating technology, how do teachers describe the extent to which they feel they are achieving equity and inclusion with their students of diverse backgrounds?

3. What factors and conditions do teachers report as helping and/or hindering their learning regarding technology use that supports equity and inclusion efforts in their classrooms?

These research questions were addressed by the findings presented in Chapter IV.

Findings

The three major findings that were uncovered through the data collected in this study were:

1. All participants (100%) conceptualized technology as a learning tool that allowed them, as self-identified culturally responsive teachers, to provide and develop knowledge building and knowledge sharing uses that were more relevant to the diverse perspectives of their students.
2. Participants described both positive and negative experiences related to their culturally responsive teaching goals, but all (100%) most frequently described their positive experiences. They felt these uses supported efforts in cultivating stronger and more confident students and families.
3. All participants (100%) indicated that they were self-directed and learned about their use of technology resources for culturally responsive approaches through informal means, including from peers who held the same values.

The research findings were mapped to each of the research questions, and then the findings were discussed in two major categories: pedagogical content and learning. This chapter provides a discussion of the findings presented in Chapter IV. Whereas the findings provided data in small narrative segments, aligned with the individual research questions, this chapter combines the individual parts to create a more holistic view of the research.

The data show that participant teachers applied their culturally responsive approaches to their implementation of a relatively new resource in classrooms.

Participants reported that technology's unique characteristics can make it a particularly useful tool for implementing culturally responsive pedagogy. The participant teachers, who described themselves as self-directed learners, also reported that they sought out opportunities for learning on their own and with like-minded peers.

The following two analytic categories, which were introduced at the end of the Chapter IV, guided this process:

1. *Pedagogical Content*: The unique affordances of technology lend themselves as a critical resource for teachers engaged in culturally responsive pedagogy.
2. *Teacher Learning*: The teachers in this study were self-directed learners who sought learning opportunities through informal approaches, in particular with peers they saw as culturally competent and aligned with their own thoughtful practice in service of their beliefs and values for equity and inclusion.

The current chapter is organized around these categories as they address the deliberate choices culturally responsive teachers make regarding their use of technology when pursuing equity and inclusion within their diverse classrooms. The researcher then presents contributions to the literature resulting from this research and offers conclusions and recommendations. The two analytic categories above address the deliberate choices that this sample of self-reported culturally responsive teachers discussed making regarding the use of technology when pursuing equity and inclusion within their diverse classrooms.

Analytic Category 1 (Pedagogical Content)

The unique affordances of technology lend themselves as a critical resource for teachers engaged in culturally responsive pedagogy.

In the literature of culturally sustaining pedagogies, including culturally competent, culturally proficient, culturally responsive, culturally relevant, and multicultural

education, researchers and practitioners advocate decentering Whiteness in classrooms and expanding upon the historical approaches to teaching and learning in American classrooms. Such classrooms are no longer predominantly White spaces, and the diversity of the student body is growing. The teachers in this study, purposely selected for their self-identified qualities of cultural responsiveness and technological proficiency, have important perspectives on technology as a multi-faceted learning tool that allows students of diverse backgrounds to access academic resources that reflect their lived experiences and therefore engage them more directly in the academic work at hand.

Gay (2000) defines culturally responsive teaching as using the cultural characteristics, experiences, and perspectives of ethnically diverse students as conduits for teaching them more effectively. She further believes that teachers need to learn how to convert this awareness into culturally responsive curriculum designs and instructional strategies and to create classroom climates conducive for learning when students are of diverse backgrounds. As one of the focus group participants remarked:

> I feel technology can be a unifier for the playing field for kids to produce work, but also for kids to access work…. But then I also think that the way that we think about using technology with the kids is beginning to understand (sic) how it can be a tool for access for the world. So, it brings in more stories and more perspectives and more tools for learning. We're bringing the Harlem Renaissance Study to my school this year, so we can use the technology to listen to the music of the time; to look at paintings from the time to bring those resources into the classroom that if we only had our read aloud book, would limit us in a way. It's also a window to bring more of our studies to life for the kids in a variety of ways.

Teachers need to know how to use cultural scaffolding in teaching students who are different from themselves (Gay, 2009). A culturally responsive classroom balances both a "mirror" and a "window" approach, supporting children in feeling known and on solid footing while also opening their world to develop new understandings through exposure to unknown content and perspectives. A "mirror" approach holds a mirror up to a student and allows them to see ideas from a familiar perspective that reflects their own

prior knowledge and experiences. Celia, working with young children, brought this awareness to her planning:

> I think particularly now that I'm in a kindergarten classroom, many of my students it's their first year at school, and so, for me, I want to honor what they bring to the table and their identities and make sure that the stories that I read aloud have characters that look like them in some capacity; so that it is relatable to them, and it's not going to be somewhere down the line, like maybe in third, fourth, or fifth grade where they're saying this is the first time I've heard my story.

In this qualitative research, all participant teachers found that technology allowed them to provide their students with perspectives and content not readily accessible in the physical classroom, including contrasting viewpoints on historical events, which allowed them to challenge their students and discuss the very idea of history and facts from a critical perspective. A focus group participant described this:

> I would say that because my class currently is not as visually racially diverse, it's important to bring other voices into the classroom and help kids understand that there are different perspectives to things. I would say that also being culturally competent is also knowing my personal biases that I bring into the classroom, and how that may affect how I presenting things, and just being aware of that and knowing that there are parents and there are families in the classroom [who] also have their biases coming in trying to figure out, not to butt heads, but trying to find some common ground.

Teachers sought to leverage technology to empower students; for example, they saw technology resources as an opportunity to expand the audience students could reach with their social justice initiatives. Hera was typical of participant teachers in her thoughtful analysis of integrating technology:

> That's how I actually discover all kinds of tools that are appropriate for meeting my goals—not as the other way around—which is people learn tools and then try to figure out how to use this tool for something else and I think that's backwards because you need to figure out what you're trying to teach and then figure out what tools are possible for achieving that goal…. I was part of the National Writing Project—where they teach basic principles on good teaching, what is good teaching. But what I learned about good teaching principles applies to what software solution actually meets the rigor or the rule of good teaching.

Thus, we see that the teachers in this study found that technology resources supported their efforts to develop inclusive and equitable learning communities. They found uses of technology to support their culturally responsive instruction, such as providing students with content that reflects their experiences more broadly.

Analytic Category 2 (Teacher Learning)

Teachers in this study were self-directed learners who sought learning opportunities through informal approaches, in particular with peers they saw as culturally competent and aligned with their own thoughtful practice in service of their beliefs and values for equity and inclusion.

