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Gardening and Watering 21st Century Soil: Culturally Responsive and Technology Enhanced Instructional Design in K12 Schools

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GARDENING AND WATERING 21ST CENTURY SOIL:
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DEDICATION

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ABSTRACT

Decades of research have documented the positive impact of culturally responsive teaching on academic outcomes for African American and LatinX students. However, as the field of education has become increasingly embedded with technology as a powerful tool of instruction, more attention is needed to understand how culturally responsive teachers use technology to close achievement gaps. Although national public policy over the last twenty-years has documented the negative impact of the digital divide on low SES, African American and LatinX students, large-scale efforts to close the divide have focused primarily on access to devices only. More recently, the second digital "use" divide has brought attention to examining teachers' instructional practices after the physical technology infrastructure is in place. This qualitative case study explored how, why, and in what ways culturally responsive teachers used technology. Data from this study revealed that teachers' pedagogical beliefs, their personal schooling experiences, training, disposition, mentorship, and expectations from school administrators influenced the ways in which they integrated technology with culturally responsive intentionality. This study provides insights for school leaders [post-COVID] tasked with the imperative to provide both access to technology and support for the uses of technology towards closing persistent achievement gaps. This information can also prove valuable for teachers seeking to improve technology-enhanced instructional practices toward providing equitable school experiences and long-term positive outcomes for an increasingly culturally diverse public-school population across the United States.

CHAPTER I

INTRODUCTION

One of the most important aspects of technology in education
is its ability to level the field of opportunity for students.

—John King, U.S. Secretary of Education, 2017

Over the last 50 years, technology has become a significant instructional tool in schools; and students' ability to use it effectively can impact academic outcomes and even post-secondary preparedness (Lei, 2010; Warschauer & Matuchniak, 2010). Technology use that leads to the development of in-demand knowledge and skills can open the doors of opportunity for full participation into society as technology-dependent industry will continue to expand in the 21st century (Warschauer, 2003). Unfortunately, for historically underserved and racially minoritized[1] students, inequitable technology use has contributed to existing opportunity gaps; instead of leveling the playing field, technology has been used as a tool of exclusion between the haves and the have-nots (Campos-Castillo, 2015; Hargittai & Hinnant, 2008).

The unequal access and use of technology is a significant problem, and it is commonly referred to as the *digital divide* (Jackson et al., 2003, 2008; Lenhart & Horrigan, 2003; Prieger & Hu, 2008). The U.S. Department of Education (2017) defines the digital divide as the "use of technology as a tool to engage in creative, productive, life-long learning rather than simply

[1] The term racially minoritized articulates that rather than being a minority by numbers only, African American and LatinX students are positioned at a lower social status (by educational institutions, policies, and teachers) within a racial hierarchy in the United States (Dei, 2000; Schissel & Stephens, 2020).

consuming passive content" (p. 11). Research by the National Center for Education Statistics [NCES], reports differences in educational outcomes seen in recent computer and information literacy (CIL) data where White and Asian students perform significantly better than other ethnic and racial minorities (NCES, 2019b). Specifically, White students had an average score of 540 and Asian students had an average score of 563 compared to Black, Hispanic, Native Hawaiian/Pacific Islander, American Indian/Alaska Native students averaging 475, 502, 473, and 470 respectively (NCES, 2019b). Data from those demographic subgroups highlight the need for schools to pay greater attention to the unique needs of students from historically underserved populations. The NCES (2019b) report determined that 8th graders' CIL score was comprised of students' proficiency in a number of technology-related areas and the use of technology for specific learning activities including but not limited to, technology for research, collaborative work online with other students, presentations, coding, tests, and audio/video productions. Students' lack of computer and technology use is significant as it directly contributes to a lack of preparedness in 21st century skills. Ultimately, students most impacted by the digital divide are preparing to be consumers instead of producers in our larger society (Donnor, 2005).

However, closing the contemporary digital divide is a complex problem as it is tied to a number of interlocking factors. According to Gorski and Clark (2001), there are three access discrepancies between racially minoritized students and their white middle class counterparts, "home access to computers, school or work access to computers and internet, and lastly, teacher preparedness to provide students educational experiences that use technology in progressive multicultural ways" (p. 15). He argues that as technological skills are becoming more and more in demand, educators need to take a more *critical approach,* and examine their practices, their

pedagogy, and their technology integration processes to effectively serve their growing diverse student demographics (Gorski & Clark, 2001).

Background of the Problem

Researchers suggest that technology innovations are contributing to inequity and widening the achievement gap, exacerbating existing sociocultural conditions (Attewell, 2001; Campos-Castillo, 2015; Selwyn, 2004). Students who come to school with a wealth of knowledge and skills in information computer technology (ICT) use are able to build up from that base while others fall further behind (Zhong, 2011). Those from middle- and upper-class families who have reliable and consistent access to computers at home and at school are more likely to have higher level digital competencies than those without (Tichavakunda & Tierney, 2018). Furthermore, how different groups use ICT, reinforces current structures of inequality (DiMaggio et al., 2004; Hargittai & Hinnant, 2008). What some scholars call the contemporary digital divide, or the *second digital divide*, refers to differences of meaningful digital use and skills.

Those who have the affordances of both access to technology enhanced curriculum, high quality instruction, and trained teachers, use technology in vastly different ways than their underserved counterparts (Warschauer et al., 2004; Gorsky, 2009). For urban students, labeled as at-risk, there is a significant difference between how technology is used compared to their suburban counterparts (Darling-Hammond et al., 2014). Spanning the continuum of higher to lower tiers of instruction, teachers of African American students consistently use technology for word processing, skill reinforcement, drill and kill, and other lower-level interactions (Darling-

Hammond et al., 2014). Teachers working with predominantly white students use technology for critical thinking, inquiry, and knowledge construction (Solomon & Allen, 2003).

The First Divide

In order to understand the imperative of technology use within education and its relationship to the achievement gap, it is essential to track large scale policy initiatives over the last 25 years. In the mid-90s discussions about the growing digital divide gained national attention after the National Telecommunications and Information Administration (NTIA) shared data from its initial report on the gap between those who had digital and technology resources and those who did not disaggregate by demographics. This report linked race, socioeconomic status, and gender to differences to the digital divide; and low-income households were those most in need. What soon followed were government programs such as E-rate and the Broadband Technology Opportunity Programs (BTOP) which provided eligible schools and nonprofits funding to intervene and support broadband connectivity (LaRose et al., 2014; Park et al., 2007). This would be the first wave of responses nationwide to address technology's role in closing the achievement gap in schools and communities. However, by defining the problem within the scope of access only, the social conditions in which technology would live and impact were not addressed. By the early 2000s, legislation enacted during Bush, Clinton, and Obama's terms would specifically outline expectations for technology's place in educational reform and large-scale policies.

No Child Left Behind Act

The role of technology in schools has continued to be one of the most challenging and widely discussed issues in educational reform policy (ESSA, 2015; NCLB, 2002). Within NLCB

(2002) both Section1-Enhancing Education Through Technology, and Section 2-Achievement Through Technology and Innovation outlined the vision for technology use in schools to close the achievement gap. These policies described the need for a strong technology infrastructure for urban and rural schools, *E-rate* subsidies for schools in need of broadband access, and descriptive language around improved academic outcomes through the use of technology. Professional learning was also highlighted as a key item for teachers to expand their ability to integrate technology into their instructional practices. The larger NCLB (2002) policy goals, outlined in Part D were as follows:

- To improve student academic achievement through the use of technology in elementary schools and secondary schools.
- To assist every student in crossing the digital divide by ensuring that every student is technologically literate by the time the student finishes eighth grade, regardless of the student's race, ethnicity, gender, family income, geographic location, or disability.
- To encourage the effective integration of technology resources and systems with teacher training and curriculum development to establish research-based instructional methods. (para.3)

Although improving academic achievement was clearly stated as the desired outcome, the implementation of this policy proved problematic. Distribution of resources varied by location as did teacher training and teacher perceptions regarding the relevance and role of technology. After a three-year review, those who had the affordances of high-quality instruction, trained teachers, and access to technology enhanced curriculum were using technology in different ways than neighboring schools (Lemke et al., 2006). Some schools were using the International Society for

Technology in Education's (ISTE) technology standards, robust curriculum, or a technology-enhanced 21st century learning framework, while others struggled to use technology with more higher-level skills and lack of funding to support their technology needs (Lemke et al., 2006).

Every Student Succeeds Act

Within ESSA (2015), technology played a major role in new models for teaching and learning in state accountability plans. Title IV, Part A of ESSA, speaks to states using innovative educational technology strategies and funding through academic enrichment grants. These funds support teacher professional development to ensure the use of technology for personalized student needs, differentiation, and for direct student services (Mesecar, 2015). Allocations within Title I, Title II, and Title IV are outlined as follows within ESSA (2015):

- Title 1, Part A:
    - States reserve 3 percent of their overall Title I, Part A funds to provide certain kinds of educational services directly to students in districts with high numbers of schools identified for improvement. These services could be linked to technology innovations, credit recovery courses, AP/IB examination costs.
- Title II, Part A
    - Provides funding for teacher development, teacher leadership, which can certainly include technology training, and/or training for teachers to implement differentiated instructional models using technology.
- Title IV, Part A
    - Allows for funding for "well rounded" education, which can provide STEM resources or even technology for after-school programming.

- Title IV, Part C
    - Provides funding for grants for "a variety of educational approaches." Once again, the flexibility in this language allows for technology to support educational technology use.

ESSA (2015) gives states and localities flexibility to redefine student success, create innovative assessment pilots and redesign of education systems to be more flexible, responsive, and connected to the real world (Patrick et al., 2016). ESSA (2015) specifically allows schools to use federal funding to support personalized learning initiatives and includes opportunities for schools to support experimentation and innovation.

To further support Title IV Part A of ESSA (2015), the U.S. Department of Education published the National Technology Plan (NETP) as a foundational technology policy document to "articulate a vision of equity, active use, and collaborative leadership" (U.S. Department of Education, 2017) to further define goals for equity and technology. This policy document would directly align to the activities within ESSA moving away from the need to transform education using technology towards the more pressing need to use technology for increasing equitable outcomes (U.S. Department of Education, 2017). The plan called for collaboration between teachers, school leaders and organizations, outlining what a robust infrastructure should entail as well as skills and competencies for teachers, schools, and students to close the digital divide. Preparing students for success in a technology-dependent workforce with 21st century skills was a policy imperative. Use of technology for personal learning, informal and formal learning, blended learning, digital citizenship, project-based learning, and equity-based enrichment programs such as *Black Girls Code*, were just some of uses of technology described to make-real

the possibilities and potential of technology-enhanced learning (U.S. Department of Education, 2017).

Digital Inequity and Technological Capital

Gilbert (2010) posits that technology access is embedded within a social, economic, and political context of intersecting inequalities situating the digital divide within a larger theory of inequality. According to Gilbert, technology capital, as technology access and use, lies within Bourdieu's (1986, 2002) social capital framework. Power, inequality, and resources are intertwined, and technology use serves as a form of networking and social capital (Gilbert, 2010). By connecting technology use to the concept of social capital, we find a relationship between technological competencies and employment opportunities; Gilbert refers to this problematic situation as *occupational segregation*, where individuals lack knowledge and skills needed to obtain high-paying, technology-dependent employment (p. 1006). Similarly, Kvasny (2002) uses Bourdieu's (1986) conceptual model of cultural and social capital to describe *capital enhancing* and *non-capital enhancing* technology uses and behaviors in schools (Attewell, 2001; Hargittai & Hinnant, 2008). Perfunctory uses of technology, those that reinforce transactional consumption align with non-capital enhancing technology use, while technology use for higher-order critical thinking, creating, collaborating, innovating, and developing in-demand skills aligns with capital enhancing behaviors. Therefore, those with greater social capital have access to greater social networks, in-demand skills, and opportunities to continue earning higher wages. Theorizing the digital divide is needed to describe the current and potential implications of how racially minoritized communities in the United States are disproportionately impacted by the digital divide compared to others with more technological social capital.

Statement of the Problem

Despite major policy reform efforts, African American and LatinX students, particularly those of low socioeconomic status, continue to underachieve academically when compared to their peers (Howard & Rodriguez-Scheel, 2017). And although policies have clearly identified communities most impacted by both the larger achievement gap and the digital use divide; efforts to mitigate these problems have not centered the needs of those populations in the intervention.

Teachers working predominantly with these groups use technology for word processing, drill and skill reinforcement, and lower tiers of interactions (Cheema & Zhang, 2013; Darling-Hammond et al., 2014). The same innovations that some hoped would provide more opportunities for underserved students, contribute to persistent inequality (Campos-Castillo, 2015; Selwyn, 2004; Tichavakunda & Tierney, 2018). The use of technology, as noted by Donnor (2005), prepares Black students to become consumers of information instead of producers. And, unfortunately, lower tier technology use does not sufficiently provide them with the technological skill base needed to navigate post-secondary endeavors and fully participate in economic mobility (Warschauer & Matuchniak, 2010).

Purpose of the Study

Given the demographic populations most impacted by the Digital Divide as low SES African American and LatinX students (U.S. Department of Education, 2017), this research seeks to explore the pedagogical beliefs and instructional design choices of culturally responsive 6-12th grade teachers who integrate technology with these populations. More specifically, this study aims to better understand how, why, and in what ways teachers use technology as an

instructional tool to meet and respond to the needs of their culturally diverse students in 21st century learning environments.

Research Questions

1. How do teachers design instruction using technology in culturally responsive ways across content-areas in 6-12th grade classrooms?
    a. What are the characteristics of a culturally responsive, technology-enhanced lesson design across content-areas?
2. Why do teachers use technology in culturally responsive ways?
    a. What motivates them?
    b. How do they envision their role?
    c. Where do they see themselves and their instructional practices within the continuum of culturally responsive teaching?
3. What are teachers' understandings about the meaning of culturally responsive teaching in a technology-enhanced learning environment?
    a. How have teachers' identity, beliefs, personal experiences, professional experiences, or training shaped their understanding of culturally responsive teaching?
    b. What aspects of culturally relevant pedagogy, if any, influence teachers' instructional design choices when integrating technology?
4. What are the characteristics of a culturally responsive, technology-enhanced lesson, design?

Theoretical Framework

Culturally Relevant Teaching is the theoretical framework guiding this study. Under the umbrella of Culturally Relevant Teaching, this study draws from both Culturally Relevant Pedagogy (Ladson-Billings, 1994, 1995a, 1995b), and Culturally Responsive Teaching (Gay, 2002, 2010a, 2010b). Culturally responsive practices are informed by pedagogical beliefs rooted in high expectations, critical caring, acknowledging, affirming, and valuing students' identities, while seeking to dismantle inequities in education. Gay (2013) argues that Culturally Responsive teaching is a radical paradigmatic shift in that it disrupts underachievement for students of color as it "does for Native American, Latino, Asian American, African American, and low-income students what traditional instructional ideologies and actions do for middle-class European Americans" (Gay, 2010b, pp .26-27). This quote suggests that schools have been designed to serve a subset of the larger population, and that closing the persistent achievement gap requires a structural intervention.

Critical Race Theory (CRT) is being used complimentarily to situate the role of race and racism in the educational experiences of African American and LatinX students historically; it provides an analytical tool to discuss systemic inequities and opportunity gaps for racially minoritized students (Delgado & Stefancic, 2017; Ladson-Billings & Tate, 2016). Through a Critical Race Theory lens, schools have failed "to properly educate the majority of culturally and racially subordinated students" (Lynn, 1999, p. 611). Moreover, by discussing culturally relevant teaching through a wider, racialized lens, educators may increase their understanding of how power and privilege manifests in schooling practices.

Significance and Contributions to the Field

This work attempts to move the larger body of research on culturally relevant teaching forward by examining pedagogy and the use of technology in practice. In current literature concerning technology integration with African American and LatinX students, closing the digital divide is addressed through access and infrastructure without attending to how technology tools are used, much less through a culturally responsive lens. In the body of literature there is a need for more empirical studies on how culturally relevant teaching practices are experienced in contemporary classrooms specifically using technology. This study provides insights into how culturally responsive teachers design their instruction to create more equitable current and long-term educational outcomes.