There are two venues for learning: formal and informal. Formal learning refers to structured learning that typically occurs in a classroom setting where the teacher sets out the learning objectives (Brookfield, 1983; Marsick & Watkins, 1990; Merriam & Caffarella, 1991; Watkins & Marsick, 1992). Informal learning occurs outside a formal, structured environment. The learners are self-directed, responsible for the goals and objectives of their own learning through trial and error (Marsick & Volpe, 1999). The learners draw on past experience, reflect on current experience, read and research; they also learn from their past mistakes (Marsick & Watkins, 1999). Informal learning activities also include learning with and through others. This can be in direct dialogue or discussion either with mentors and role models who guide and inspire learning actively, or through networks allowing interactions with new people. Learning to use technology resources in ways that supported efforts for equity and inclusion was described as an informal and experiential process by participant teachers. They all reported that they learned about culturally competent approaches to technology integration through informal learning strategies like the ones listed above. For example, Sarah tried a new tool because she knew that her teammates would support her as she tried to learn:

> I'd never used Padlet before, so this year I learned by creating Padlets for my kids, and I learned by maybe asking my team … popping your head in and just seeing if anyone there knows a way that you could do something quicker or more efficiently.

Another participant teacher, Ronnie, took an experiential approach: "I think because I'm still relatively new in my career, I kind of will try anything and I don't have a big ego about it and I'm fine with it failing miserably. And I'm willing to experiment and play." Erin, too, had this attitude to her learning:

> A lot of technology these days is fairly intuitive, so I guess it's having the mindset of learning by doing. I'm not sure how this works, but I'm just going to give it a shot … or just click buttons. I think it's a problem-solving mentality. If one thing doesn't work, then try something else. If that doesn't work, then try something else.

Kurt Lewin (1947) viewed learning as linked to a learning cycle of experience, observation and reflection, formation and then testing of concepts. He drew on the Kolb Learning Cycle with four stages (Kolb, 1984): Hands-on Experience; Observation and Reflection; Abstract Conceptualization; and Active Experimentation.

In Schön's (1987) reflection-in-action theory, learning takes place when action is informed by reflection. For Schön (1983), as for Freire (1970/2000) and Brookfield (1994), reflection and action together are a process where individuals become aware of their underlying assumptions, reflect on their initial understanding of the problem, and develop new ways of defining problems. Reflection-in-action processers learn as they define and then implement new courses of action. This informal learning approach of experimentation, self-directed action, and experiential learning also draws on the ideas of John Dewey. Dewey's (1938) conception of the relationship between learning and experience includes:

- All genuine education comes about through experience (p. 13).
- Experience must exhibit two major principles of continuity and interaction (p. 27).

- The principle of interaction of experience means that "an experience is always what it is because of a transaction taking place between an individual and what, at the time, constitutes his environment" (p. 41).

Described by Brookfield (1986), critical reflection "is the process to engage the learner in a continuous and alternating process of investigation and exploration, followed by action grounded in this exploration, followed by reflection on this action, followed by further action, and so on" (p. 91). Audrey exemplified this reflective approach: "There was just an openness and a willingness to just learn and that, that was something that was valued. Using technology in a meaningful way, was really valued." Kiera was open to possibilities in a cyclical style:

> I think a lot of trial and error. I think being okay, trying something and having it not work and then saying it's okay that this didn't work, there might be something else out there, or there might not be right now.

Leah put the same thought more succinctly: "Seeing what works, seeing what doesn't work, seeing what needs to change [when trying out new tools with students]."

To learn from experiences, learners connect what they have learned from current experience to those in the past as well as see possible future implications (Merriam & Caffarella, 1999). Ronnie described her learning as open to reflection and action: "I think because I'm not too precious about my lessons, I will—and I'm pretty upset with myself when things go poorly, I am pretty quick to look for a better solution. And often, that will be technologically related."

Dewey (1938) argued that learning is a social process. In this study, when participants confronted a problem that could not be solved from existing knowledge and expertise, they reported turning to their social network of friends and peers for assistance. For example, Karen reported learning through a serendipitous social approach: "I also think timing was just a benefit; that I came in as a teacher the year iPads were introduced at school so there was a lot of talking about how to use the iPads that year. So, I think I

benefitted from that timing." Mackie found the social aspect critical to her incorporation of tools that supported her equity and inclusion goals:

> Just now, I was saying I could totally try that out in my space. So, being able to have conversations with other educators about things that actually work for them, and to see how it's worked. The Document Camera was something that I probably would have never said I really need one of those until I saw how much it opened up access to kids and then felt the need to now I use one every day. So, seeing it work, to me, is more important than just hearing about it.

Tennant and Pogson (1995) extend Dewey's notion of social process by showing that social context interconnects with historical context in adult learning and development. Wilson (1993) shows that knowledge and learning do not transfer across contexts automatically: "Knowledge and learning have to be understood as inextricably integrated in the setting in which they occur" (p. 73). Participant teachers also saw that their opportunities to integrate technology authentically were inspired by the particular contexts they found themselves in at critical moments in their career. As Mackie reflected:

> I feel like I was most relevant in my time at the school because there was a culture of technological advancement, amongst teachers. Zena, my first head teacher in my associateship, was on Twitter, she was doing Twitter Talk, she was doing tech talk, she was signing up for virtual classrooms. And so, it was just a part of my every day so it became something that I was interested in. There's less of a culture of that in my current school, so I feel less relevant. I think that seeing it work for other teachers is a way, I feel, I can integrate technology into my classroom.

In the focus group, Jeff elaborated further on this idea of context:

> It's the culture of the school that really enhances the interest and the drive to incorporate technology into the classroom. Currently, where I am now, it's not as strong as it is here. And I feel like it's a lot of the work that I did here in terms of connecting with other classrooms around the world, or even just within connecting with other professionals. I was much more up to date more through Twitter and through all these other platforms and I feel like there's a part of me now that I'm trying to find that balance. It's like a candy store when you're connected to all these people, you want to share all these ideas but then you've got to winnow it down it down and try to think

> specifically for what is going to work in my space with my current students. I think that has always been a challenge to find that balance.

Schön (1983) and Ferry and Ross-Gordon (1998) acknowledge that reflective practitioners seek to involve others in their search for new solutions. Kiera looked for that inspiration outside of her immediate context and in the larger world of social media:

> I follow a lot of other educators on Instagram who are often posting about cultural competency in their classrooms or new digital learning or technologies that they're trying, so trying to sort of develop my personal learning network through social media … through connecting with other teachers who are not only in my building but also in the wider world and really making that time to continue my growth that way.