There are numerous studies on culturally relevant and responsive practices in public schools (Esposito & Swain, 2009; Feger, 2006; Gutstein, 2003; Hefflin, 2002; Hubert, 2014; Johnson, 2011; Ladson-Billings, 1995; Milner, 2011; Morrell & Duncan-Andrade, 2002). However, there is a gap in the literature regarding culturally relevant teaching practices with instructional technology. Prior research has examined culturally relevant teaching practices and technology integration in schools separately. However, this dissertation contributes to the body of knowledge regarding the intersection of the two centering culturally relevant teaching as the foundation. As schools integrate 21st century literacies and technological skills in preparing our global workforce, this research sheds light on how increasingly diverse public schools can enhance instruction with technology in relevant and authentic ways. Culturally responsive teaching practices, which have been shown to produce positive outcomes in education, present a

viable solution to transform student trajectories (Aronson & Laughter, 2016; Esposito & Swain, 2009; Gay, 2002; Howard & Terry, 2011; Johnson, 2011; Ladson-Billings, 1995, 2014).

Research Delimitations

This research uses a qualitative case study approach to capture the dimensions of culturally relevant teaching with technology and how racially and ethnically diverse 6th-12th grade teachers design instruction. Within the field of teacher education case studies provide a contextual picture of situational constructs; they are used widely in training, and they provide a "basis for positive transfer by experts in a complex environment" (Berliner, 2001). However, case study is not generalizable to other populations as it is context specific.

Additionally, as this is a qualitative case study, there will not be a direct examination of academic achievement data as a more tangible quantitative measure of success. Despite these limitations, the researcher hopes that the significance of this study, and the finding therein will inspire teachers, teacher-educators, and other researchers to consider how the landscape of education requires innovative approaches in order to realize positive, long-term outcomes for the growing numbers of culturally diverse students. A key assumption is that culturally relevant teaching, as one approach aligned to critical pedagogies, has the ability to disrupt inequitable schooling practices by creating environments designed for all students to thrive.

CHAPTER II

LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Introduction

Not enough is known about the deliberate choices culturally relevant teachers make when using tools to close the achievement gap for historically underserved students. One area contributing to the larger gap is students' use of technology for critical thinking, problem-solving, and higher- level activities. This gap is often referred to as the second digital divide (Moore et al., 2002; Gorski, 2005; Gorski, 2009; Lee, 2003; Warschauer, & Matuchniak, 2010; Warschauer et al., 2014). As public schools become more culturally diverse, attention is needed to understand how teachers are responding to their students' needs and enhancing their instruction through authentic technology use.

This literature review examines the current research in two major areas that are determined to be most relevant to this study, culturally relevant teaching, and technology integration in K12 schools. Culturally relevant teaching guides this study as a theoretical framework supported by a Critical Race Theory lens to frame the historical context. The first part of this literature review describes the situation of schooling for African American children as one of the historically underserved, racially minoritized groups in America. Culturally relevant teaching follows, as one approach designed to disrupt inequitable schooling practices by creating environments for all students to thrive. Critical Race Theory explains why disparities have persisted in the 21st century for certain communities compared to others. The second part of this

review examines the potential of technology to enhance classroom learning through an examination of current technology integration models. The third, and final section examines scholarship demonstrating how technology has been used in culturally and racially diverse classrooms thus far. The researcher proposes culturally relevant teaching enhanced technology use as an intervention to increase opportunities for historically underserved students moving the needle towards closing the achievement gap for those most impacted.

Review of Literature

Brown v. Board of Education

The United States has a history of denying educational rights for African Americans and inequitable schooling as evidenced by the landmark case, Brown v. Board of Education (1954) (Lynn & Parker, 2006; Tate et al., 1993). However, Brown v. Board (1954) failed to provide quality education for African Americans because it applied a mathematical solution to a mountainous social problem (Tate et al., 1993). The dismantling of separate and unequal schools through policy mandate was rooted in an expansive lens, shifting resources without focusing attention on weighty influential social factors. According to legal scholar, Kimberly Crenshaw (1988), an expansive lens sees "equality as the result;" the solution lies in eliminating the unequal conditions using the authority of the courts. By integrating racially segregated schools as a desirable outcome, other structural conditions were assumed to be inevitably changed for the better regarding African American students. In contrast, the restrictive lens views equality as an ongoing social transformation; and, within this process, inclusive and democratic processes are engaged (Crenshaw, 1988). A restrictive approach draws attention to changing discriminatory practices incrementally; however, it does not necessarily yield equitable outcomes. Ultimately,

Crenshaw views the two working together as an optimal solution for long-term change. According to Tate et al. (1993), schools created their own model of what desegregation should look like, failing to provide the conditions for optimal learning for those who needed it most. They argue that the "social construction of equal" was different from the reality of equality when it came to comparing the education of White children with the education of African-Americans (Tate et al., 1993).

In Rousseau and Tate's (2003) study, they employ the same restrictive vs expansive lens to analyze teachers' understandings concerning how to best educate culturally diverse students and create equitable learning environments. Teachers in this study used a restrictive lens toward equity work which prevented them from bringing into question the lower grades earned by students of color (Rousseau & Tate, 2003). They described a colorblind version of equal treatment for all students without considering "disproportionately negative outcomes" and the subpar academic preparation students received (Rousseau, & Tate, 2003). Similarly, in Young's (2011) study, she described how white, liberal, teachers, "saw social justice education as more about embracing the students' individuality and their diversity rather than addressing issues of social and racial equality" (p. 1454). In these studies, teachers viewed changing student outcomes separately from the acknowledgment of structural challenges. Charleston et al. (2014) proposes the use of Culturally Relevant Instruction to address the "unfinished business" of Brown v. Board ensuring equitable learning opportunities for African American students. Culturally Relevant Teaching brings a *both-and* approach into education centering social justice and creating optimal conditions for learning and success for students of color.

Culturally Relevant Teaching

In this study, the researcher has chosen to use the umbrella of Culturally relevant teaching to encompass both culturally relevant pedagogy (Ladson-Billings, 1995, 2014) and culturally responsive teaching (Gay, 2010a, 2010b, 2014). Culturally relevant teaching has been shown to produce positive outcomes for multicultural, racially, ethnically, and linguistically diverse students in America's schools (Aronson & Laughter, 2016; Esposito & Swain, 2009; Gay, 2002; Johnson, 2011; Ladson-Billings, 1995, 2014; Milner, 2011). These distinct practices are informed by pedagogical beliefs rooted in high expectations and affirming students' identities while seeking to dismantle inequities in education. Gay (2013) argues that Culturally Responsive teaching is a radical paradigmatic shift in that it disrupts underachievement for students of color and it "does for Native American, Latino, Asian American, African American, and low-income students what traditional instructional ideologies and actions do for middle-class European Americans" (Gay, 2010b, pp. 26-27).

Geneva Gay (2002) defines culturally responsive teaching as "using the cultural characteristics, experiences, and perspectives of ethnically diverse students as conduits for teaching them effectively" (p. 106). Culturally responsive teachers value students' lived experiences, their communicative norms, the traditions, and the funds of knowledge they bring into the classroom (Villegas & Lucas, 2007). Teachers who adopt these practices see themselves as an extension of their students' familial community and work to establish ongoing and effective communication. Rooted in social justice, culturally responsive teachers deconstruct issues of power, equity, and privilege within the curriculum while possessing and building cultural competence (Gay & Kirkland, 2003). Designing culturally relevant curriculum, accordingly,

involves acquiring deep knowledge of the historical contributions beyond a few cursory figures (Gay, 2002). It involves acknowledging relevant and timely issues, historical atrocities and social injustices, and controversial issues of race and racism that directly impact both our larger society and students of color (Gay, 2002). Gay (2013) argues that education for culturally diverse students should aim to connect in-school experiences with students' out of school experiences towards promoting equity, agency, community building, and student empowerment. Ladson-Billings (1995b) defines Culturally Relevant Pedagogy as pedagogy,

> specifically committed to collective, not merely individual, empowerment. 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 current status quo of the social order. (p. 160)

Ladson-Billings' (1995a) study illuminated teaching practices that were most successful with African American students in urban schools. A mixed group of eight [White and African American] teachers created a teaching and learning environment that was student-centered and demonstrated a commitment to students' families and their larger communities. Students, as active participants in these environments were watered and cultivated towards success; they engaged in critical dialogue, identified complex problems in their community, and used the classroom as an agentic space to discuss solutions (Ladson-Billings, 1995a). Three tenets ground Ladson-Billings' conceptual model (see Table 1). A culturally relevant teacher demonstrates high *academic expectations*, *cultural competence*, and *sociopolitical consciousness* (Ladson-Billings, 1995a).

Table 1

Characteristics of Culturally Relevant Teachers

Culturally Relevant Teachers	
High Expectations & Academic Success	Academic Success refers to "the intellectual growth that students experience as a result of classroom instruction and learning experiences" (Ladson-Billings, 2014, p. 75).
Cultural Competence	Cultural competence refers to "the ability to help students appreciate and celebrate their cultures of origin while gaining knowledge of and fluency in at least one other culture" (Ladson-Billings, 2014, p. 75).
Sociopolitical Consciousness	Sociopolitical consciousness refers to "the ability to take learning beyond the confines of the classroom using school knowledge and skills to identify, analyze, and solve real-world problems" (Ladson-Billings, 2014, p. 75).

Undergirding these three foundational tenets, were teachers' beliefs, and ideologies. According to Ladson-Billings (1995a), culturally responsive teachers held (1) distinct conceptions of self and others, (2) conceptions about social relations with students, and (3) conceptions about knowledge. They were reflexive and critical in their teaching practices, embraced fluid teacher-student communication, and believed in students as possessors and creators of knowledge, not culturally deficient or empty vessels to be filled (Ladson-Billings, 1995). They care deeply for their students and view themselves as extensions of their students and their communities. Teachers who take this pedagogical stance, help "students accept and

affirm their cultural identity while developing critical perspectives that challenge inequalities" (p. 469) that are perpetuated by schools and other racialized institutions.

In more recent years, Ladson-Billings (2014) discusses how Culturally Relevant Teaching has adapted to meet the needs of a changing world and changing educational systems. This change has ushered in new pedagogical approaches embracing Hip-Hop culture and creative ways to use technology. In disrupting the cycle of academic failure, Ladson-Billings posits that "our pedagogies must evolve to address the complexities of social inequalities" (p. 77). Speaking on the urgency of the digital divide and preparing students for jobs that have yet to be created, Ladson-Billings' (2013) envisions teachers using technology in imaginative and innovative ways. She implores them to take an anthropological approach towards learning about students, their communities, and what is most relevant to them. With knowledge about students and their communities, teachers are then able to design learning experiences that boost engagement using technology and align classroom instruction with students' everyday lives (Ladson-Billings, 2013).

There has been promising research as to the benefits of culturally responsive education. In Byrd's (2016) study of 315 teachers across the U.S., culturally relevant teaching practices were found to be "significantly associated with both academic outcomes and ethnic-racial identity development" (p. 1). In this study, middle and high-school student perspectives were centered in the use of "culture-based and general constructivist practices" (p. 3). However, all reported outcomes were not positive. Byrd also reported that "critical consciousness socialization was related to lower feelings of belonging" (p. 4), which the author relates to students becoming more aware of implicit bias and racism within their school through culturally responsive

teaching. To counter this, she discusses the importance of teachers cultivating positive ethnic-racial social identities in their students, developing cultural competence, and connecting curriculum to real-world challenges while continuing to acknowledge inequalities (Byrd, 2016). Culturally responsive teachers raise awareness of racial inequalities, create learning environments with higher level critical thinking while affirming students' cultural backgrounds and identities.

In Kana'iaupuni et al.'s (2010) quantitative study, culture-based educational practices were found to positively impact student outcomes in public and private Hawaiian high-schools. Kana'iaupuni et al. surveyed roughly 2,900 students, 2,200 parents, and 600 teachers across 62 schools concerning the effectiveness of grounding teaching and learning with cultural relevance. Among other things, this study found that culturally responsive practices impacted students' self-efficacy, positive social-emotional well-being, fostered strong relationships, and feelings of belonging; these things, in turn, impacted academic achievement in reading and math scores. Kana'iaupuni et al. noted the following:

> These students are also more likely to know stories and facts about their communities and demonstrate higher levels of civic responsibility. They reported multiple occasions of working to protect the environment in their communities (reflecting mālama ʻāina, caring for the land, a significant value and practice in Hawaiian culture). Perhaps more importantly, students exhibit high levels of trust and connection to their schools. This outcome is exceptionally meaningful because many Native students come from families with low socioeconomic backgrounds who have experienced multiple generations of marginalization in public schools. (p. 18)

To address the achievement gap and failing traditional models of public schools, this large-scale research sought to re-examine the relationship between instructional practices, student, family, and community engagement, and student success for culturally diverse demographics.

In another study, Gutstein (2003) researched how a 7th grade teacher designed projects incorporating *Mathematics-in-context* with core concepts through a social justice and culturally responsive problem-solving lens. Students connected math to their lived experiences, examining racial profiling of police traffic stops while learning about proportions. By intentionally integrating academic learning to the everyday experiences of 7th grade, low income, Latino populations, students were motivated to explore and use math. They grew in their sociopolitical awareness and viewed themselves as change agents. Furthermore, students developed "a different orientation towards mathematics" (p. 46) and began to adopt a more critical stance in examining math in other current issues such as housing disparities.

Similarly, Epstein et al.'s (2011) qualitative study examined curriculum design and how a social studies teacher incorporated culturally responsive and social justice content with low income, Latino and African American high school students. She exposed her students to historical views of marginalized people from multiple viewpoints through incorporating absent narratives, and ensured the content described them as change agents and challengers of injustice (Epstein et al., 2011). In teaching about racism and history through a complex lens, stereotypes were purposely dismantled. For example, students compared contemporary trials of police officers accused of shooting Black men with historical trials of Black shootings from the early 1990s as well as the political actions surrounding these occurrences. The authors suggest these approaches "may enable students to imagine and act on such possibilities in their own lives and

communities" (p. 4). In examining the impact of this type of curriculum on low-income Latino and African American students, researchers found that post-instruction, students were able to recognize different forms of racism from raised socio-political consciousness; and furthermore, data revealed that students viewed "people of color as resilient and having had agency" (p. 12) as subjects, and not only as victims of racism.

In centering culturally responsive instructional design, Morrell and Duncan-Andrade's (2002) study examined how Hip-Hop music was used in an urban high-school English Language Arts classroom to teach expository writing and analytical skills. Students critiqued Hip-Hop music as literary texts alongside traditional canonical literature; and students compared how the variety of texts addressed complex societal problems and social injustices. The unit explored in their research was grounded in critical pedagogy, and as a form of cultural scaffolding, teachers used content that directly connected to students' lives. Through a culturally responsive lens, they designed their unit to enable students to apply the knowledge they possessed about Hip-Hop and used it as a bridge to build students' confidence in argumentation. Furthermore, students applied their existing and new knowledge in the development of a cumulative critical essay critiquing dominant messages within media and popular culture and raising their critical consciousness (Morrell & Duncan-Andrade, 2002). Students developed a rich historical grounding of Hip-Hop as a post-industrial art form alongside other literary time periods (e.g., Elizabethan, Puritan Revolution, Harlem Renaissance). According to researchers, "the fore fronting of Hip-hop as a genre of poetry also helped to facilitate the transition to understanding the role individual poets may have played in their own societies" (p. 91). Ultimately, students were engaged and able to make significant cross-textual connections. Other researchers support this research and the

impact of designing more inclusive learning spaces that welcome students' cultural assets through curriculum redesign; they discuss the importance curriculum to counter the unofficial knowledge that often alienates students of color in schools (Emdin, 2010; Lachney, 2017; Taliaferro Baszile, 2009). Culturally responsive teaching is one way to mitigate mismatches between students' cultural realities and school experiences.