Borgatti and Cross (2003) define learning in social networks as relationships "that underlie information seeking and sharing" (p. 433). They go on to point out that learning from another person is a function of: "(1) knowing what that person knows; (2) valuing what that person knows; (3) being able to gain timely access to that person's thinking, and (4) perceiving that seeking information from that person would not be too costly" (p. 432). Thus, in a social network, members seek or exchange information. Brad sought these kinds of networks online:

> There's a whole other story about my development as a teacher talking with other teachers on social media…. But if you're up for the discussion, there is a broad range of people and resources out there…. Now there are people I follow on Twitter and it's provocative and interesting and it challenges.

All of the participants in this study took similar approaches as self-directed learners, seeking learning opportunities through a range of informal approaches. They practiced behaviors such as asking questions, taking risks, and reflecting critically on their practice.

Contributions to the Literature

This study provides critical insights into how self-identified culturally relevant teachers use technology. Although numerous research studies have investigated ways to help teachers learn to integrate technology (Brown & Warschauer, 2006; Darling-Hammond et al., 2005; Mishra & Koehler, 2006; Nadolny, 2011; Pierson & Cozart, 2005), few studies have looked at the specific integration of technology with culturally responsive pedagogy. There are two areas that may contribute to the growing literature on this topic.

First, the study provides previously undocumented data on teacher practices in leveraging technology resources in diverse classrooms. The interviews and other data sources capture rich descriptions of how teachers use technology for these purposes. Participants provide evidence that technology can be an active dimension of their work toward equity and inclusion. Thus, this research expands upon existing literature on pedagogical practice in both technology in education and diverse classrooms.

A second contribution to the literature is the discovery of the self-directed learning that took place in this purposeful sample of self-identified culturally relevant teachers. Their approaches to learning reflected aspects of informal learning found in the literature. Participant teachers engaged in self-directed learning through direct experience, critical reflection, and social interaction to develop culturally responsive approaches to technology integration. The approach of these teachers to learning has implications for developing future culturally responsive teachers.

Conclusions

Based on the major findings and interpretations, the researcher has drawn the following three conclusions.

Conclusion I

Technology enables engagement of students in a wider sphere, increasing their learning opportunities.

This first conclusion connects to the specific uses of technology teachers described in their culturally responsive classrooms. Many teachers found that technology could provide a more diverse and expansive landscape of content for their students. This enabled teachers to expose students to contrasting perspectives and viewpoints as well as viewpoints that reflected the students' own values and experiences, no matter where they came from. This expanded sphere of reference also allowed teachers to feel they were able to differentiate instruction authentically and effectively.

Conclusion II

Technology holds the potential to positively impact teacher's goals for equity and inclusion.

This second conclusion stems from the many positive outcomes described by participant teachers when they leveraged technology resources to support their classroom goals. The teachers found uses that supported differentiated instruction when serving wide-ranging groups of students. They especially appreciated tools where they could collect formative assessment information on students in collaborative teams that could influence their instruction. They found uses that supported collaborative student work in disparate communities where students could work together on problems they had identified and seek solutions they could communicate with larger audiences. This critical consciousness is an essential component of culturally responsive pedagogy described in the literature. Additionally, teachers found that technology allowed them to have stronger home-to-school connections where they could partner with families and have effective engagement at home to support academic success in school.

Conclusion III

Formal learning is not necessarily the primary vehicle by which teachers learn to use technology in ways that support equity and inclusion.

Though most of the participant teachers had direct access to educational technologists in their school as well as opportunities to attend formal conferences for professional development in both pedagogy development and technology integration, they found that they learned most frequently through their own trial and error or by being exposed to peers both in the community and online. The participant teachers learned to use technology in ways that supported their goals of equity and inclusion through informal strategies where they participated in a professional learning community at their school and online with other teachers who also identified as culturally responsive. This insight may hold potential for re-thinking professional development opportunities for teachers in the area of culturally relevant pedagogy.

Recommendations for Teachers

Pre-service, early career, and experienced teachers could use the findings in this study to innovate their own classroom practice and to consider new approaches to professional development in the realm of technology integration. Currently, there are limited opportunities for teachers to learn specific uses of technology that support goals of equity and inclusion. Developing a local and online global professional learning community of teachers who share a philosophy of culturally responsive approaches would be critical to learning more about how to integrate technology in the classroom to support equity and inclusion goals. Teachers would benefit from peer groups in order to gain exposure to new approaches that support true equity and inclusion, not just more efficient methods of replicating current practice. While technology can make everyday tasks easier for teachers, the literature and this research support instructional approaches that expose students to a greater range of contrasting perspectives and viewpoints to

influence learning and teacher differentiation. Teachers would benefit from taking risks and experimenting broadly in order to find uses of technology that support them pedagogically. The following four recommendations thus emerge:

1. Teachers should make every effort to connect with peers in their own community who share their values of equity and inclusion. Inspiring and learning from each other is essential to developing best practice and new strategies to support and develop students in diverse communities.
2. Teachers should connect with culturally responsive teachers outside their immediate community, including online. These connections provide an essential peer group to ask questions, guide practice, and inspire creative problem solving.
3. Teachers should share their experiences and what they have learned as they develop new approaches for technology that support their goals of equity and inclusion with their administrators and colleagues. They should make every effort to present at school staff meetings, conferences, and online as a way of expanding best practices beyond their own classroom.
4. Teachers should practice self-directed learning behaviors to support their students. These include risk-taking, questioning, and inquiry with other teachers in order to develop culturally responsive approaches with technology resources. There are few studies or ready-made tools at this time, but there is plenty of opportunity to align goals with tools through experimentation.

Although this research only included teachers as participants, recommendations for school leaders and education program leaders were suggested as implications for professional development emerged (Appendix I: Further recommendations).

Future Research

Future research is needed in three main areas: (a) deepening our understanding of different demographic student groups; (b) longitudinal examination of outcomes; and (c) the inclusion of the family's perspective.

This research study sampled a very small group of individuals. The participant teachers all pursued a similar pedagogical practice. They all worked in urban, private, and relatively well-resources schools, often with a highly selective student group. Future research should look at a far larger sample size with a larger demographic. It would be beneficial to conduct a study that examined suburban and rural contexts, in addition to this urban one. Furthermore, a study of teachers in public schools would be enlightening. Finally, future studies could examine teachers in early childhood, high school, and secondary school settings, in addition to the elementary school setting examined in this study.

A longitudinal study, where students in diverse classrooms were tracked to see the progress of the students over time, would give deeper insight into the success of technology integration in culturally responsive classrooms. It would be important to define success more broadly, beyond just school performance in academic benchmarks. Measures of success should also include more 21st century competencies in students, such as critical thinking, openness to diverse perspectives, and cultural competency.

A third approach to future research could be to consider the perspective of the family members in addition to those of teachers and students. Effective family engagement is critical to student success and closing the achievement gap (Mapp & Kuttner, 2013). Family engagement practices that build trust and support academic socialization have proven to have the most positive impact on student performance (Mapp & Kuttner, 2013). Future research could examine the perspective of family

members when technology resources are used as a communication and community building practice in classrooms.

Summary

This study sought to understand how teachers who consider themselves to be culturally inclusive teachers use technology to support a culturally responsive pedagogy in culturally diverse classrooms. Participant teachers were actively using technology in ways that map onto their pedagogical values. Teachers described learning using technology in informal ways rather than through formal professional development. They observed other teachers who shared their values, took risks, and engaged in trial and error with technology resources to discover ways to leverage tools for specific teaching goals. Participant teachers found practices for integrating technology resources that supported their values of equity and inclusion primarily through informal means.

As schools continue to enroll increasingly diverse student bodies, it is essential that all teachers continue to explore and implement pedagogical practices that respect the diversity of the teachers' classrooms and serve the needs of students from a range of cultural backgrounds. The perspective of these participant teachers, committed to broadening the opportunity for diverse learning in their classroom, is essential. Their voices can guide us as we seek to develop effective practices that allow teachers to integrate technology resources successfully in diverse classrooms in order to engage and prepare all students for 21st century skills. At a time when the world is shrinking, these issues are more important than ever.

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Appendix A

IRB Notification Letter

TEACHERS COLLEGE
COLUMBIA UNIVERSITY

Teachers College IRB *Continuing Review Approval Notification*

To: Kathryn Kaiser
From: Myra Luna Lucero, Research Compliance Manager
Subject: IRB Approval: 18-166 Protocol
Date: 12/27/2018

Please be informed that as of the date of this letter, the Institutional Review Board for the Protection of Human Subjects at Teachers College, Columbia University has approved your *continuing* study, entitled "*Diversity in the Digital Age*" on 12/27/2018.

The approval is effective until **01/07/2020**.

The IRB Committee must be contacted if there are any changes to the protocol during this period. **Please note:** If you are planning to continue your study, a Continuing Review report must be submitted to either close the protocol or request permission to continue for another year. Please submit your report by **12/24/2019** so that the IRB has time to review and approve your report if you wish to continue your study. The IRB number assigned to your protocol is **18-166**. Feel free to contact the IRB Office (212-678-4105 or IRB@tc.edu) if you have any questions.

As subject enrollment is complete, no newly stamped copy of the consent form is provided with this continuing approval. You may retrieve a PDF copy of this approval notification from the Mentor site.

Best wishes for your research work.

Sincerely,
Dr. Myra Luna Lucero
Research Compliance Manager

Appendix B

Consent Letter

!

Teachers College, Columbia University
525 West 120th Street
New York NY 10027
212 678 3000

INFORMED CONSENT

Protocol Title: Diversity in the Digital Age: Creating Inclusive and Equitable Communities

Principal Investigator: Kathryn Kaiser, Doctoral Candidate Teachers College Columbia University
917-375-2189, kk2224@tc.columbia.edu

INTRODUCTION

You are being invited to participate in this research study called "Diversity in the Digital Age: Creating Inclusive and Equitable Communities. " You may qualify to take part in this research study because you identify as a culturally competent teacher and report proficiency with technology.

Approximately twenty people will participate in this study and it will take up to 2 hours of your time to complete.

WHY IS THIS STUDY BEING DONE?

This study is being done to better understand how teachers pursuing equity and inclusion in their classrooms leverage technology tools in their pursuit.

WHAT WILL I BE ASKED TO DO IF I AGREE TO TAKE PART IN THIS STUDY?

If you decide to participate, you will be asked to complete a short demographic inventory about yourself, which should take about five minutes.

You may choose participate in an individual interview, you will be interviewed by the principal investigator. You will be asked questions about your experiences and be able to talk about some of your experiences in your pursuit of achieving equity and inclusion in diverse classrooms.

To ensure accuracy, individual interviews and focus groups will be audio-recorded for later transcription and review. After the audio-recording is written down (transcribed) the audio-recording will be deleted. If you do not wish to be audio-recorded, you will still be able to participate. The interview will take approximately forty-five minutes. You will be given a pseudonym or false name/de-identified code in order to keep your identity confidential.

You may be invited to participate in a small group/focus group interview, run by the principal investigator, where other participants like you will discuss their experiences in education. This interview will also be recorded, and a research assistant will be taking notes. Everyone will be asked not to discuss what is being spoken about outside of the group but it is impossible to guarantee complete confidentiality. This will take about one hour.

All of these interviews will be done at a time that is convenient for you over the phone, SKYPE or in person.

WHAT POSSIBLE RISKS OR DISCOMFORTS CAN I EXPECT FROM TAKING PART IN THIS STUDY?

This is a minimal risk study, which means the harms of discomforts that you may experience are not greater than those encountered in daily life. However, there are some risks to consider. Your participation may involve the collection of some private information relating to your experiences as a teacher, **However, you do not have to**

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answer any questions or divulge anything you don't want to talk about. You can stop participating in the study at any time without penalty.

The principal investigator is taking precautions to keep your information confidential and prevent anyone from discovering or guessing your identity, such as using a de-identified code (for example DIDA_0004) instead of your name and keeping all information on a password protected database and locked in a file drawer.

WHAT POSSIBLE BENEFITS CAN I EXPECT FROM TAKING PART IN THIS STUDY?

There is no direct benefit to you for participating in this study. Participation may benefit future students who work in diverse classrooms. It may also benefit the field of teacher education to better understand the needs of teachers who want to become inclusive and equitable in their practice.

WILL I BE PAID FOR BEING IN THIS STUDY?

You will not be paid to participate in this study. There are no costs to you for taking part in this study.

WHEN IS THE STUDY OVER? CAN I LEAVE THE STUDY BEFORE IT ENDS?

The study is over when you have completed the interview, demographic inventory, and focus group. However, you can leave the study at any time even if you haven't finished.

PROTECTION OF YOUR CONFIDENTIALITY

The investigator will keep all written materials locked in a desk drawer in a locked office. Any electronic or digital information (including audio recordings) will be stored on a computer that is password protected. What is on the audio-recording will be written down and the audio-recording will then be destroyed. There will be no record matching your real name with your de-identified code. The master list, which identifies, you is kept locked and separate from the list of de-identified codes. The data will be kept for 5 years after the completion of the study.