Challenges to Culturally Relevant Teaching

There are a number of challenges associated with the implementation of culturally relevant teaching in K12 environments. In some studies, teachers held limited conceptual understandings of what culturally relevant teaching was, found it difficult to distinguish what was most relevant, or oversimplified it (Sleeter, 2012; Young, 2010). For example, cultural celebrations were acknowledged in food, fun, and festivals; however, cultural resources were not used for higher level teaching and learning during instruction. Additionally, studies revealed the problem of *trivialization*, (Sleeter, 2012) where teachers reduced culturally responsive teaching to a checklist or carefully prescribed steps instead of embracing a pedagogical approach guiding instructional practices and curriculum development. In other examples, teachers struggled with *essentializing*, or reducing the complexity of cultural ways of knowing, being, and living, to a single narrative, or a limited set of characteristics embodying an entire racial or ethnic group of people (Sleeter, 2012).

Young's (2010) study found that teachers focused on specific components of culturally relevant pedagogy while underutilizing others. For example, some teachers demonstrated cultural competence by incorporating multicultural literature into the curriculum and focused on getting to know their students' background more personally. However, these same teachers did not hold

high academic expectations or prioritize sociopolitical consciousness (Young, 2010). In part, the underdevelopment of these areas was attributed to teacher's cultural biases; another contributing factor was the district's focus on raising testing scores as a means of addressing inequality, not specifically critiquing the curriculum. Young (2010) further notes, "teachers found it difficult to incorporate the sociopolitical consciousness component of culturally relevant pedagogy within state-mandated curriculum given time constraints and an abundance of expectations. Those who touched this area, did so sparingly" (p. 253). Similarly, Morrison et al. (2008) found that one of the challenges to culturally relevant pedagogy was the pushing against organizational power dynamics and CRP's positioning in opposition to disrupting the status quo. The authors contend that culturally relevant pedagogy ultimately clashes with the traditional ways in which education is carried out in our society, thus making culturally relevant teaching seem to be a "herculean" endeavor, and almost impossible (Morrison et al., 2008, p. 444). Duncan-Andrade and Morrell (2008) counter this point, in sharing how centering the lived experiences of students can serve as a starting point instead of designing instruction solely through a teacher-centered lens. In creating a classroom where students are the subjects of their own learning, teachers are able to make powerful bridges to students' lives.

Centering Race within Culturally Relevant Teaching

In K12 scholarship, specifically in the area of culturally relevant teaching, race has not always been named and discussed explicitly. In her seminal study 25 years ago, Ladson-Billings (1995) highlighted exceptional teaching and instructional practices of educators who taught Black students. Race was situated contextually; but over the years as the theory expanded, scholars moved away from discussions of race and CRP (Milner, 2017). Culturally Sustaining

Pedagogy, as a more recent example, focuses on intersectionality and the need for teachers to develop complex cultural and linguistic competencies (Paris & Alim, 2014). However, broadening notions of cultural responsiveness and de-emphasizing race has afforded a "denial of racialized positionality of power and privilege" (Dei, 2000, p. 26). To that end, Milner (2017) argues that "race should be an integral core of CRP" (p. 2) which allows for the acknowledgement of students' and teachers' racialized identities as well as how they interact within school communities. This acknowledgement positions racism as a structural force and examines a myriad of school-based outcomes associated with race (Milner, 2017). Institutionally, racism lives in school policies and practices as evidenced by culturally biased high stakes testing and tracking (Oakes, 2008), disproportionately negative behavior interventions, and persistent patterns of underachievement (Milner, 2017). Furthermore, historically African American students lack access to quality curriculum (Ladson-Billings, 1998) and are often taught by teachers holding deficit-based views of their ability. Given some of these factors, scholars take the position that "rather than serving as the great equalizer, schools function in actual practice to reproduce racial inequality" (Di Angelo, 2010, p. 10).

The first two components of culturally relevant pedagogy [cultural competence and high academic expectations] do not require teachers to examine systems and structural issues such as racism, nor do they require teachers to examine historical inequities and their impact on education. According to Brown-Jeffy and Cooper (2011), teachers who espouse to be culturally relevant may choose to place value on students' culture and cultural assets, however, "culture does not always take into account the permeating thread of racism in the fabric of American life" (Brown-Jeffy & Cooper, 2011, p. 79). Therefore, they propose the use of Critical Race Theory

with Culturally Relevant Pedagogy as a conceptual marriage to prepare teachers and students to be critically conscious of the current social and cultural contexts. It is needful for teachers to actively "work against the oppression that shapes their students' educational experiences" (Schissel & Stephens, 2020, p. 144). In doing so, they may develop an awareness of their own identity positioning. White and black educators who engage in racial reflection can examine their assumptions about racially minoritized students as their instructional and pedagogical practices are not exempt from racial power dynamics (Gooden & O'Doherty, 2015). Cultivating a culturally relevant and *race-conscious pedagogical perspective* (Madkins & de Royston, 2019) can prove helpful for teachers to have greater clarity on how they might understand their students' racialized realities as the foundation for the work of actively disrupting inequitable systems.

Critical Race Theory

Critical Race Theory emerged out of the legal field and Critical Legal Studies in the 1970s and 1980s. Legal scholars challenged the ways in which interpretations of the law contributed to persistent societal inequities and racial injustices (Lynn & Parker, 2006). Critical Race Theory rests on five core tenets: (1) the centrality and embeddedness of race and racism; (2) challenging dominant perspectives; (3) commitment to social justice; (4) value placed on experiential knowledge; and (5) valuing interdisciplinary knowledge and multiple perspectives (Kohli & Solórzano, 2012). Critical Race Theorists believe that racism is normal and embedded within American society; they advocate for social transformation through critical consciousness and legitimizing all voices within our racialized society (Delgado, 1990; Crenshaw, 1998). They

uncover the subtle ways in which racism lives through interconnecting systems and seek to end all forms of oppression (Delgado, 1990, Crenshaw, 1998).

CRT expanded to the field of education among other areas and provided a theoretical framework for understanding the role education plays in maintaining inequities in schools (Ladson-Billings & Tate, 1995; Howard & Navarro, 2016). Drawing from the scholarly work of W.E.B. DuBois, Ladson-Billings and Tate (1995) situate societal racial divides in schools and classrooms with the problem of educating descendants of enslaved Africans. DuBois' discussion of the literal and metaphoric *color line* represents a division between the races that manifests in society and in education. Arguably, schools continue to maintain the invisible, if not the physical dynamics of the *color line* through a chasm of differences in educational opportunities. For example, students with the affordances of college preparatory curriculum, highly qualified teachers, innovative tools and resources, and consistent enriching experiences are being prepared to sustain a higher social status amid a global workforce. Schools serve as social reproduction machines to predetermine lanes of success for some based on a variety of factors [race, class, gender, cultural norms] and relegate others to the peripheral (Ladson-Billings & Tate, 2016). Ladson-Billings and Tate (1995) posit that although poor children fall behind in school, institutional and structural racism play a significant role in attainment.

In Wallace and Brand's (2012) study investigating the practices of two highly effective White and Black middle school science teachers, both were found to acknowledge and respond to student's racialized experiences while also demonstrating critical consciousness. In this case, both the *centrality of race* from a Critical Race Theory perspective, and the critical consciousness from Culturally Relevant Teaching were evident in their findings. Neither teacher

had formal training in culturally responsive teaching; however, both saw themselves as advocates for underserved and minoritized communities. The following themes emerged as significant themes: (a) teachers' background experiences provoked a critical awareness of societal constructions of race, (b) teachers' critical awareness of the influence of societal constructions of race influenced their teaching philosophies, and (c) teachers' sociocultural awareness informed their perspectives of students' needs and behaviors. Additionally, both science teachers were invested in their students' individual well-being which translated into advocacy (Wallace & Brand, 2012).

Technology Use

Technology Use, Academic Achievement, and Demographics

Race and socioeconomic status (SES) are the most important predictors of academic achievement with technology use in schools (Warschauer & Matuchniak, 2010; Cheema & Zhang, 2013). The intersection of these two [race and SES] form a unique situation, one that SES alone cannot fully explain. According to Tsatsou (2011), the broader sociocultural context shapes the digital divide in schools, and he describes the presence of interlocking divides beyond those *who have* and those *who do not have* technology. Warschauer et al.'s (2004) study of eight California schools demonstrates a working model for how these intersecting divides function within school contexts. One group of schools was categorized as low SES and fell at the bottom academic tier with high numbers of LatinX students; the other group was categorized as high SES and fell at the upper academic tier with less than 10% of under-represented and racial and ethnically diverse students. The purpose of the study was to examine the relationship between technology use, academics, and school context. Researchers found both similarities and

differences in the ways technology was used across subject-areas and school buildings. For example, in English classes across both groups, students used computers to type papers; however, students in the high SES schools were using technology to not only write papers, but to edit, analyze, and conduct research. Researchers further described significant differences in school climate, culture, and curriculum. For example, low SES high racial and ethnic demographic schools had few credentialed teachers and were characterized as having low-level instruction; while high SES, majority White Schools offered much more advanced (AP) level offerings (Warshcauer et al., 2004). Distinguishing factors between the two school communities show a significantly higher level of academic readiness in the higher SES, majority White schools even though both had access to technology. This study reveals what Warshcauer et al. refers to as the "social embeddedness of technology"; noting that, "technological and social realms are highly intertwined and continuously cocreate each other in myriad ways" (p. 585). In this case, technology use, SES, and racial make-up were intertwined.

Lei and Zhao's (2007) study found that not all types of technology-enhanced tasks improve academic achievement. For example, tasks such as webpage construction and programming improved achievement whereas taking notes within a WORD document had a negative effect. And when examining factors such as frequency, Lei and Zhao found that those who used technology the least, showed the highest GPA due to the high-quality technology-based activities they were engaged in and the goals that were set for students. The role of technology as an instructional component also varies depending on the value ascribed to it by the teacher. During a two-year [1998-2000] school improvement effort to use technology effectively, Moore et al. (2002) found that teachers lacked knowledge on how to use computers,

noting, “It seems that many of the teachers view the computer as a reward for good behavior rather than an integral tool to support learning” (p.7). Similarly, Schofield and Davidson’s (2002) study found that technology was used as a privilege or reward to the most advanced students. Still for others, effective technology use was linked to teacher’s pedagogical beliefs and the ways in which they centered constructivist teaching; in these studies, teachers' values were the drivers in adopting student-centered instructional practices (Blanchard et al., 2016).

For urban students labeled as at-risk, there is a significant difference between how technology is used compared to their suburban counterparts (Darling-Hammond et al., 2014). Spanning the continuum of higher to lower tiers of instruction, teachers of African-American students consistently use technology for word processing, skill reinforcement, drill and kill, and other lower-level interactions while teachers working with predominantly white students use technology for critical thinking, inquiry, and knowledge construction (Darling-Hammond et al., 2014; Solomon & Allen, 2003). Unfortunately, these findings are consistent with historical data reported twenty years ago. Owens and Waxman (1995) found that in urban schools, technology use was tied to remediation compared to suburban schools where technology use was tied to enrichment. Similarly, it was found that students who used computers for remediation engaged in question-responsive transactional activities compared to more advantaged students who used computers in innovative ways. In Moore et al.’s (2002) study, both teacher disposition, low expectations for minority students, and lack of effective behavior management, were all factors that influenced lower-level use of technology.

Technology Integration through a Digital Divide Framework

In examining the Information, Computers, and Technology (ICT) use patterns over a seven-year longitudinal study across Florida [elementary, middle, and high] schools, Hohlfeld et al. (2017) found that low SES students used technology for remedial work and drill and kill *computer directed* activities whereas high SES students were more *self-directed* and used technology for collaboration, communication, and creation. They discussed their findings through Hohlfeld et al.'s technology integration model describing three levels of the digital divide in schools (see Figure 1 below).

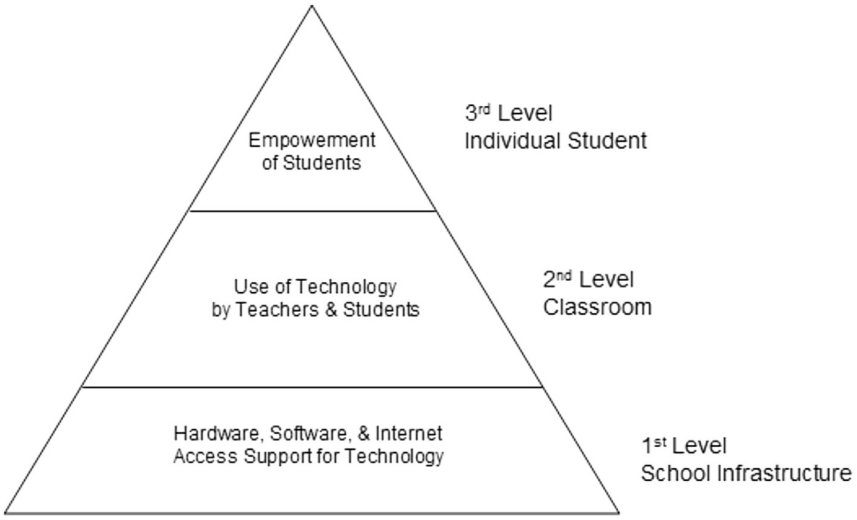

Figure 1. Levels of the digital divide in schools (Hohlfeld et al., 2017)

Table 2

Levels of the Digital Divide

Levels	Descriptions
(1) School Infrastructure-access to hardware and software	"This level, which relies on access to hardware, software, the Internet, and technology support within schools, grounds equity in ICT between schools of differing SES (Hohlfeld et al., 2008). The desired outcome at this level is to address the need of all students to have access to current, working technology hardware and software" (Hohlfeld et al, 2017, p.1650).
(2) Classroom frequency and purpose of use for instruction	"Level Two of the pyramid focuses on the integration of technology into the instructional process of the classroom. During instructional activities, students learn how to use technology tools efficiently in order to personalize their learning, collaborate with others, and to create and produce projects. The desired outcome for instructional activities at Level Two of the digital divide is for students to master and gain fluency with ICT skills so that they are ready to use them for individual empowerment in the next level of the digital divide" (Hohlfeld et al, 2017, p. 1650).
(3) Individual Students Empowerment	"At Level Three, students select and use ICT tools seamlessly, just as they use pencils or pens, to accomplish their individual goals. The outcome for Level Three of the digital divide reflects the goal of public education, that is, to produce citizens who can fulfill their personal dreams and contribute to society by engaging productively and successfully in a global digital world" (Hohlfeld et al, 2017, p. 1650).

Although the levels of technology integration are hierarchical [School Infrastructure, Classroom, and Individual Student], they are dynamic and fluid as well. For example, a student

who has high levels of technology proficiency at the individual empowerment level, when learning a new task, may need to engage in level one and two activities while gaining mastery of new skills (Hohlfeld et al., 2017). Researchers noted that issues in the first level regarding physical infrastructures, software, hardware, and internet access impacted all other levels (Hohlfeld et al., 2017). In fact, level three's effectiveness is dependent on the quality and extent of instruction in level two (Ritzhaupt et al., 2013). According to Ritzhaupt et al. (2013), due attention is needed to examine the use and purpose in level two [instructional uses] as the foundation for movement towards level three [empowerment]. Within their study, a number of concerns were raised. For example, high SES schools commonly used technology for "instructional purposes with students, families and the community (e.g., video conferencing, web publishing, podcasting, e-mailing families and students)" (Hohlfeld et al., 2017, p. 149) at a much higher likelihood than teachers in low SES schools. There was also a considerable difference in the level of parent-interactions and teacher responsiveness in the high SES schools compared to the low SES schools. Researchers desired more information to better understand teachers' motivations for contacting parents more in high SES schools. Generally, low SES schools had support structures in place to use technology; however, high SES schools had access to more software and their teachers were more comfortable using technology for a variety of instructional purposes (Hohlfeld et al., 2017). One limitation of this study was that researchers relied on secondary quantitative data from the state of Florida Department of Education's measurement system (Technology resources inventory); they recommended more in-depth qualitative inquiry for further research.