HOW WILL THE RESULTS BE USED?

The results of this study will be published in journals and presented at academic conferences. Your name or any identifying information about you will not be published. This study is being conducted as part of the dissertation of the principal investigator.

CONSENT FOR AUDIO AND OR VIDEO RECORDING

Audio recording is part of this research study. You can choose whether to give permission to be recorded. If you decide that you don't wish to be recorded, you will still be able to participate in this research study.

_____I give my consent to be recorded

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_____
Signature

_____ I **do not** consent to be recorded

_____
Signature

OPTIONAL CONSENT FOR FUTURE CONTACT

The investigator may wish to contact you in the future. Please initial the appropriate statements to indicate whether or not you give permission for future contact.

I give permission to be contacted in the future for research purposes:

Yes _____ No_____
Initial Initial

I give permission to be contacted in the future for information relating to this study:

Yes _____ No_____
Initial Initial

WHO CAN ANSWER MY QUESTIONS ABOUT THIS STUDY?

If you have any questions about taking part in this research study, you should contact the principal investigator, Kathryn Kaiser, Doctoral Candidate Teachers College Columbia University, 917-375-2189, kk2224@tc.columbia.edu

If you have questions or concerns about your rights as a research subject, you should contact the Institutional Review Board (IRB) (the human research ethics committee) at 212-678-4105 or email IRB@tc.edu. Or you can write to the IRB at Teachers College, Columbia University, 525 W. 120th Street, New York, NY 1002. The IRB is the committee that oversees human research protection for Teachers College, Columbia University.

PARTICIPANT'S RIGHTS

- I have read and discussed the informed consent with the researcher. I have had ample opportunity to ask questions about the purposes, procedures, risks and benefits regarding this research study.

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INFORMED CONSENT

- I understand that my participation is voluntary. I may refuse to participate or withdraw participation at any time without penalty.
- The researcher may withdraw me from the research at his or her professional discretion.
- If, during the course of the study, significant new information that has been developed becomes available which may relate to my willingness to continue my participation, the investigator will provide this information to me.
- Any information derived from the research study that personally identifies me will not be voluntarily released or disclosed without my separate consent, except as specifically required by law.
- I should receive a copy of the Informed Consent document.

My signature means that I agree to participate in this study

Print name:

_____ **Date**:_____

Signature:

_____

Appendix C

Demographic Data Inventory

To help understand the factors that are important to how teachers use technology in diverse classrooms, the following information will be useful in analyzing the research data. Please answer each question by indicating the choice that best describes you, or write in the correct information. All responses are strictly confidential. Individual responses will not be shared.

1.What is your age range?
20 -- 29
29 – 39
40 – 49
50 - 59
60 - 69
70 - 79 +

2.Gender:
a. Female
b.Male

3. Race of ethnic group
a. Asian American/ Pacific Islander
b. African American
c. Hispanic
d. Native American
e. White/Caucasian
f. Other

4. What is your country of origin (where you were born) _____?

5. What is the highest level of education you have completed?
a. Graduated from college
b. Some graduate training beyond college
c. Masters level graduate degree
d. Advanced degree (e.g., Ph.D., J.D)

6. How many years have you been a teacher? _____

7. How many professional development workshops/conferences regarding cultural competence have you attended in your career?
1. None
2. 1-3
3. 4-6
4. 7-9
5. 10 or more

8. How would you describe your technological proficiency?
1. Novice
2. Developing
3. Expert
4. Tech Guru to others

Appendix D

Cultural Competency Checklist

PROMOTING CULTURAL & LINGUISTIC COMPETENCY

Self-Assessment Checklist for Personnel Providing Services and Supports In Early Intervention and Early Childhood Settings

Directions: Please select A, B, or C for each item listed below.
A = Things I do frequently, or statement applies to me to a great degree
B = Things I do occasionally, or statement applies to me to a moderate degree
C = Things I do rarely or never, or statement applies to me to minimal degree or not at all

PHYSICAL ENVIRONMENT, MATERIALS & RESOURCES

_____ 1. I display pictures, posters and other materials that reflect the cultures and ethnic backgrounds of children and families served in my early childhood program or setting.

_____ 2. I select props for the dramatic play/housekeeping area that are culturally diverse (e.g. dolls, clothing, cooking utensils, household articles, furniture).

_____ 3. I ensure that the book/literacy area has pictures and storybooks that reflect the different cultures of children and families served in my early childhood program or setting.

_____ 4. I ensure that table-top toys and other play accessories (that depict people) are representative of the various cultural and ethnic groups both within my community and the society in general.

_____ 5. I read a variety of books exposing children in my early childhood program or setting to various life experiences of cultures and ethnic groups other than their own.

_____ 6. When such books are not available, I provide opportunities for children and their families to create their own books and include them among the resources and materials in my early childhood program or setting.

_____ 7. I adapt the above referenced approaches when providing services, supports and other interventions in the home setting.

_____ 8. I encourage and provide opportunities for children and their families to share experiences through storytelling, puppets, marionettes, or other props to support the "oral tradition" common among many cultures.

PHYSICAL ENVIRONMENT, MATERIALS & RESOURCES (CONT'D)

_____ 9. I plan trips and community outings to places where children and their families can learn about their own cultural or ethnic history as well as the history of others.

_____ 10. I select videos, films or other media resources reflective of diverse cultures to share with children and families served in my early childhood program or setting.

_____ 11. I play a variety of music and introduce musical instruments from many cultures.

_____ 12. I ensure that meals provided include foods that are unique to the cultural and ethnic backgrounds of children and families served in my early childhood program or setting.

_____ 13. I provide opportunities for children to cook or sample a variety of foods typically served by different cultural and ethnic groups other than their own.

_____ 14. If my early childhood program or setting consists entirely of children and families from the same cultural or ethnic group, I feel it is important to plan an environment and implement activities that reflect the cultural diversity within the society at large.

_____ 15. I am cognizant of and ensure that curricula I use include traditional holidays celebrated by the majority culture, as well as those holidays that are unique to the culturally diverse children and families served in my early childhood program or setting.

COMMUNICATION STYLES

_____ 16. For children who speak languages or dialects other than English, I attempt to learn and use key words in their language so that I am better able to communicate with them.

_____ 17. I attempt to determine any familial colloquialisms used by children and families that will assist and/or enhance the delivery of services and supports.

_____ 18. I use visual aids, gestures, and physical prompts in my interactions with children who have limited English proficiency.