Technology Integration Models

TPACK. Mishra and Koehler's (2006) TPACK, a widely adopted technology integration model in education, represents a body of knowledge teachers must possess to create, what have determined to be the most effective technology enhanced learning environment. Their model focuses on three core areas, content knowledge, pedagogy/pedagogical knowledge, and knowledge of technology; and the intersection or convergence of all three distinctly different knowledge(s) creates a teacher's TPACK. TPACK was developed to incorporate technology and extended Shulman's (1986) notion of pedagogical content knowledge (PCK), which reaches beyond content knowledge towards an in-depth understanding of foundational teaching practices as specialized knowledge of how to teach. Mishra and Koehler (2006) define (TPACK)Technological Pedagogical Content Knowledge as

> 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. (p. 66)

As described in their model, expertise in one or two of the three areas is not enough; teachers aim to work towards the development of all three essential knowledge(s) at the core, to create an optimal learning situation with technology, teaching, and learning (see Figure 2).

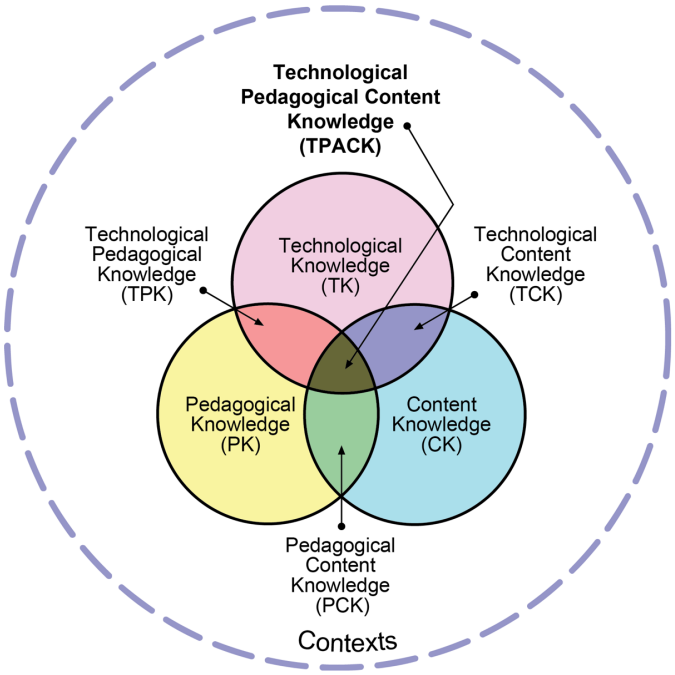

Figure 2. TPACK Framework (Koehler & Mishra, 2009)

Table 3

TPACK Framework (Koehler & Mishra, 2009)

TPACK Framework & Descriptions	
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" (Koehler & Mishra, 2009, p. 63).
Pedagogical Knowledge (PK)	"Pedagogical knowledge (PK) is 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" (Koehler & Mishra, 2009, p. 64).
Technology Knowledge (TK)	"Knowledge of technology tools and resources currently and as they change over time as well as the ability to apply it to

	teaching and learning" (Koehler & Mishra, 2009, p. 64).
Pedagogical Content Knowledge (PCK)	"PCK is 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" (Koehler & Mishra, 2009, p. 64).
Technological Content Knowledge (TCK)	"An understanding of the manner in which technology and content influence and constrain one another... Teachers need to understand which specific technologies are best suited for addressing subject-matter learning in the domains and how the content dictates or perhaps even changes the technology—or vice versa" (Koehler & Mishra, 2009, p. 65).
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, p. 65).

Mishra and Koehler (2006) and Koehler and Mishra (2009) created this conceptual model for schools and teachers to design a balanced technology-enhanced learning environment.

In Stoilescu's (2015) multiple case study, he explores the ways that three public school Math teachers use the TPACK framework in their integration of technology. He describes the *metarepresentational* possibilities in using technology and argues that "integrating technology

into mathematics classrooms should not be simplistically perceived as using computers to avoid calculations" (Stoilescu, 2015, p. 517). Technology was to be used to significantly improve teaching and learning and provide students with opportunities for multidimensional modeling and innovative approaches for students to demonstrate understanding (Stoilescu, 2015). Findings from this study revealed that all three teachers integrated technology in different ways with varying, and therefore, they had different TPACKs. The differences were directly connected to how they balanced the three central areas within TPACK and the pace at which they adopted and implemented their use of technology (Stoilescu, 2015). For example, one participant had stronger content and technological knowledge but needed to strengthen pedagogical knowledge. Whereas another participant was stronger in pedagogical knowledge but needed more support in technological knowledge. Ultimately, participants in this study were all successful integrating technology as per the TPACK model; however, all took the approach that centering student needs and learning outcomes were more important than the use of technology in itself (Stoilescu, 2015).

Harris and Hofer's (2017) study explored how the TPACK framework was understood and used in K12 schools as an instructional planning as an ongoing professional development initiative. Researchers invited teachers from 27 large and small school districts across the United States that were actively using TPACK within their organizations. Once together as a group, they were to share their TPACK stories, reflect on their work, critique, and learn from each other. In several participating schools/ districts, the following TPACK profiles emerged; TPACK served as a connector, a grassroots initiative, a check---and---balance, an instructional planning tool, a technological focus, a compass, and a collaborative process (Harris & Hofer, 2017). A key

finding across participants was the importance of school context and culture as both influenced the ways in which the TPACK framework was adapted (Hoffer & Harris, 2017). TPACK was also integrated with other technology-related professional development structures.

Schools that served culturally diverse students, paired TPACK with other models. For example, some school districts used both TPACK and Universal Design for Learning (UDL) to support English-Language Learners or they used TPACK and Puentedura's (2006) Substitution Augmentation Modification Redefinition (SAMR) model. In other findings, the impact of TPACK was due to collaborative work by teachers in PLCs, with coaching, and was used in more personalized learning pods across districts (Harris & Hofer, 2017). And although some districts served culturally diverse populations, this study did not address how technology integration and instructional design impacted teachers' ability to best serve these student populations beyond the scope of ELL learners and language proficiency.

This connects to one of the gaps in TPACK, its adaptability in culturally diverse classrooms. More specifically, in the area of *pedagogical content knowledge*, TPACK fails to explicitly address the significance of students' and teachers' social and cultural context as influencers in a multicultural classroom. School demographics are changing with increasing numbers of LatinX and African Americans whereby there often exists a cultural mismatch between students and their predominantly White female teaching force (Goldenberg, 2014).

The conditions that promote learning, as well as the connection to student's prior knowledge embedded within the *pedagogical content knowledge* component of TPACK, strengthen the argument for centering culturally relevant pedagogy. The researcher in this study argues that technological knowledge, core content knowledge and solid instructional practices

can and should be informed by culturally relevant pedagogy as "the meaning of a technological tool never exists in isolation" (Philip & Garcia, 2013, p. 304). In the existing TPACK model, culture is not recognized as a bridge or key lever for teaching with technology; it is represented as an invisible dotted line on the peripheral (Koehler & Mishra, 2009).

Expanding TPACK. A number of scholars have suggested revising the TPACK framework to recognize sociocultural contexts and their relationship to teaching with technology (Angeli et al., 2016; MacKinnon, 2017; Rosenberg & Koehler, 2015; Porras-Hernández & Salinas-Amescua, 2013). This body of research shifts discussions of culture and context from the peripheral and names them as critical components for tech integration in schools. Porras-Hernández and Salinas-Amescua expanded the TPACK model by adding knowledge of student-as *actors* as well as knowledge of complex contextual levels: (a) macro-national and global, (b) meso-local school community, and (c) micro-classroom and teacher. In Figure 3, find their double-sided visual model. The left side depicts the TPACK model with the addition of three contextual levels, and the right-side folds in a fourth circle pointing to knowledge of students.

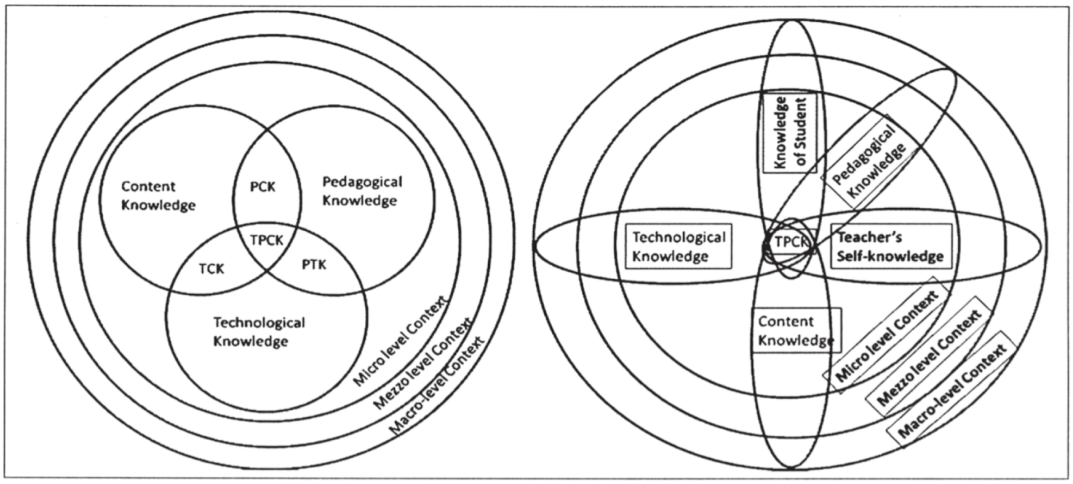

Figure 3. Technology integration with students and contextual levels (Porras-Hernández & Salinas-Amescua, 2013)

In recognizing students as *actors*, teachers acquire specific knowledge of their students; this includes knowledge about their culture, their lives outside of school, what motivates them, and even their communication styles. In recognizing teachers as *actors*, teachers may examine their subjectivities as well as their own cultural norms, beliefs, dispositions, and notions of what their role can and should be in relation to the students they serve (Porras-Hernández & Salinas-Amescua, 2013). Teachers, much like students, are non-neutral beings. In their study, researchers found stark differences in how technology was used in Mexico's rural and urban areas embedded within a larger context where social inequities abound (Porras-Hernández & Salinas-Amescua, 2013). In their study, teachers recognized place-based challenges and viewed themselves as developers of students to help them transform their communities and their families' lives; they taught to empower students for success "in a rapidly changing world" (Porras-Hernández and Salinas-Amescua, 2013, p. 234).

Building upon Porras-Hernández and Salinas-Amescua's (2013) multilevel model, the researcher proposes a critical race theory contextual framing of technology integration in U.S. schools. As this research uses Critical Race Theory to situate schooling for demographics most impacted by the digital divide, it is needful to acknowledge the ways in which race and racism manifests in schools with technology use (see Table 4). Research indicates that even when socio-economic status is not a factor, achievement gaps persist as well as inequitable educational outcomes for racially minoritized students in public schools (Howard, 2019).

Table 4

Technology Integration Contextual Levels and the Centrality of Race and Racism

Technology Integration and The Centrality of Race and Racism	
Level of Context	Critical Race Theory Connection
Macro-level →	Structural barriers and systemic inequities in education specifically regarding the digital use divide disproportionately impacting racially minoritized students.
Meso-level →	Inequities in school-based policies, discipline, and tracking of racially minoritized students into remedial classes where they may not have access to technology use with higher-order thinking and optimal preparation for post-secondary success.
Micro-level →	Instructional inequities and conditions in classrooms. Specifically, teachers' dispositions and pedagogical beliefs about their role in closing the achievement gap to prepare racially minoritized students for post-secondary success.

From the micro-level, examining teachers' pedagogical beliefs all the way to the macro level-structural barriers, technology use is embedded within a social, political, and educational context.

Technology Integration and the Technology Integration Matrix [TIM]

The Technology Integration Matrix [TIM] is a tool that was created by the Florida Department of Education and the Florida Center for Instructional Technology to help educators evaluate their level of technology integration in their classrooms (FCIT, 2019). It was developed to evaluate lessons through a pedagogical approach instead of focusing on how one single tool is used in isolation. Based on a constructivist theoretical framework (Jonassen et al., 2003), the matrix provides language and a structure to help educators evaluate technology integration and

identifies characteristics of student engagement as well. There are five technology integration levels from "entry," where the teacher is most active and technology is used in conventional ways, towards transformation, where students are highly independent, and technology is used innovatively. Characteristics of the learning environment are non-hierarchical and describe what students are doing in the classroom independently or collaboratively; those levels are described as: (a) active, (b) collaborative, (c) constructive, (d) authentic, and (e) goal oriented.

The TIM is a conceptual framework not an empirical model; and its creators focused on practitioners and their professional development needs. It was created by a team of educators and researchers who garnered feedback from "focus groups and interviews with teachers, technology specialists, principals, district personnel, and university researchers" in the state of Florida when developing it (Welsh et al., 2011, p.71). A strength of the TIM is that it also includes resources online including videos where teachers model best practices and an accompanying TIM observation tool (Welsh et al., 2011). Nevertheless, there are limitations in the use of the TIM matrix; culture, and cultural dimensions of both students as well as their learning environment are not explicit in the language of the matrix.

Technology Integration and Pedagogy

Technology integration is a complex process facilitated and hindered by a pool of factors such as training, technology support, and professional development (Inan & Lowther, 2010). Research, for instance, has shown that teacher perceptions, perceived usefulness, as well as self-efficacy are significant barriers to effective technology use (e.g., Hew & Brush, 2007; Moore-Hayes, 2002). The ever-changing applications and dynamic growth in the tech industry also creates problems as teachers' knowledge about specific products can become outdated. In

Hew and Brush's (2007) analysis of 48 empirical studies citing barriers to technology integration, resources, teachers' knowledge and skills and teachers' attitudes and beliefs accounted for 40% of the challenges (Ertmer et al., 2012, p. 124). These findings add to other research that reveals teachers' attitude and perceptions as well as technology self-efficacy correlate with the usage of technology in the classroom (Kale & Goh, 2014; Brinkerhoff, 2006; Ertmer & Ottenbreit-Leftwich, 2010).

In general, teachers who are well equipped with the skills, support, and a positive attitude toward teaching with technology are more likely to integrate it into their practices effectively (Kale & Goh, 2014). Although schools with more resources may appear to have the ideal situation, Harper and Milman's (2016) review of 46 peer-reviewed empirical studies reported mixed results in overall academic achievement in 1:1 settings. They found that in K-12 classrooms, "the change in academic achievement was likely due to changes in teachers' instructional approaches" (p. 132). When teachers use technology as intentional components within instructional design, the technology itself is not the significant factor. It is the use of technology, and the instructional approaches teachers employ to purposely move towards their curricular goals and outcomes. Additionally, teacher's pedagogical beliefs are critically linked to how they use technology in practice (Tondeur et al., 2017).

Culturally Relevant and Responsive Technology Use and Designing Instruction

When proposing what teaching with technology informed by culturally relevant pedagogy may look, there is not a one size fits all solution. Mensah's (2011) study serves as one model demonstrating how elementary pre-service teachers designed and implemented a culturally responsive tech-enhanced science unit where students investigated air pollution and

asthma-based hospitalization rates in New York city. The design of these lessons directly connects to CRP because they were linked to social and economic challenges and environmental disparities in students' real lives. Teachers integrated both traditional tools and technology. Out of the seven strands of ISTE (2016) technology standards for students most relevant to Mensah's (2011) study is the *Standard (3)-Knowledge Constructor* as students were "using digital tools to construct knowledge, product creative artifacts and make meaningful learning experiences for themselves and others" (ISTE, 2016). In their planning and implementation, teachers not only probed students to conceptualize air pollution through the use of Vaseline stations [designed to catch dust and particles in various rooms of their homes], but students also used computers to research the how air pollution connects to asthma and other health conditions in the zip codes in which they lived (Mensah, 2011). As students increased their understandings about air pollution, they were encouraged to demonstrate their new knowledge and meaningful conclusions in multiple modalities (e.g., through observational drawings and graphics, through creative expression and storytelling, or through written notes.) Giving students the flexibility to bring their creative and cultural assets into their shared classroom discussions and higher-level thinking increased student engagement. Additionally, teachers were intentional about the asset-based language they used with students, referring to them as scientists who were conducting relevant and timely research for themselves and their families instead of simply treating them as students completing a classroom assignment (Mensah, 2011). At the conclusion of the unit, students were empowered to take action in small, but meaningful ways in their own communities, as they were more aware of how their own actions could reduce air pollution.

Squire et al.'s (2008) study found that African American middle school students increased their academic knowledge, technology expertise, and self-efficacy by engaging in a year-long after-school game-based learning program. Students learned rule structures and consequences for success within simulated environments that represented historical places and situations. They increased content knowledge, learned new vocabulary, and applied background knowledge of history in creative problem-solving situations within a community of practice (Squire et al., 2008). Student participants played thematic games while facilitators modeled strategies, academic language, and even provided additional tools and resources, such as maps of historical civilizations (e.g., Babylonians, Egyptsonians, Hittites). In some of these thematic games, participants learned about techniques used to grow food in geographic regions as well as knowledge of trading and military strategies. Researchers noted that "multiple game scenarios were designed to illustrate that no one historical model captures every aspect of history" (Squire et al., 2008, p. 43). Participants even extended their learning beyond the game-based interactions; some read supplemental books and viewed documentaries on their own. And, by the end of the program, all long-term participants experienced identity transformation, transitioning from consumers to producers of information through their experiences in the program (Squire et al., 2008). They also improved their academic grades in social studies and across other subjects.

Another study found that students' self-concept and identity were positively impacted along with increased computational thinking skills through a culturally responsive summer program for African American and Latina girls (Scott & White, 2013). Participants used multimedia, and analytical skills to create projects that drew attention to important issues in their community (Scott & White, 2013). Prior to gaining access to laptop computers, the girls were

tasked to create a storyboard, write a proposal, and substantiate a research design for the projects they wanted to complete. This was significant because technology was used as a tool to bring all the pieces together after the foundations had been established. Scott and White note, "Overtime COMPUGIRLS see their identities as contributory members of a digital community...COMPUGIRLS understand the role of technology, not as an end but a means to advance community" (p. 676). The authors contend that girls of color lack access to technology opportunities because of the lack of culturally relevant approaches and maintain that black and brown girls are interested in and can thrive in STEM fields. Many of the girls in this program had little to no prior experience with computing, and by the end of the program, not only had they increased technological knowledge; they researched problems in their communities and found ways multimedia could make an impact on our larger society with their imprint as digital innovators.

One central component of culturally responsive teaching is bridging the gap between school learning and home, or community learning. In Lachney's (2017) study, he used a culturally responsive computing (CRC) framework to bridge the social and school worlds by using technology in culturally responsive ways in Math and Computing classrooms. The design and implementation of technology use in this study, takes a *whole systems* approach where teachers, students, and their families were all integral parts of an educational ecosystem in "mutually reinforcing relationships" (Lachney, 2017). This relationship building aspect moves beyond curriculum development and content reform towards rethinking the role of schools as empowering communities in schools where accountability to high-stakes testing, corporatization, and standardization have historically been prioritized (Lachney, 2017). Students' cultural capital

is often missing in standardized tests and curriculum; and as a result, white middle class culture excludes diverse cultures and their ways of thinking and being. In Lachney's study, teachers and university professors engaged in dialogue to develop explicit content connections with students' families and communities when developing their UFT Cornrow curves workshop. Rejecting deficit cultural models, hair braiders from students' communities were involved in teaching "the computational significance of braiding" which increased student interest in STEAM thus impacting the negative effects of "education that structurally distances African American culture from school curriculum" (Lachney, 2017, p. 430). This study serves as one example of how teachers can purposefully embed technology use within a culturally responsive classroom.

Sweet et al.'s (2004) mixed-method multiple case study describes seven high-performing, high-technology schools with low-income predominantly African American and LatinX students. Researchers found that most schools used technology within the range of 10 to 13 different purposes, some extending up to 16 purposes (p. 14). Depending on the school, teachers used technology for mastery of basic skills, skill reinforcement, interdisciplinary work, critical thinking, and creation in varying degrees. And some schools used both technology and traditional paper together. Their overarching success characteristics across all schools within their case study are not specific to the technology itself but bear evidence of a complete cultural transformation. All schools were observed to have had the following: (a) challenging and caring learning environments, (b) coherent instructional programs, (c) professional community among teachers, (d) effective school leadership, (e) emphasis on improvement, and (f) parent and community involvement (Sweet et al., 2004, p. 7). In this study, their success was connected to a

combination of culturally responsive practices, effective leadership, and a comprehensive approach.

Online Learning and Culturally Responsive Teaching

In our current educational landscape, schools are redesigning what classroom teaching looks like and shifting models of instruction due to the COVID-19 pandemic (Rice et al., 2020). Online instruction brings in new dimensions to teaching and learning, a variety of different tools as well as new roles. For example, teachers in online and blended environments serve in multiple capacities, as facilitators, technologists, content experts, and even instructional designers (Martin et al., 2019; Cochrane & Maposa, 2019). Digital tools, flipped learning models, learning management systems (LMS), and communicating heavily via the internet bring both challenges and opportunities for students and teachers as co-learners (Ukpokodu, 2008). One area of concern is the challenge of how to intentionally build relationships and develop community. Boyd (2016) posits that the history of online instruction is rooted in a culture of delivery, test-based, competency driven, and socially disconnected. This model of teaching impacts the structure of relationships, "redefining individual identities" (Gomez, 2009). And unfortunately, this technology-enhanced culture does not align with community-based and collective community ways of being which are common in non-Euro-centric communities (Hammond, 2014). Online classes, by design, are technological structures; they create access to bodies of information functioning as task-based environments and reinforcing the underlying, "values, beliefs, and truths of those systems" (Boler, 2004, p. 171). Instructors are therefore tasked with "rehumanizing" technology and technological spaces (McLauren, 2000, as cited in Schneider & Smith, 2014). Adams et al. (2018) extend this concept further by proposing that online learning

runs counter to culturally relevant classrooms in that "access and management of content are emphasized over pedagogy and inquiry" (p. 365).

Cultural dimensions influence students' engagement and learning across traditional and distance/online education (Lee, 2003; McLoughlin, 1999; Young, 2008). Woodley et al. (2017) views culturally responsive teaching as an opportunity to conceptualize a new way to flip existing models of online learning. In the design of online instruction, teachers can bring cultural referents into the content as well as culturally grounded interactional norms thus creating an inclusive learning environment that supports culturally and linguistically diverse students (Heitner & Jennings, 2016; Lee, 2003). It has been suggested across P20 classrooms educators embed the following into online learning design: (1) validating students' pre-existing knowledge with relevant activities, (2) providing multi-dimensional and comprehensive learning opportunities, (3) transform synchronous online meetings to build community, and (4) empower students through liberatory leadership opportunities (Woodley et al., 2017). By making intentional design choices in online environments, student engagement may be impacted as "students move from being passive participants in their education to becoming co-constructors and responsible for developing self-directed learning paths as they navigate the educational system" (p. 470).

Synthesis of the Research

In order to gain a full perspective of the scholarly literature on culturally responsive teaching with technology, historical and current research was examined and critiqued, focusing attention on the ways in which technology is used in diverse classrooms. This spanned scholarship on culturally relevant teaching, technology integration models, and barriers teachers

face when integrating both approaches in K12 classrooms. The literature points to explicit barriers with varying ideas of what culturally responsive teaching is. Other barriers include lower-level technology use in schools with high percentages of racially minoritized students. A social justice, asset-based approach, like culturally relevant teaching, can prove useful in efforts to close the digital divide. However, more studies, such as this one, are needed to explore teacher practices and how pedagogy informs instructional design. Additionally, this research can further the progression of practitioner-based research for schools who seek ways to be more responsive to their culturally diverse communities of learners in technology-enhanced learning environments. The following questions drive this research:

1. How do teachers design instruction using technology in culturally responsive ways across content-areas in 6-12th grade classrooms?
    a. What are the characteristics of a culturally responsive, technology-enhanced lesson design across content-areas?
2. Why do teachers use technology in culturally responsive ways?
    a. What motivates them?
    b. How do they envision their role?
    c. Where do they see themselves and their instructional practices within the continuum of culturally responsive teaching?
3. What are teachers' understandings about the meaning of culturally responsive teaching in a technology-enhanced learning environment?

a. How have teachers' identity, beliefs, personal experiences, professional experiences, or training shaped their understanding of culturally responsive teaching?

b. What aspects of culturally relevant pedagogy, if any, influence teachers' instructional design choices when integrating technology?

4. What are the characteristics of a culturally responsive, technology-enhanced lesson, design?

The next chapter describes the methodology used to collect and analyze data to answer the proposed research questions.

CHAPTER III

METHODOLOGY

Overview

The intention of this study was to capture the complexity of culturally responsive and technology enhanced teaching in K12 classrooms. This chapter outlines the research design, population sample, data collection methods, and procedures. It is organized in the following sections: (a) Case Study Design, (b) Sampling procedures and population, (c) Data collection, (d) Data analysis, (e) Verification and trustworthiness, (f) Researcher's role, (g) Limitations.

Case Study Design

Case study, as a type of qualitative research, employs in-depth data collection methods and provides a more holistic understanding of the phenomenon in its natural setting (Stake, 2006). An important aspect of qualitative research is that it collects participant meanings, brings personal values into the study, observes behavior, and studies the context of participants and phenomenon (Creswell & Creswell, 2017). This research was aligned with these approaches as teacher beliefs, experiences, and practices were explored. Additionally, within the field of teacher education, case studies provide a contextual picture of situational constructs (Merriam, 1998). Berliner (2001) describes the role of case study knowledge in teacher education as "the basis for positive transfer by experts in complex environments, meaning that the ability to codify and draw on case knowledge may be the essence of adaptive or fluid expertise" (p. 477). Hence,

as the main focus of this study was to understand the experiences and practices of culturally relevant teachers who use technology, I chose a case study design.

Collective Case Study

Case studies may involve a single case or multiple cases. In collective case study research, multiple individuals, as cases, are explored to garner a better understanding of a larger representative body of cases (Stake, 2006). One advantage to this approach, and using multiple cases, is that findings allow for more comparisons to be made and are therefore perceived as having more reliability (Merriam, 2009). Furthermore, given the myriad of situational factors in a collective case study, I set out to uncover links between and within cases. Attention to teachers within these multiple cases, allowed me to do the following (a) provide the contexts and allow for comparisons of their complex realities, professional experiences, and training; (b) illuminate how teachers integrated technology in culturally responsive ways across different content areas; and (c) explore how racially and ethnically diverse teachers described their role as potential change agents in closing the digital divide.

Research Questions

1. How do teachers design instruction using technology in culturally responsive ways across content-areas in 6-12th grade classrooms?
    a. What are the characteristics of a culturally responsive, technology-enhanced lesson design across content-areas?
2. Why do teachers use technology in culturally responsive ways?
    a. What motivates them?
    b. How do they envision their role?

   c. Where do they see themselves and their instructional practices within the continuum of culturally responsive teaching?

3. What are teachers' understandings about the meaning of culturally responsive teaching in a technology-enhanced learning environment?
   a. How have teachers' identity, beliefs, personal experiences, professional experiences, or training shaped their understanding of culturally responsive teaching?
   b. What aspects of culturally relevant pedagogy, if any, influence teachers' instructional design choices when integrating technology?
4. What are the characteristics of a culturally responsive, technology-enhanced lesson, design?

Selection Criteria

The target population met my selection criteria; they were teachers who self-identified as culturally responsive, consistent users of technology, and had been teaching more than three years in grades 6-12. As a pre-screener, teachers completed a culturally responsive checklist to assess their pedagogical beliefs and their alignment with culturally relevant pedagogy. The pre-screening checklist was a modification of Hsiao's (2015) Culturally Responsive Teacher Preparedness Scale. All of the prompts on the checklist directly connected to four key areas of culturally responsive teaching (cultural competence, high-expectations, socio-political awareness, and critical caring (Ladson-Billings, 1995; Gay, 2002) (see Appendix C for the checklist). Teacher-participants in this case study held full time teaching positions and the student populations they served met specific requirements; they taught in schools with at least

25% African American students or a combination of African American and LatinX students at a minimum of 25%. The sample of teachers was intended to be racially and ethnically heterogeneous as diversity of participants across multiple subject areas would strengthen cross-case analysis.

Sampling Procedures and Sample Population

Teacher participants were recruited through sending out an email call to existing educator networks and professional organizations I was a member of to inform them about the proposed research (e.g., International Society for Technology in Education, Illinois Digital Educators Alliance). Seven individuals responded to the call via email and agreed to participate in the study. Out of the seven who expressed interest, five teachers ultimately participated in the study. By design, the sample size I was seeking for this study was 4-6 participants. While there are advantages of conducting a multiple case study with a larger sample size for more breadth, Dubois and Gadde (2002) argue for fewer cases with greater depth and richness as a multiple case study should not seek "statistical generalization" (p. 559). Therefore, a sample size of five was appropriate. Participants were provided the necessary forms (i.e., consent forms and information about the study) by email. Documentation was sent via a downloadable form for them to review and sign. Once consent forms were signed, I set up dates for data collection at a mutually agreed upon time. Below is a table that summarizes the five participants and their characteristics including teacher name [pseudonym], grade level, subject, self-identified race). Participants in this study were representative of teachers in grade levels' 6-12 across multiple subject areas including English Language Arts, Mathematics, Healthy/PhyEd, as well as Science.

Table 5

Teacher Participants

Teacher	Grade Level	Subject	Self-Identified Race	Lesson Plan Details
Charlie	9th-12th	Science	African American	Lesson Plan 1: September Lesson Plan 2: January
Maxine	9th-12th	Health & P. E	African American	Lesson Plan 1: September Lesson Plan 2: June
Michelle	7th-8th	Math	African American	Lesson Plan 1: September Lesson Plan 2: March
Andrea	6th-8th	ELA	White	Lesson Plan 1: September Lesson Plan 2: December
Julianna	9th-12th	ELA	African American	Lesson Plan 1: September Lesson Plan 2: January

Although all teachers who participated in this study came to it with different understandings of culturally responsive teaching, their responses to the pre-screener questions indicated that they possessed base-line knowledge about culturally relevant pedagogy. There were nineteen descriptive statements on the Culturally Responsive Checklist pre-screener of which participants were to self-report if they engaged in culturally responsive practices: (A) frequently, (B) some of the time, or (C) rarely/never. There were no numeric values connected to the letters A, B, or C; nor was there a specific threshold for As, Bs, or Cs that I was looking for participants to meet. If a participant indicated the letter “B” on at least one of the descriptive statements, indicating that they engaged in one of the culturally responsive practices “some” of the time, I moved forward with conducting the interview.

All five participants indicated that they engaged in culturally responsive teaching practices frequently, marking the letter "A" on more than half of the [19] descriptive statements on their pre-screener. The lowest number of As reported on one pre-screener was 10, and the highest number of As on one pre-screener was 17. There was also a range of Bs reported by participants which indicated that participants engaged in culturally responsive practices "some of the time;" the lowest number of Bs reported on a single pre-screener was 2 and the highest number of Bs reported on an individual pre-screener was 5. And, finally, for the letter C, indicating that an individual engaged in culturally responsive practices "rarely or not at all," the lowest reported number of Cs on one pre-screener was "0," and the highest number of Cs reported on one pre-screener was "4." Details concerning the pre-screener data are found in Table 6 below.

Table 6

Culturally Responsive Pre-Screener Results

Teacher	**Culturally Responsive Pre-Screener** 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. *There were 19 descriptive statements in total.*
Charlie	17-As | 2-Bs | 0-Cs
Maxine	15-As | 2-Bs | 1-Cs
Michelle	13-As | 5-Bs | 1-Cs
Andrea	10-As | 5-Bs | 4-Cs
Julianna	14-As | 3-Bs | 2-Cs

Data Collection

Data collection methods for this study were designed to capture teacher's use of technology, their pedagogy, and their instructional design choices which were documented through interviews and document review. Interviews were conducted via online video conference and were audio-recorded with participant's consent. Each interview was scheduled to be approximately 60 minutes long. For the most part, interviews lasted close to the full hour; there were two interviews that were slightly shorter than the full hour. After the first set of interviews, I jotted down process notes which included which questions I probed more than others or questions or where I added a transitional sentence between questions. I also took notes about high-level take-aways from each conversation immediately following the interview.