_____ 19. When interacting with parents and other family members who have limited English proficiency I always keep in mind that:

_____ (a) limitation in English proficiency is in no way a reflection of their level of intellectual functioning.

_____ (b) their limited ability to speak the language of the dominant culture has no bearing on their ability to communicate effectively in their language of origin.

_____ (c) they may neither be literate in their language of origin nor English.

_____ 20. I ensure that all notices and communiqués to parents are written in their language of origin.

_____ 21. I understand that it may be necessary to use alternatives to written communications for some families, as word of mouth may be a preferred method of receiving information.

_____ 22. I understand the principles and practices of linguistic competency and:

_____ (a) apply them within my early childhood program or setting.

_____ (b) advocate for them within my program or agency.

COMMUNICATION STYLES (CONT'D)

_____ 23. I use bilingual or multilingual staff and/or trained/certified foreign language interpreters for meetings, conferences, or other events for parents and family members who may require this level of assistance.

_____ 24. I encourage and invite parents and family members to volunteer and assist with activities regardless of their ability to speak English.

_____ 25. I use alternative formats and varied approaches to communicate with children and/or their family members who experience disability.

_____ 26. I arrange accommodations for parents and family members who may require communication assistance to ensure their full participation in all aspects of the early childhood program (e.g. hearing impaired, physical disability, visually impaired, not literate or low literacy etc.).

_____ 27. I accept and recognize that there are often differences between language used in early childhood/early intervention settings, or at "school", and in the home setting.

VALUES & ATTITUDES

_____ 28. I avoid imposing values that may conflict or be inconsistent with those of cultures or ethnic groups other than my own.

_____ 29. I discourage children from using racial and ethnic slurs by helping them understand that certain words can hurt others.

_____ 30. I screen books, movies, and other media resources for negative cultural, ethnic, racial, or religious stereotypes before sharing them with children and their families served in my early childhood program or setting.

_____ 31. I provide activities to help children learn about and accept the differences and similarities in all people as an ongoing component of program curricula.

_____ 32. I intervene in an appropriate manner when I observe other staff or parents within my program or agency engaging in behaviors that show cultural insensitivity, bias or prejudice.

_____ 33. I recognize and accept that individuals from culturally diverse backgrounds may desire varying degrees of acculturation into the dominant culture.

_____ 34. I understand and accept that family is defined differently by different cultures (e.g. extended family members, fictive kin, godparents).

_____ 35. I accept and respect that male-female roles in families may vary significantly among different cultures (e.g. who makes major decisions for the family, play and social interactions expected of male and female children).

_____ 36. I understand that age and life cycle factors must be considered in interactions with families (e.g. high value placed on the decisions or childrearing practices of elders or the role of the eldest female in the family).

_____ 37. Even though my professional or moral viewpoints may differ, I accept the family/parents as the ultimate decision makers for services and supports for their children.

VALUES & ATTITUDES (CONT'D)

_____ 38. I accept that religion, spirituality, and other beliefs may influence how families respond to illness, disease, and death.

_____ 39. I recognize and understand that beliefs and concepts of mental health or emotional well-being, particularly for infants and young children, vary significantly from culture to culture.

_____ 40. I recognize and accept that familial folklore, religious, or spiritual beliefs may influence a family's reaction and approach to a child born with a disability or later diagnosed with a disability or special health care needs.

_____ 41. I understand that beliefs about mental illness and emotional disability are culturally-based. I accept that responses to these conditions and related treatment/interventions are heavily influenced by culture.

_____ 42. I understand that the health care practices of families served in my early childhood program or setting may be rooted in cultural traditions.

_____ 43. I recognize that the meaning or value of early childhood education or early intervention may vary greatly among cultures.

_____ 44. I understand that traditional approaches to disciplining children are influenced by culture.

_____ 45. I understand that families from different cultures will have different expectations of their children for acquiring toileting, dressing, feeding, and other self-help skills.

_____ 46. I accept and respect that customs and beliefs about food, its value, preparation, and use are different from culture to culture.

_____ 47. Before visiting or providing services in the home setting, I seek information on acceptable behaviors, courtesies, customs, and expectations that are unique to families of specific cultural groups served in my early childhood program or setting.

VALUES & ATTITUDES (CONT'D)

_____ 48. I advocate for the review of my program's or agency's mission statement, goals, policies, and procedures to ensure that they incorporate principles and practices that promote cultural diversity, cultural competence and linguistic competence.

_____ 49. I seek information from family members or other key community informants that will assist me to respond effectively to the needs and preferences of culturally and linguistically diverse children and families served in my early childhood program or setting. .

How to use this checklist

This checklist is intended to heighten the awareness and sensitivity of personnel to the importance of cultural diversity, cultural competence and linguistic competence in early childhood settings. It provides concrete examples of the kinds of practices that foster such an environment. There is no answer key with correct responses. However, if you frequently responded "C", you may not necessarily demonstrate practices that promote a culturally diverse and culturally competent learning environment for children and families within your classroom, program or agency.

Appendix E

Interview Schedule

Introduction

What does it mean to be culturally responsive?
How would you describe the diversity of your classroom?

How do teachers of diverse students characterize the role of technology in their practice?

What made you decide to use technology in your classroom?

How does teaching with technology fit into the plans of your classroom as a whole? What are your objectives when using technology?

How did teaching with technology fit into the plans of the school as a whole? What were their objectives?

When you teach, how would you describe your pedagogy? (traditional? progressive? A blend?)

Describe how much autonomy you are given in the classes you teach, and how your school works. Where does technology fit in that structure?

Tell me about how you prepare for class when technology will be involved.

What do teachers of diverse students identify as uses of technology that enhance or diminish opportunities for equity and inclusion?

What are some examples of ways you use technology to enhance your work with students?

What are some examples of ways technology prevents you from achieving your goals with students?

Do you use technology to communicate with others at school? Who? How does technology support or hinder that communication?

Does technology have a use in your assessment? How? Or Why not?

Do you use technology to help you organize? How does this help students? Or Why not?

Do you use technology to present content to students or families or other teachers? How is this beneficial? Or Why not?

How Participants Perceived the Quality and Value of Their use of technology in diverse classrooms? Or What meaningful outcomes, results or evidence of equity and inclusion or inequity and bias do teachers of diverse students see in their use of technology in their classrooms?

Describe how you can tell when your students benefit from your use of technology in the classroom.

Describe how you can tell when your students are harmed by your use of technology in the classroom.

What methods do you use to engage your students with technology? How do you feel they compare qualitatively to your non-technology strategies?

When your class is over, are you confident that your students had a meaningful learning experience because of the use of technology? Or because you chose not to use technology?