The first round of interviews established background information about each participant during which they discussed their teaching experiences, training, pedagogical beliefs, school context, how they used technology, and their planning process. At the conclusion of the first interview, teachers were asked to share lesson plans from two different times of the year (e.g., Fall, Winter, Spring) in preparation for the second interview. This second interview (see Appendix E) allowed participants to discuss their instructional planning and instructional activities in more detail. This entailed discussing what they proposed to do compared to what they actually did and gave them the opportunity to explain pivots or changes they made during instruction from their recollection. Additionally, these interviews allowed participants to share contextual background information about their lesson plans (e.g., where the lesson plan fell within their units of study) as well as self-reported interactions with students. These rich details were significant given that no classroom observations were conducted.

Case study commonly uses multiple data sources to gain a more comprehensive understanding of the phenomenon (Stake, 2006; Patton, 2015). Therefore, the two data collection methods, semi-structured interviews and lesson plan review were appropriately chosen. Multiple data sources allowed me, as the researcher, to put all the "puzzle pieces" together as "data from these multiple sources are then converged in the analysis process rather than handled individually" (Baxter & Jack, 2008, p. 556).

Individual interviews were conducted using protocols that were developed with direct alignment to the research questions (see Appendix A and Appendix E for interview protocols). In designing them, criteria for analysis were considered using Yin's (2009) unit of analysis matrix and the four research questions (see Table 7). Teachers were the primary unit of analysis and the teachers' lesson plan was the embedded unit of analysis. One assumption I held was that teachers with a culturally responsive pedagogical disposition would use technology in ways that were distinctly different from how other teachers use technology. Another assumption was that pedagogy would translate into practice through decisions that were made by teachers in the lesson planning process (e.g., decisions about what content would be chosen, norms, activities, choice of tools, what students would be doing with technology, assessment choices, and how the teacher would deliver content).

Table 7

Case Study Unit of Analysis Table Based on Yin's (2009) Unit of Analysis

Unit of Analysis		
Primary Unit of Analysis	Teacher→	Teachers' process for designing culturally responsive and technology enhanced lesson plans informed by their pedagogy. Teachers' understanding of what it means to be culturally responsive. Teachers' uses of technology, why they use it, the choices they make, and with what outcomes in mind.
Sub Unit/ Embedded Unit	Lesson Plan→	The product of a process where elements of culturally responsive pedagogy are embedded with the lesson plan. Also embedded in the lesson plan is how technology is used to support student learning in culturally responsive ways.

For the second data collection method, participants were asked to submit lesson or unit plans for analysis from two different time periods within one calendar year. Analyzing lesson plans helped garner a deeper understanding of the planning, instructional design, and assessments used by teachers incorporating both culturally relevant teaching and technology over the course of a school calendar year. Ideally, I would have conducted in-person observations as a third data collection method; however, given the fluid nature of COVID-19 health concerns in schools, in-person observations were not done.

Methods

Data Analysis

For this case study, there were different phases of data analysis, and I reviewed interview transcripts and lesson plans closely multiple times; my process employed both inductive and deductive approaches. Initially, the process was led by a deductive approach, whereby pre-set

larger coding categories were used which established clear links to research questions I sought to answer (Saldaña, 2021). The primary list of codes I constructed that were applied to interviews and lesson plans are provided in Table 8. *Dedoose* software was used to manage interview transcripts and to organize lesson planning documents. I did not create a hierarchical leveled system of codes within the *Dedoose* codebook (e.g., primary codes with specific subcodes) so as not to force fit data into a rigid structure (Saldaña, 2021). Rather, I purposely chose to keep the codes broader, allowing for some discovery. While I coded transcripts, I also constructed brief memos where codes did not fit within the coding scheme to revisit upon subsequent review of data. If I noted similar memos across other participant interview data, I assessed if new codes needed to be developed.

Table 8

Thematic Codes and Definitions

Code	**Definition**
Culturally Relevant Teaching	Mentions of pedagogy, beliefs, actions, or instructional practices that align with culturally relevant teaching.
Technology Use	Mentions of technology use for planning or instruction.
Planning & Instruction	Mentions of planning processes, instructional design choices, instructional materials with or without the use of technology.
Teacher Background	Mentions of teacher's identity, teacher training, teacher's prior personal educational experiences, school or community context.

After applying these initial codes, patterns, inductive codes, and themes emerged. I coded one transcript at a time, and with each additional participant, I reflected on the similarities and

differences between participants from one transcript to another; I also gained familiarity with the use of the codebook with each subsequent round of coding. Table 9 below is a condensed list of inductive codes that were created.

Table 9

Inductive Codes and Definitions

Code	**Definition**
Culturally Relevant Teaching	
Pedagogy	Approach to teaching and beliefs about the role of a teacher.
Definition of CRT	Understanding of what culturally relevant teaching is.
Technology Use(s)	.
Tools	Mentions of specific tools described by teachers for instruction.
Uses	Mentions of how teachers or students were using technology.
Purpose and goals	Reasons why technology was used, goals, and outcomes teachers were seeking.
Planning and Instruction	
School Expectations	Mentions of school policies and expectations for planning.
Process	Process and steps teachers took when planning for instruction.
Practices	Actions teachers planned for or took while teaching.
Training and Education	Training, education, or professional development mentioned.
Teacher Characteristics	
Background	Mentions of educational experiences that influenced teaching.
Mentors	Mentions of mentors and their guidance.
Classroom culture	Classroom norms, expectations, activities, and environment.
Continued Learning	Mentions of increasing their learning including new tools or approaches to support students

After themes were determined, I further analyzed data related to technology use for any overlap with culturally relevant teaching, utilizing the four core areas of (a) cultural competence, (b) high academic expectations, (c) socio political awareness, and (d) critical caring. For example, if a participant shared that they used technology with the goal of increasing visual representations of students' cultural backgrounds, that would be coded under both cultural competence as well as technology use. Additionally, I used the TIM Matrix (Florida Center for Instructional Technology, 2019) to categorize teachers' uses of technology progressing from conventional and guided uses of technology towards independent, innovative, uses of technology with students (see Appendix B for the TIM Matrix analysis tool). And, finally, I conducted cross-case analysis to determine themes and allow for similarities and differences between cases to emerge (Miles & Huberman, 2014).

Verification and Trustworthiness

Two specific measures strengthened the internal validity of this study, one of which was the use of multiple data sources for triangulation. A primary benefit of using multiple data sources is that it is one way to address "the concern (or accusation) that a study's findings are simply an artifact of a single method" (Patton, 2015, p. 674). I also used member checking, sharing my initial findings with participants to ensure accuracy of their responses and to also request feedback on misinterpretations or areas where they would like to clarify. Feedback from participants on tentative interpretations further increased the trustworthiness of findings (Thomas, 2006).

Researcher Role and Positionality

My background in urban education serving in predominantly low income, disinvested communities affected my role as a researcher. My membership as a racially minoritized Black female educator contributes another layer of subjectivity as I have experienced school as a hostile place growing up in and around the Chicagoland area. It was not until college that I experienced teachers that interacted with me through an asset-based lens. I have also served as a teacher, interventionist, and instructional coach with predominantly African American and LatinX student populations for over a decade, and I viewed my teaching role as one who exists to serve those communities.

My K12 experience positioned me as a peer expert, potentially impacting how I interpreted findings due to my own values and assumptions. Contrastly, in the role of a teacher-researcher, my positionality may have established credibility and rapport as an "insider" instead of as an objective researcher. Understanding the nuances of teacher expectations and balancing parent, administrator, and student needs, allowed me to use that knowledge when asking relevant follow-up questions during semi-structured interviews.

Ethical Considerations

Research took place after I had successfully obtained IRB approval. All protective measures for confidentiality were explained within the IRB documents and within the informed consent process in writing and were also provided verbally to research participants. Data were de-identified and securely stored in a password-protected OneDrive; once research has concluded, data will be destroyed.

Limitations and Choices

There are three significant limitations to this study. Because this is a case study design, the findings are context-specific and are not generalizable. The second limitation is the lack of student voice to provide counternarratives to data provided by teachers. Lastly, the study took place during the time of a global pandemic, and COVID has presented unique challenges; primarily, it impacted the ability to physically observe classroom instruction in the natural setting as I had hoped to do.

CHAPTER IV

FINDINGS

The purpose of this case study was to provide a rich description of how teachers use technology and design instruction using technology in culturally responsive ways. In this chapter, I present a high-level overview and key research findings followed by a more in-depth report of findings from participants' responses in answering all the research questions.

Research Questions

1. How do teachers design instruction using technology in culturally responsive ways across content-areas in 6-12th grade classrooms?
    b. What are the characteristics of a culturally responsive, technology-enhanced lesson design across content-areas?
2. Why do teachers use technology in culturally responsive ways?
    a. What motivates them?
    b. How do they envision their role?
    c. Where do they see themselves and their instructional practices within the continuum of culturally responsive teaching?
3. What are teachers' understandings about the meaning of culturally responsive teaching in a technology-enhanced learning environment?

a. How have teachers' identity, beliefs, personal experiences, professional experiences, or training shaped their understanding of culturally responsive teaching?
b. What aspects of culturally relevant pedagogy, if any, influence teachers' instructional design choices when integrating technology?

4. What are the characteristics of a culturally responsive, technology-enhanced lesson, design?

Findings Overview

Technology changed the way teachers interacted with and built relationships with students, where and how learning took place, the ways in which knowledge was assessed, as well as the type of resources and instructional tools teachers used. However, technology as an embedded factor in classrooms did not shift teachers' conceptions of culturally responsive teaching in a significant way. Teachers' knowledge and understandings about culturally responsive teaching in a technology-enhanced environment aligned with what we've seen in the foundational literature on culturally responsive teaching. Participants were situated across a continuum, and each teacher prioritized at least two out of the four core components which included: (a) cultural competence, (b) high expectations, (c) critical caring, and (d) socio-political awareness. Across the sample, teachers' understandings about culturally responsive teaching were influenced by their background and training, mentorship and modeling from African American teachers, and their own critical reflexive practices.

Most participants held high expectations of students and viewed their role to be preparers of the next generation of individuals destined to make the world a better place. Both the students

and teachers played active roles and were engaged in the technology-enhanced learning environment. However, at times teacher beliefs ran contrary to prevalent messages within their schools' deficit-based policies; low expectations were normalized for African American and LatinX students and *passing* was good enough. Many teachers, though not all, intentionally pushed against the status quo by cultivating students as both critical thinkers and knowledge creators. To them, high expectations and deep caring were interconnected in order to see positive long-term outcomes for their students. Technology was an instructional tool, a tool of empowerment, and one component in the larger effort to help students to be successful in college or the career of their choosing.

Although there was alignment in many cases, culturally relevant pedagogy did not always inform technology use. The two existed separately in some cases and were more integrated in others. Culturally responsive teachers used technology as one of their tools in their instructional toolbox with four overarching goals: (a) to build knowledge, (b) to assess knowledge and progress, (c) to build an inclusive community, and (d) to provide content that was more representative of the diverse cultural backgrounds of their students. These goals informed the uses of technology in their classrooms. For many teachers, knowledge of students' lives and what was most important to their communities and families were just as important as formal training in their respective content areas. In order to build students' content knowledge [with or without the use of technology], teachers integrated their knowledge about students' cultural and social experiences into their instructional practices and their choice of content. They drew from a well of both traditional-tangible resources and web-based resources. The individual teachers' purpose driven goals, their pedagogy and their beliefs about technology which determined how

technology would be used in their classrooms. Other factors that influenced technology use were place-based expectations from their school leaders, district policies, as well as teacher and student preparedness to use technology.

All participants described the permeance of technology and the ways in which their school district had become more reliant on technology as a result of the COVID-19 pandemic. Technology use was expected and situated in a larger school system and simultaneously within their individual classroom. Teachers, in turn, complied with their school systems' requirements to use technology for learning management and for strengthening content area knowledge and skills.

All five teachers believed their students needed technology skills to navigate functional and operational aspects of school. Some recognized the impact of COVID in illuminating new ways that they would have to support students' learning curve relative to technology. To that end, some made an intentional choice to engage in technology-focused professional development to increase their own technology competencies which would in-turn help them to better support their students. Teachers' disposition towards technology and their efforts to push beyond school expectations were reflected in the ways they incorporated technology in their classrooms

Similarly, school expectations were a significant factor in instructional planning priorities, the planning process, and the role technology would fulfill within instructional design. More often than not, teachers' planning process was conventional, centering curriculum and content standards as the primary starting point. Building from there, teachers would follow that up by incorporating culturally responsive content, learning supports, and technology tools. Some teachers were trained in and actively used a backwards design process such as UBD

[Understanding By Design]; these teachers often developed their own individualized lesson plans and/or unit plans. Others used packaged lesson plans and district-provided curriculum pacing guides, then they adapted as needed for their students.

During interviews, teachers articulated the complexity of culturally responsive teaching in a technology enhanced environment. In this chapter, I discuss four major findings which emerged from participants' responses in answering all the research questions.

Understandings about Culturally Responsive Teaching in a Technology-Enhanced Environment

When asked about what it means to be culturally responsive in a technology-enhanced environment, there was a continuum of responses. However, across the sample, being culturally responsive meant knowing students deeply and demonstrating care for them, valuing, and affirming their experiences, holding high expectations, creating learning environments where students succeed both in-the-present and in-the-future, and lastly, preparing students to be critical thinkers and leaders. Technology as an embedded factor in classrooms, did not change teachers' concepts of culturally responsive teaching significantly as, in many cases, their pedagogy informed their technology use. The presence of technology in the learning environment did change other things, namely, the way teachers interacted and built relationships with students, where and how learning took place, the ways in which knowledge was assessed, and the type of resources and instructional tools teachers used.

Teachers' knowledge and understandings about culturally responsive teaching in a technology-enhanced environment aligned with what we've seen in the foundational literature on culturally responsive teaching with teachers demonstrating one or more of the following

characteristics: cultural competence, high expectations, socio-political awareness, critical caring. These core elements were evident in what they valued, believed, and prioritized. The table below visually represents the continuum of participant understandings and beliefs relating to culturally responsive teaching. Four out of the five teachers discussed how they were using technology to support cultural competence or for critical thinking. All teachers used technology to build stronger relationships and support critical caring. Two teachers used technology to support students' development of socio-political awareness.

All teachers described at least two of the core components, and all participants overlapped in the areas of cultural competence and critical caring.

Table 10

Teacher's Understanding of What it Means to be Culturally Responsive

Culturally Responsive Components	Descriptors:	Name & # of participants discussing CRP component	Used Tech with CRP Component
Socio political awareness	Prepare students to critically analyze the current educational, social and political context, to build their agency, & to affect change. Use content and school-specific skills and knowledge and connect them to solving problems that impact students' families or communities.	Julianna Maxine (2)	Julianna Maxine (2)
High expectations	Believe ALL students can produce high quality work and provide scaffolds for learning when needed while maintaining high expectations. Incorporate ways for students to be knowledge creators and incorporate multiple forms of assessments and multiple modalities for students to demonstrate understanding.	Julianna, Maxine Mindy Charlie (4)	Julianna Maxine Mindy Charlie (4)
Critical caring	Connect with, learn from, and build strong relationships with students, students' families and/or their communities. Recognize equities in education and/or prepares students for long-term success beyond the immediate content objectives.	Julianna Maxine Mindy Charlie Andrea (5)	Julianna Maxine Mindy Charlie Andrea (5)
Cultural competence	Integrate positive, accurate, representations of students' culture, and cultural backgrounds. Build cultural scaffolds and create engaging learning environments where students can share their life experiences. Connect in-school learning with students' lives outside of school; incorporate, activities, or interactional norms that value students' identities.	Julianna Maxine Mindy Charlie Andrea (5)	Julianna Maxine Mindy Charlie (4)

Factors of influence. Teachers' knowledge and understandings about culturally responsive teaching were influenced by their background experiences and training, mentorship and modeling from African American teachers, and critical reflexive practices. In my first

interview with Maxine, she discussed how her place in life, having recently experienced the loss of a close loved one, provided a window into understanding her students who were experiencing tremendous loss with their families and in their communities. She not only empathized with students in the Title 1 school, but she also saw herself in them and she wanted them to know that they were deeply cared for.

> I connected with them because some of these kids have suffered such great amounts of loss for life. Like I had kids who had lost their mothers, their fathers, I had kids who lost a sibling and not always to like gun violence or anything. Some was to illness; some was to car accidents.

Three out of four teachers saw themselves as extensions of their students' home communities whether or not they physically lived near their students. These teachers had been raised in communities with positive African American role models; they valued their students' cultural experiences, and they respected students' community-based cultural norms. They entered classrooms with a contextual understanding of the people and places their students were connected to. However, even those who were cultural insiders adopted a learning stance, intentionally seeking to understand as much as they could about their students' interests and experiences in order to link in-school learning with out of school experiences. This relational positioning placed teachers in the role of co-learner alongside their role as content expert and instructor. Maxine talked about the importance of knowing how socio-economic status, and even immigration-status, intersects with race and ethnicity. Her students from North Carolina who worked in farms had different life experiences from her upper-middle class African American students from urban areas. And her Black students who were immigrants did not all share the

same cultural and historical backgrounds either. Knowing these things and acknowledging the layers of their cultural onion mattered a great deal in developing positive relationships.

Maxine intentionally took time to listen to her students, which she believed helped to minimize bias, strengthened student-to-teacher relationships, and shaped her perspective to view potential cultural mismatches as differences instead of deficits.

> ...sometimes we assume that like our Black kids are going to like hip hop music. I like Taylor Swift…I have native born LatinX students who identify more with the Black students than they do with Hispanic or Latinx students right…. But then also understanding that there's still some cultural stuff there, right. They will say Miss in their culture, they wouldn't say Miss [X] so understand that's not an insult. That's not, because I've heard Black teachers in particular, that are offended when they don't say Miss so and so or Mr. so and so …You can talk to them about it. Don't be upset with them about it because this is their culture.

For teachers, like Andrea, who had limited engagement with communities of color growing up, this learning stance helped her to get to know her students more deeply. She tried her best to learn about her students' cultural backgrounds, the rules and norms that were important to them in their homes, and their families' expectations for school-based interactions. Afterward, she integrated what she learned as much as she could into her classroom practices to "make learning relevant."

Charlie shared his concerns about White teachers adopting quick-fix solutions with the intent to be culturally responsive, without engaging in this deeper learning with their students. For example, he had seen teachers swap out reading passages written by White authors and

replace them with LatinX or African American authors. According to Charlie, these well-meaning acts on their own were insufficient and missed the relationship building aspect of being culturally responsive.

> If you're going to be really culturally responsive to the students, you actually have to know your students, and not just superficial information, you have to know what they like, and the lingo, understand the dynamics of family structure and stuff like that. It takes time to do that. And once you understand what makes that kid tick, and what causes them to drive for their experiences, then you can go back in and actually use examples from their life or things that are meaningful to them.

Similarly, in an interview with Julianna, she discussed her concern with teachers adopting surface-level conceptions of culturally responsive teaching without understanding the negative outcomes of their actions. She believed that teachers' culturally disconnected actions unintentionally create inequities.

> I feel there is an equity issue, when you're trying to be too cool and too nice. And too, that's not, that's not our stuff. That's your cultural norms that you're infusing in… that really irks me. And then sometimes, you know, I think also, when I read some of the stuff about being culturally relevant, it's like gamify, and do this and do that. And sometimes you're gonna sit and you're going to read, and you're going to write, and you may say I'm bored. Me too, I'm bored with this conversation… sometimes people believe that if I'm being culturally relevant, I need to write a rap and do a dance and all of it. No, you need to be 100% dedicated to pushing them to the next level.

Charlie saw first-hand how school policies perpetuate inequitable outcomes for African American and LatinX students; and he believed they were influenced by racial bias. In sharing one specific example to illustrate this, he described a district-wide policy where students could earn a 50% on assignments even if they did nothing. This worried him as he believed it was a disservice to his students. This policy stood in contrast to his belief that if given the right tools, supportive scaffolds, and guidance, the bar for learning did not have to be lowered. Charlie took a special interest in supporting his students who were not reading and writing at grade level. He made sure, even as a science teacher, that he provided students with shorter, more targeted reading passages to cover core content. He supplemented wet-labs with graphic organizers to help students chart their thinking and used technology to provide digital images to aid in inquiry-based discussions of lab results to support student-to-student learning in small groups (Maeng et al., 2013). In addition to this, he provided supplemental *YouTube* videos to bolster conceptual understandings using media with concrete examples. Furthermore, he made it a practice to find videos with speakers who mirrored his LatinX and African American students whenever possible. He also searched for science videos focused on issues that students faced in their communities. However, amid these efforts, Charlie faced resistance. Some of his students gave him pushback for insisting they complete their work and for having a higher standard than other teachers. Additionally, some of his White colleagues who" felt sorry for the kids" did not understand his positioning on academic rigor.

Representation in Curriculum and Student Experiences

Three teachers spoke about the need for more culturally responsive content to affirm and value their students' backgrounds, histories, and communities; this was a gap area within their

formal curriculum they wanted to address. Their efforts to be culturally responsive were grounded in their desire to create learning environments where their students saw positive representations of themselves.

Julianna, who teaches AP Language and Composition infused culturally responsive content into her curriculum with and without the use of technology. Course outcomes and objectives in teaching rhetorical analysis and argumentative writing could have been met with any number of text choices. However, Julianna required her students to analyze Black orators and writers across the diaspora and their masterful skills with argumentation and influence. Students analyzed the social and political contexts surrounding historical events, the intended audiences of the message, and the actions of people like Nelson Mandela and Shirley Chisholm.

> you have to, you know, show students that they have a role in the system and a responsibility and that it's not enough to learn, you have to then do something with what you have learned.

Through Julianna's perspective, students needed to understand historical happenings to analyze and critique both the message and the messenger. To that end, Black orators, writers, and political figures were integrated throughout the year, not just in Black History Month. It was important for Julianna that her students "move beyond Martin Luther King" to expand their knowledge of impactful Black individuals and learn to implement some of the same approaches and strategies into their own writing and speaking.

Andrea explained that one of the ways she infused cultural responsiveness as an ELA teacher was to choose texts her students could identify with and find relevant that may not have been in the historically White canon.

> I know that the white narrative has always been dominant in education. And so I really try to move everything away from that as best I can. And I try to make my kids the ones who are empowered in the classroom that they are able to, I want them to be able to... go into the world, and set expectations… like, I don't have to conform to this traditional idea of like white standards and expectations

Additionally, Andrea shared that when studying Shakespeare, she sought out contemporary versions of *Othello* that surfaced issues of racism and not just the presence of a Black character. She also purposely evaluated her independent reading library to ensure that there was a breadth of diverse books that represented her African American and LatinX students.

Models and Mentors from African American Teachers

Two out of the five teachers shared the significant impact that modeling and mentorship played in developing them into culturally responsive teachers, especially the guidance they received from African American teachers. It was through these relationships that critical conversations took place where teachers reflected on their own educational experiences and what they hoped to achieve with students. These mentors guided participants in becoming more aware of the sociopolitical challenges African American students faced and stirred a desire in them to be part of meaningful change.

In my interview with Julianna, she discussed her mentor from the Teach for America training program who introduced her to literature on the *school to prison pipeline* and community organizing in service to African American and LatinX communities. It was because of their mentor-mentee relationship, that she developed a greater understanding of the power and responsibility that teachers hold as well as the connections they can build with families and the

extended school community. With Julianna's knowledge of systems of inequity in education, she became reflexive, honest, and introspective, interrogating what she had learned in her own schooling and in her formal teacher preparation program which. She began to critically reflect on her practices and shift her mindset which led her to enact more culturally responsive practices.

> to be a good culturally responsive teacher, you have to undo the things that you have been taught, the things that you know, both consciously and so subconsciously. And that is really hard. You know, like, I remember when I first like, read about the school to prison pipeline, and what it felt like to see myself showing up in the things that they were writing.

Charlie came from a family of educators where both his mother and father were African American teachers. He had been taught by his mother for two years in high school and described her as a "dynamic science teacher." Her students were actively engaged in learning and he and his classmates even competed in science fares. Unfortunately, her expectations for students were not the same as other teachers in his school. There were some honors classes that Charlie had been placed into where his teachers held low expectations of him and held low expectations for their Black students in general. His mother's modeling sparked his love of science, but it also gave him a tangible example of culturally responsive teaching to draw from in molding him into the teacher he would strive to become. Her model showed him the importance of believing in his students' ability to master difficult concepts regardless of their starting point. And, building from her example, Charlie made sure his students saw great things from them and expected them to rise to the occasion.

Andrea's mentor, Mrs. Carter [pseudonym used] had a profound impact on her growth as

a White teacher seeking to serve predominantly African American students. Mrs. Carter was a highly respected teacher, a "powerful figure," who knew all the students and their families. She also happened to be a Black woman. The conversations that Andrea had with her shaped her professional growth and her journey in becoming more conscious of her own biases during her early teaching years.

> she really helped me, like we had a lot of frank conversations about race. There were things that she would point out to me that I was doing or help me, challenge me about the ways that I serve my babies, the ways that I was teaching. And so, and so she was really transformational for me.

This mentor relationship was coupled with Andrea's active self-directed informal learning. She sought out books and literature focused on culturally responsive teaching and urban multicultural education to improve her own practice, books such as Dr. Christopher Emdin's (2016), *For White Folks Who Teach in the Hood and the Rest of Ya'll Too*, and Zaretta Hammond's (2014), *Culturally Responsive Teaching and the Brain.* These books helped her to reflect on her pedagogy, her teaching practices, and how she was contributing to school-based inequities.

Culturally Responsive Teaching and Technology Use

The reasons why teachers choose to use technology was connected to its role in fulfilling their larger purpose, whether in service to culturally responsive goals or not. Although culturally responsive teaching and technology use were aligned in several cases, culturally responsive teaching was not always the driver for technology use. Three factors influenced the range of technology uses: (a) teachers' individual goals, (b) expectations from school systems and structures, and (c) teacher and student preparedness to use technology. These three were

interdependent at times and completely separate from each other at others.

Teachers' individual goals when using technology primarily fell into three broad categories; to support knowledge building, to develop authentic and caring relationships with students, and to create an engaging and responsive learning environment. All three categories connected with culturally responsive teaching through teachers' intentionality when using technology. More specifically, teacher's goals when using technology were aligned with increasing cultural competence, fostering high expectations, developing socio-political awareness, and critical caring. Other uses of technology, such as to navigate learning management systems or to reinforce skills, were often grounded in compliance. Lastly, teachers' preparedness to use technology was influenced by their training as well as their beliefs about what role technology should play in schools.

Technology to support knowledge building. As an instructional tool, technology served many purposes. Mindy used technology with the *Gradual Release Method* in her Mathematics class, replacing the physical white board with collaborative tools like *Jamboard*. She would model the first step, the "I do," and have students collaborate and complete the "We do" as the next step before students worked independently. Students worked in small groups across multiple simultaneous boards to solve a problem while Mindy observed and gave feedback after visually seeing their thinking. She also used *Jamboard* for Math-talks, where students visually and verbally talked-through their thinking individually or in small groups. This activity fostered critical thinking aloud that may have otherwise happened internally. It also helped students to get comfortable with the learning process instead of focusing narrowly on getting the answer right. Mindy especially found this approach valuable in her efforts to cultivate students as leaders.

Everyone in the class contributed during their time to talk; and students helped each other often as peer supports in a culture where making mistakes was part of the knowledge-building process. In Mindy's case, her school administration encouraged all teachers to use the *Graduate Release Method*; however, some teachers made the common pitfall of skipping from the "I do" to the "You do." Technology tools like *Jamboard* afforded teachers the opportunity to engage students in both the "I do" and the "We do" seamlessly where all students had the ability to learn with and from each other in real time. One of Mindy's larger goals for her students was to cultivate the leader in them and for students to see themselves as mathematicians who could solve problems in the real world. In order to move students from dependent learners to independent learners, Mindy created a classroom culture centering high expectations where feedback was normalized, encouraged, and expected. Students knew their role was to engage in the learning process, whether in math stations, in small groups, or in whole group discussions. Technology, as a tool, helped to facilitate her overarching leadership goal, increase Mathematics knowledge and skill building, and fulfill the ask of her administration.

In another example, Maxine used technology for knowledge-building in multiple ways; she shared content with students through *Nearpod*-enabled mini lessons and she integrated media resources where students saw representations of their diverse cultures and identities. She also developed web-quests where students conducted research and embarked on a learning journey. Instead of simply finding content and plugging it into an answer slot; her health and physical education students were required to connect what they were learning with problems in their direct communities or issues that impacted their families. Instead of providing hypothetical case studies, her students were investigating publicly available health-related data on diseases, data on

accessible healthcare, and health-related outcomes.

> Sometimes we watch these videos about [Pseudonym] Jail, and how when they closed all the mental health facilities, the number of inmates increased at [Pseudonym] Jail, and these inmates all had mental health issues. And they're like, man, it makes sense. Like, it's just, it's interesting, what captures their attention.

This made learning relevant for Maxine's students and helped move concepts and issues that seem far away from them and brought them close to home, making them tangible and immediate.

As part of Maxine's daily practices, students also used structures like the C.R.A.P method when investigating information and researching online. The C.R.A.P method is an inquiry-based model where students analyze the source of the information and its credibility through different lenses to assess if the information is current, reliable, written by a reputable authority, or written with high levels of subjective bias. Students not only used the C.R.A.P method individually; they also engaged in rounds of questioning each other and discussed their findings through a timed activity. These practices supported critical thinking through multiple modalities; technology helped facilitate the process although it was not specifically technology dependent and could have been done with traditional pen and paper articles and resources.

Both Maxine and Charlie used technology for learning scaffolds to support their ESL students. Maxine used the translation function in PowerPoint to display Spanish subtitles and make content more accessible; Charlie allowed students who were more fluent in Spanish to write their assignments in their first language, and later translate it to English. In addition to this, he often allowed his students who were less fluent in English to confer with other Spanish speaking students to have them peer share and explain concepts to each other. He wanted all his

students to know that they were valued, and that learning Science was not dependent on their ability to speak English well. Both his no-tech and tech-enhanced learning supports demonstrated his beliefs about students and his role as a teacher.

Developing caring, authentic relationships with students. All participants recognized the importance of building authentic, caring relationships with students. For Maxine, care was demonstrated by providing social and emotional learning activities in her first five minutes of class using technology. She often asked emotional temperature check type questions or checked-in with students to find out about happenings in their community that they could share if they felt comfortable. She used polls or web-based applications like *Google* Forms. She also used meditation apps to enable students to destress before moving forward with content-based activities. These efforts were not designed as solutions for more serious student needs but were small intentional ways for Maxine to create a classroom culture of care. Like Maxine, Julianna incorporated ways for students to feel heard and valued and included through digital surveys. She asked students what was working best for them, and what changes they suggested for ways to improve their own learning and their shared class environment. One of the examples she discussed was that her students did not want to read about slave narratives because of the sadness they invoked. Even though it was tough for her to hear their responses at times, she used their feedback to make shifts in her instruction and content.

Mindy, who works in a predominantly African American school, shared that for many of her students, she has been the first teacher they had for the entire school year. There had been high teacher turnover, and her students felt abandoned. With an understanding of what her students experienced in the past, she set out to build positive relationships with families by

sending them *checking in on you* text messages in addition to the digital newsletter she published. These efforts ensured that she was communicating openly and often with her students and her families. She believed it also helped to build trust.

Additionally, Mindy implemented behavior management systems using low-tech positive reinforcement and high-tech digital tools such as *Class Dojo*. Her students started each day with a clean slate; she found this to be helpful in communicating her beliefs that her African American students can and should co-create a positive learning environment with their peers. She didn't want her students to feel that if they didn't behave appropriately for one day, they would be labeled a bad student and treated as such for the remainder of the year. Mindy's efforts were fruitful as she wrote very few disciplinary write-ups. In turn, her students did not lose instructional time by having to leave her classroom to see a disciplinarian or administrator. Mindy's use of *Class Dojo* served multiple purposes. From an outside observer, she was using technology as a positive behavior reinforcement tool; but for Mindy, she coupled the use of this tool with language to cultivate students as leaders. And although students were responsible for their own points, she encouraged them to support each other so that community-care was centered and not individual aims only. The *Dojo* points, which students accumulated through the web-app when demonstrating appropriate behaviors, were not a single motivator; relationship building was key to how she used that tool.