What factors and conditions help or hinder teachers when using technology to support equity and inclusion in their classrooms?

How did you learn how to use technology proficiently? What gave you confidence in your ability to use technology?

Tell me about the support system your school had in place to help you with using technology to enhance equity and inclusion. (Instructional designers? A technology support team? Professional development? What kind of help was available?)

Was there discussion among fellow instructors about using technology to support teaching and learning?

Describe how you stay relevant in your field of expertise (conferences, social learning, research, peers). Tell me about the ways you learn about the latest pedagogical innovations and techniques. How do you apply what you learn to your practice?

What is the difference between applying new pedagogical techniques for equity and inclusion in your face-to-face class and using technology?

Appendix F

Timeline for Dissertation

12/2017	• Proposal hearing with advisor and 2nd reader
1/2018	• Submit to IRB and obtain IRB approval
1/2018-6/2018	• recruit participants
3/2018-8/2018	• Send letters of participation • Send demographic inventories • Schedule and conduct interviews • Use outside service to transcribe all interviews as they occur • Begin process of data analysis as interviews are transcribed to ascertain emergent themes
9/2018	• Analyze data • determine major findings
10/2018	• Write findings Chapter IV
11/2018	• Write discussion Chapter V
12/2018	• Draft full dissertation
1/2019-3/2019	• Prepare for defense, working with advisor
4/2019	• Defend dissertation
4/2019	• Make post-defense edits
5/2019	• Graduation

Appendix G

Participant Background Table

Participant Pseudonym	School	self-reported cultural competency checklist average	Grades Taught	age range	Gender	Race or ethnic group	country of origin	Highest level of education	Years Teaching	number of PD regarding cultural competence attended	self-described technological proficiency
Erin	School 1	3	K-3	29 – 39	Female	Asian American/ Pacific Islander	US	Masters level graduate degree	15	4-6	Expert
Brad	School 2	2.1	6	40 – 49	Male	White/Caucasian	England	Masters level graduate degree	21	4-6	Developing
Sharonda	School 2	2.8	7	60 – 69	Female	West Indian	USA	Advanced degree (e.g., Ph.D., J.D)	22	1-3	Developing savvy
Vera	School 2	2.9	7	29 – 39	Female	Hispanic	U.S.	Masters level graduate degree	10	10 or more	Developing
Jason	School 3	2.6	6-8	40 – 49	Male	White/Caucasian	USA	Masters level graduate degree	18	10 or more	Tech Guru to others
Cory	School 3	2.9	6-8	40 – 49	Female	Bi-racial	USA	Masters level graduate degree	18	10 or more	Developing
Karen	School 4	2.7	2	20 – 29	Female	White/Caucasian	USA	Masters level graduate degree	7	4-6	Expert
Ronnie	School 5	2.5	6-8	29 – 39	Female	White/Caucasian	USA	Some graduate training beyond college	7	7-9	Developing
Mackie	School 5	3	1	29 – 39	Female	African American	United States	Masters level graduate degree	7	10 or more	It depends on the lesson
Celia	School 5	2.5	K-3	29 – 39	Female	Asian American/ Pacific Islander	United States	Masters level graduate degree	3	1-3	Expert
Leah	School 6	2.7	K	29 – 39	Female	African American	United States	Masters level graduate degree	8	1-3	Developing
Dierdre	School 6	2.4	2-8	29 – 39	Female	Hispanic	United States	Masters level graduate degree	10	1-3	Developing
Jerry	School 6	2.4	6-8	20 – 29	Female	mixed	United States	Some graduate training beyond college	4	4-6	Tech Guru to others
Charles	School 7	2.3	2	29 – 39	Male	White/Caucasian	United States	Masters level graduate degree	8	4-6	Expert
Byron	School 7	2.9	3	20 – 29	Male	Hispanic	Colombia	Masters level graduate degree	5	4-6	Developing
Mira	School 8	2.5	1	29 – 39	Female	Multi-racial - Asian American/White	USA	Masters level graduate degree	8	1-3	Developing
Kiera	School 9	2.9	1	29 – 39	Female	Multiracial	United States	Masters level graduate degree	11	1-3	Expert
Winnie	School 9	2.8	7	29 – 39	Female	Asian American/ Pacific Islander	United States	Masters level graduate degree	8	1-3	Developing
Priya	School 9	2.5	K	29 – 39	Female	African American	Jamaica	Masters level graduate degree	10	10 or more	Developing
Jeff	School 9	2.8	K	50 – 59	Female	Asian American/ Pacific Islander	USA	Masters level graduate degree	33	4-6	Developing
Ingrid	School 10	2.9	K-3	29 – 39	Female	African American	U.S.A	Masters level graduate degree	12	10 or more	Expert with support
Mary	School 11	2.9	1	29 – 39	Female	Hispanic	United States	Masters level graduate degree	12	10 or more	Developing
Sarah	School 11	2.5	4	40 – 49	Female	Black Caribbean	Born in California; raised in the Bahamas	Masters level graduate degree	8	4-6	Developing
Terra	School 12	2.8	K	20 – 29	Female	African American	United States	Masters level graduate degree	5	4-7	Developing
Franny	School 13	2.9	3	40 – 49	Female	Haitian-American	United States	Masters level graduate degree	21	10 or more	Developing
Audrey	School 14	2.7	K	29 – 39	Female	African American	United States	Masters level graduate degree	15	10 or more	Developing
Greg	School 15	2.9	K-2	40 – 49	Female	African American	United States	Masters level graduate degree	28	10 or more	Tech Guru to others
Hera	School 16	3	6-8	40 – 49	Female	Asian American/ Pacific Islander	Taiwan	Masters level graduate degree	11	10 or more	Tech Guru to others
Edwin	School 16	2.9	6-8	29 – 39	Male	Hispanic	United States	Masters level graduate degree	4	4-6	Developing
Davis	School 17	2.2	4	20 – 29	Female	White/Caucasian	United States	Masters level graduate degree	5	4-6	Developing

Appendix H

Finding Distribution Tables

Research Question 1: How do teachers who identify as culturally responsive characterize the use of technology in their practice?

Participant Pseudonym	Technology use as a tool to enhance learning		Technology use as a life tool
	Knowledge building	Differentiation	
Erin	x	x	
Brad	x	x	x
Sharonda	x	x	x
Vera	x	x	x
Jason	x	x	
Cory	x	x	
Karen	x	x	x
Ronnie	x	x	x
Mackie	x	x	x
Celia	x	x	x
Leah	x	x	
Dierdre	x	x	x
Jerry	x	x	x
Charles	x	x	x
Byron	x	x	x
Mira	x	x	
Kiera	x	x	x
Winnie	x	x	
Priya	x	x	
Jeff	x	x	x
Ingrid	x	x	x
Mary	x	x	x
Sarah	x	x	x
Terra	x	x	
Franny	x	x	x
Audrey	x	x	
Greg	x	x	
Hera	x	x	x
Edwin	x	x	x
Davis	x	x	x
Total	30	30	20
%	100	100	67

Research Question 2: When incorporating technology, how do teachers describe the extent to which they feel they are achieving equity and inclusion with their students of diverse backgrounds?

Positive Outcomes

Participant Pseudonym	High Engagement				Authenticity	
	Increased student participation	Student ownership	Motivation and enthusiasm	Increased parent engagement	collaboration with peers	21st century skills
Erin	x	x	x	x		x
Brad						x
Sharonda	x	x			x	x
Vera	x	x	x			x
Jason				x	x	x
Cory		x			x	x
Karen	x	x		x		x
Ronnie						
Mackie			x			x
Celia			x			x
Leah		x				
Dierdre		x	x	x	x	x
Jerry		x				x
Charles		x		x		
Byron	x				x	x
Mira				x		x
Kiera		x		x		x
Winnie		x		x		
Priya						x
Jeff	x					x
Ingrid						
Mary				x	x	x
Sarah		x		x		x
Terra				x		x
Franny	x	x	x		x	
Audrey				x		
Greg		x			x	x
Hera		x	x			x
Edwin			x			x
Davis			x			x
Total	26				24	
%	87				80	

Negative Outcomes

Participant Pseudonym	Inauthenticity				Confusion			Barriers	Poor social choices online
	Bells and Whistles	Assumptions	Isolation	Loss of Human relationships	Lacking Exploration	Misunderstanding	Distraction		
Erin									
Brad			x	x					x
Sharonda									x
Vera							x		
Jason	x								x
Cory									
Karen	x								
Ronnie	x			x		x	x	x	
Mackie									
Celia									
Leah									
Dierdre	x								
Jerry									
Charles	x	x							
Byron							x	x	
Mira	x				x				
Kiera	x								
Winnie	x					x	x		
Priya	x	x						x	
Jeff									
Ingrid		x						x	
Mary		x						x	
Sarah							x	x	
Terra	x								
Franny			x			x			
Audrey									
Greg									
Hera	x								
Edwin									
Davis									
Total	15				7			6	3
%	50				23			20	10

Research Question 3: What factors and conditions do teachers report as helping and/or hindering their learning regarding technology use that supports equity and inclusion efforts in their classrooms?

Participant Pseudonym	Conditions that Facilitate Learning								Conditions That Impede Learning
	Informal Learning Approaches					Formal Learning Approaches			Access to resources
	Students	Peers	Online	Asking questions	Jumping in	PD and reading	Presenting	In-house experts	
Erin		x	x	x	x	x	x	x	
Brad		x	x		x	x			
Sharonda	x			x	x	x		x	
Vera	x	x				x	x	x	x
Jason		x	x	x	x	x	x	x	
Cory	x	x		x	x	x	x		
Karen		x		x	x	x		x	x
Ronnie	x	x	x	x	x	x			
Mackie				x	x				
Celia		x		x	x				
Leah		x	x		x	x			
Dierdre					x	x			
Jerry		x		x	x	x		x	
Charles		x	x	x	x	x			
Byron		x	x	x	x	x	x	x	x
Mira		x	x	x	x	x		x	x
Kiera		x	x	x	x	x			
Winnie		x		x		x		x	
Priya		x		x	x	x		x	x
Jeff			x						
Ingrid		x	x		x	x	x	x	
Mary		x	x	x		x		x	
Sarah	x			x	x	x		x	
Terra		x	x	x	x	x		x	
Franny		x		x		x		x	x
Audrey		x		x	x				
Greg		x	x	x	x	x	x	x	x
Hera		x	x		x	x			x
Edwin		x				x	x	x	x
Davis		x	x						
Total	30					25			9
%	100					83			30

Appendix I

Additional Recommendations

This small study captured a number of findings that could be useful to teachers, administrators, and policy-makers. There are implications for professional development programs, and the development of learning communities within schools. The openness of the participant teachers, coupled with their commitment to equitable and inclusive learning communities provided a rich perspective that many others could benefit from as a means for better serving our diverse school systems. While school leaders and program administrators were not interviewed for this study, these leaders could be informed by the perspective of teachers and benefit from considering their experience when planning for teacher support and teacher education in their programs.

Recommendations for School Leaders

Administrators should note the value in establishing informal opportunities for teachers to learn from one another in the school or be exposed to peer learning communities between schools. Authentic learning happens when teachers practice agency, asking questions and taking risks. These behaviors need to be valued by leaders for them to be practiced broadly by the community. Establishing regular time for teachers to observe, share, and discuss how technology is supporting or detracting from their philosophical goals would create a community of practitioners who take risks and share findings openly. Thus, school leaders would benefit from the considering the following four implications:

1. School leaders should openly acknowledge the challenges in serving a diverse student population and invite teachers to be part of a learning community where best practice is an ongoing process of professional development. Risk-

taking and questioning need to be modeled by leaders to encourage teachers to do the same.

2. School leaders could establish informal professional learning communities of teachers at their own school. They could establish structured time for discussion, observation, and sharing of technology approaches that support a culturally responsive classroom.
3. School leaders could establish informal professional learning communities of teachers between their school and other neighborhood and networked schools. They could establish structured time for discussion, observation, and sharing of technology approaches that support a culturally responsive classroom.
4. If teachers attend formal professional development, school leaders could have teachers go in small groups and provide opportunities for participants to apply new learning and continue growing after the event through regular informal discussions and sharing.

Recommendations for Teacher Training Program Administrators

Teacher training programs establish foundational knowledge and life-long learning approaches. Many of these programs have a formal curriculum that provides instruction in traditional classrooms. Because informal learning proved to be an essential teacher practice in connecting pedagogy with technology resources, teacher education programs should introduce opportunities for teachers to benefit from this model. Thus, teacher training program administrators would benefit from the following three recommendations:

1. Teacher training program leaders should include curriculum grounded in critical pedagogy, especially culturally responsive approaches.

2. Teacher training program leaders could include a mentoring program that allows more experienced culturally responsive teachers to guide and model practice for new teachers.
3. Teacher training program leaders could provide opportunities for students to develop informal learning communities among themselves and in connection with other teachers to model informal learning practices as essential to ongoing growth and development.