Andrea, used technology as a tool of belonging, understanding that seemingly small asks of students could create either challenges or opportunities. For example, at the beginning of the year, instead of asking her students to describe their families and their neighborhoods exclusively, she created an activity where students could introduce themselves as they wanted to

be seen in the classroom community. If students wanted to talk about their neighborhood or their families, they could. But if they wanted to talk about the person they were becoming, what was most important to them, even the name they preferred to be called, they were encouraged to do so through a PowerPoint presentation. Andrea embedded a structured writing requirement in this activity as well so that it served two purposes; she could assess their writing and she could begin the process of understanding her students at a deeper level. In her interview, she talked about her awareness that students come from different socio-economic situations, and even asking things like what students did over the summer could surface positive or negative emotions. Having alternatives for students to draw from, and creating opportunities for students to be included, helped to create a sense of belonging.

Engaging and responsive learning environments. Multiple teachers shared how technology helped them to create an engaging and responsive learning environment. Students collaborated via *Google docs* or *Padlet*, shared their thinking through voice-to-text notation applications, or used game-based interactive applications like *Quizzes*, *Nearpod* or *Kahoot* to demonstrate their knowledge and skills. Teachers like Mindy, Julianna, and Maxine used real-time data from student responses via technology to make instructional pivots, re-teach a concept with a targeted mini lesson, and provide additional resources. The use of applications like *Playposit* allowed teachers to use high interest media while embedding standard-based or reflexive questions to check for understanding and to ensure active learning instead of simply watching a video.

In Mindy's class, her students used *TikTok*, a social media technology tool to engage in error analysis of Math problems. Students explained their step-by-step process for solving a

problem and other students could view the analysis and weigh in, providing feedback as to where the student or small group could have solved the problem in a different way. These medium afforded students the opportunity to tap into their generational and culturally based ways of communicating while engaging in higher-order thinking as knowledge-creators. Innovative uses of technology like this provide multiple modalities for students to engage with content and foster collaboration and feedback in ways that are authentic and relevant. Mindy was not a master of *TikTok* or heavily engaged in social media, but she knew it was used widely by the young people she taught, and her classroom use of their preferred technology medium allowed for opportunities that may not have been possible otherwise.

In my interview with Charlie, he acknowledged that there were times when his science class could not compete with students' interests outside of class as there were topics which students needed to know that could seem just plain boring to learn. One of the ways that he balanced boring or dense concepts was by creating an engaging classroom environment whenever possible; he did this by allowing students to co-create music playlists via *YouTube* while they were doing lab work. And before adding songs to the class playlist, he talked to students about their favorite songs and why they chose a specific artist. Although these efforts were not connected directly with science instruction, these interactions were one way of building strong relationships with students. Charlie wanted his students to know that although he did not listen to all of their music choices in his day-to-day life, he was genuinely interested in what was important to them. Ultimately, the class playlist included both Charlie's old school favorites and his students' favorites which fostered community-building.

Students' readiness and confidence to use tech. Students' readiness to use technology

was a factor teachers weighed before choosing edtech tools. As Maxine planned for instruction, she considered what students knew as well as the learning curve they may need to develop when deciding if she should use one tool over another. Students' familiarity and the number of times they had practiced using the tool were factors in being confident in their ability to shift from dependent to independent users. Maxine also considered other supports such as access to high-speed internet or the degree to which students may need parental or peer guidance if they were required to complete their work at home.

> If our class were to get quarantined for some reason you had to go home and you know we work from home. Could you navigate Canvas in our course without me being with you?

She further acknowledged that using technology required different ways of giving directions and even specific language within the instructions (e.g., click, drag, copy, insert). With that in mind, Maxine used a combination of physical and digital worksheets with detailed descriptions for students; and she gave directions multiple times and in multiple ways. And, if needed, she also provided resources with screen-shot images embedded. Anticipating these types of challenges, helped her to design practical solutions to remove barriers within her scope of reach. Similarly, Julianna discussed the gap between her students' actual technology skills and what she assumed them to be. Julianna was surprised at how much her students didn't know about navigating basic word processing computer skills and researching online. The way they used their cell phones and even social media was quite different from her expectations for technology use in the classroom. Julianna found it necessary to walk students through simple tasks and retaught them when necessary. She also recognized that as she increased her own knowledge of how to use a variety

of technology tools, her learning would trickle down and help students to become more confident in their use of technology. During my interview with Julianna, she provided some tangible examples of what her learning curve looked like.

> I learned how to do *Flipgrids*, and *Playposits*, and word clouds and online surveys…I'll hit record, and I'll read the text…I embed a hyperlink. So, I learned how to do a lot of things like that, that I had never really liked taking the time to learn how to do before.

Uses of Technology

When painting the picture of technology use in their classrooms, teachers largely focused on conventional uses, and integrated culturally responsive practices in various ways. These uses of technology were often undergirded by culturally relevant pedagogy. Sixteen distinct uses of technology emerged from the study which fell into six large category buckets, tech for (a) learning management, (b) creating instructional materials, (c) knowledge-building, (d) assessment, (e) relationship building and positive social-emotional learning, and (f) active engagement, learning with students. Table 11 below shows these buckets and examples of technology uses within each category.

Table 11

Technology Uses

Categories	Examples of Technology Uses
learning management	● submitting assignments & grades ● school-wide communication via email ● organizational procedures (e.g., attendance) ● efficiency systems (e.g., electronic book inventories)
creating instructional materials	● teacher creates instructional materials to be used in person and/or digitally ● teacher creates visualizations including those that represent culturally diverse communities ● teacher creates note-taking and organization guides, & graphic organizers
knowledge building	● students access content (core curriculum content & supplemental content) ● language and ESL supports ● targeted skill building & skill reinforcement ● multiple modalities for students to engage with content & concepts ● analysis, critical thinking, critique, & problem solving ● research
assessment	● formal and informal assessments that replace or supplement paper ● students demonstrating knowledge and understanding in creative and authentic ways via projects, presentations, videos, etc.
relationship-building & positive social emotional learning	● SEL activities & supports ● monitor behavior & reinforce positive behavior expectations ● communicate with parents and building positive school-home connections
active engaged learning with students	● collaboration in small groups ● feedback loops with instructor ● metacognitive thinking/ document learning process /ask questions of self in real time with feedback

Traditional uses vs. technology uses with culturally responsive intentionality.

Culturally responsive practices were reported in five out of the six category buckets of technology use; the only exclusion was in the category of learning management. To highlight the nuances between using technology conventionally and using technology with culturally

responsive intentionality, Table 12 shows examples side-by-side. For example, in the big bucket area of relationship building and social emotional learning, a teacher using technology conventionally may choose to incorporate community-building activities; however, if that teachers were using technology for community building to value and affirm their individual and cultural identities or to better create culturally affirming spaces of belonging, that added layer of focus adds a clear distinction. It shifts activities from a more general focus to a clear shift towards culturally responsive practices.

Using the Technology Integration Matrix [TIM]

The Technology Integration Matrix (TIM) is a conceptual framework that was created through a collaboration between the Florida Center for Instructional Technology (FCIT) and the Florida Department of Education (Welsh et al., 2011). It is a framework that seeks to provide schools and school leaders with a tool to evaluate technology integration and improve instruction. The TIM framework describes five levels of technology integration in the classroom [entry, adoption, adaptation, infusion, and transformation], as well as five characteristics of the learning environment which are active, constructive, goal directed, authentic, and collaborative (Florida Center for Instructional Technology, 2019).

Table 12

Technology Uses and Technology Uses with Culturally Responsive Intentionality

Category Buckets	learning mngt	creating instructional materials and content		knowledge building		engaged, active learning for students		assessment		relationship-building & positive social emotional learning	
Technology Use vs. Technology Use with Culturally Responsive Intentionality	Technology Uses	Technology Uses	Culturally Responsive Intentionality	Technology Uses	Culturally Responsive Intentionality	Technology Uses	Culturally Responsive Intentionality	Technology Uses	Culturally Responsive Intentionality	Technology Uses	Culturally Responsive Intentionality
	Using technology to post assignments, monitor submission of assignments, send whole class communication via email and other tasks such as taking attendance or entering grades.	Using technology to create instructional materials with templates, materials, and resources that align with curriculum and subject matter content.	Using technology to create instructional materials and seek out resources that reflect students' cultural backgrounds in the design. Finding and using media with concrete examples of discipline specific concepts that relate to students' everyday lives. Using technology to find content that presents multiple perspectives, viewpoints, and experiences to integrate with curriculum that reflect cultural diversity and diverse experiences.	Using technology for students to access content and research a given topic or problem (with or without instructional guides and scaffolds).	Using technology to provide opportunities for students to analyze, critique, research, or solve problems that they experience in their communities or everyday lives. In school learning is directly connected with out of school learning. Students use technology to think critically and build knowledge that can be applied immediately and can prepare them for success beyond the classroom.	Use technology to engage with students' thinking in the moment using tools like Nearpod/Kahoot/ Padlet, Google forms, using technology to check for understanding and give student feedback.	Using technology tools to engage students in higher-order thinking undergirded by high-expectations and cultivating students as leaders, problem solvers, and knowledge-creators. Rejecting deficit-based thinking and low expectations for culturally and linguistically diverse students.	Using technology to have students submit projects or assignments digitally. Using tech to allow students to make the best choice out of a given set of options using a tech tool. Using technology for skill reinforcement of a concept.	Using technology to create opportunities for students to demonstrate knowledge and understanding using culturally grounded forms of expression including, but not limited to visuals, media, and technology innovations.	Using technology for community building activities.	Using technology for community building to value and affirm their individual and cultural identities. Technology to better understand students' experiences and create culturally affirming spaces of belonging and develop strong relationships with families and communities from which students live.

For the purpose of this study, I chose the Technology Integration Matrix (TIM) as a tool in data analysis. After conducting interviews, the TIM was used to describe technology uses by self-identified culturally responsive teachers. Instructional practices using technology were identified through interview data and lesson planning documents then matched to the cells and descriptors within the TIM matrix. A copy of the TIM Matrix with a description of the technology levels as well as the characteristics of the learning environment can be found in Appendix E. Table summaries with specific details regarding the (5) levels of technology integration and the (5) characteristics of the learning environment are shown below in Table 13.

Table 13

Levels in the Technology Integration TIM Matrix [Florida Center for Instructional Technology (FCIT, 2019)]

Technology Integration Levels	
Level	Description
Entry Level	The teacher uses technology to deliver curriculum and content; teacher is the most active use of technology, direct instruction and individual work in conventional ways.
Adoption Level	The teacher directs students in the conventional and procedural uses of technology tools.
Adaptation Level	The teacher facilitates students in exploring and independently using technology tools
Infusion Level	The teacher provides the learning context, and the students choose the technology tools to achieve the outcome.
Transformation Level	The teacher encourages the innovative use of technology tools. Technology tools are used to facilitate higher order thinking activities that may not have been possible without the use of technology

Table 14

Characteristics of the Learning Environment in the TIM Matrix [Florida Center for Instructional Technology (FCIT, 2019)]

Technology Integration: Characteristics of the learning environment	
Characteristics	Description
Active	Students are actively engaged in using technology as a tool rather than passively receiving information from the technology. .
Collaborative	Students use technology tools to collaborate with others rather than working individually at all times.
Constructive	Students use technology tools to connect new information to their prior knowledge rather than to passively receive information.
Authentic	Students use technology tools to link learning activities to the world beyond the instructional setting rather than working on decontextualized assignments.
Goal-directed	Students use technology tools to set goals, plan activities, monitor progress, and evaluate results rather than simply completing assignments without reflection.

Across all five participants, their uses of technology were distributed across the entire matrix at all levels; however, the majority were concentrated within the two levels of *adoption* and *adaptation*. In the *adoption* phase, as the second level, use of technology tools is conventional, teacher directed, and most often involve a baseline of "procedural understanding" with tasks limited to one focused use (FCIT, 2019). In the subsequent level, *adaptation*, we find technology more integrated into the lesson and students as more independent in their use of technology. Although students' use of tech is still teacher directed, what makes this level different from the level prior is the students' familiarity with different tools and greater

independence. Additionally, in the *adaptation* level, students engage in more exploration and require less instruction on activities and procedural guidance (FDIT, 2019).

Most frequently in this study, teachers used technology at the *adoption level* for independent use and for small group collaboration to build knowledge. Within the *adaptation level*, teachers used technology authentically for independent activities that connected to students' lives with exploration and some degree of student choice. Infrequent uses of technology were reported at the infusion and transformation levels, where tech is used in unconventional ways and/or for self-directed student uses. Table 15 shows the distribution of technology use by the TIM levels across all participants.

A more detailed snapshot with activity examples within the two highest concentration levels of adoption and adaptation described and visually captured in tables below.

Table 15

Technology Integration Matrix for Levels of Technology Integration in the Classroom (FCIT, 2019)

Visual Heat-Map distribution of technology use

	Entry	Adoption	Adaptation	Infusion	Transformation
Active	Information passively received	Conventional procedural use of tools	Conventional independent use of tools; some student choice and exploration	Choice of tools and self-directed use	Extensive and [or] unconventional use of tools
Collaborative	Individual student use of tools	Collaborative use of tools in conventional ways	Collaborative use of tools. Some student use and exploration	Choice of tools and regular use for collaboration	Collaboration with peers and outside resources in ways not possible without technology
Constructive	Information delivered to students	Guided conventional use for building knowledge	Independent use for building knowledge; some student choice and exploration	Choice of tools and regular use in building knowledge	Extensive and unconventional use of technology tools to build knowledge
Authentic	Use unrelated to the world outside of instructional setting	Guided use in activities with some meaningful context	Independent use in activities connect to students lives; some choice and exploration	Choice of tools and regular use in meaningful of activities	Innovation use for higher order learning activities in a local or global context
Goal Oriented	Directions given step-by-step and task monitoring	Conventional and procedural use of tools to plan or monitor	Purposeful use of tools to plan and monitor; some student choice and exploration	Flexible and seamless use of tools to plan and monitor	Extensive and higher-order use of tools to plan and monitor

Adoption Level. There were several examples of technology use that were mapped onto the adoption level. One activity within the active adoption sub-level was part of an AP Language and Composition lesson designed for students to practice developing an argument before writing a summative rhetorical analysis essay. Students analyzed statements and messages within visual aesthetics related to the concept of justice using digital images of Lady Justice and a *YouTube*

video on Carter G. Woodson's work. Students considered their own experiences, the images, and the video prior to developing their own definition of justice with reasons and evidence which was to be submitted via a written paragraph. This was one lesson in a larger unit where students would develop a position on what it means to live in a just or unjust society and ultimately write a rhetorical analysis essay. Students deconstructed different types of justices (e.g., distributive, retributive, restorative), and asked big questions such as "how do laws contribute to or maintain a just society?" This lesson was placed in the active adoption cell because it was teacher-directed, students followed a set procedure, and utilized technology (e.g., digital images, a *Youtube* video, and submitting an assignment online). Julianna often used other technology tools like *Playposit* for students to check for understanding when viewing videos individually. She also used *Nearpod* to ask students for immediate feedback while in a whole group setting. In subsequent lessons, students engaged in critical thinking through Socratic Seminars and discussed their position of justice and how the laws contribute to justice or injustices.

In Julianna's selection of digital images, she used an African American version of Lady Justice as well as the traditional Lady Justice; she also chose a video on Carter G. Woodson intentionally because he was a prolific African American writer and historian. In this example, at the active adoption sub-level, culturally responsive uses of technology are evident in her choice of content which is aligned with her larger goals of having students see reflections of themselves in the curriculum and signal to students that their words and their actions can change the world.

Another activity from the table that was categorized in the constructive adoption sub-level was within a lesson from Maxine's Health and Physical Education class. In it, Maxine described how her students shared their findings after engaging in an online wellness web quest.

They were to discuss how their new knowledge after engaging in web quest helped them to think differently about the everyday health-related choices teenagers make. This activity was categorized as constructive adoption because it was initiated by the teacher, following a set procedure using technology tools, but it was also embedded with ways for students to build their knowledge individually and collaboratively. In my interview with Maxine, she talked about the importance of students increasing their knowledge about all the dimensions of health which could help them to lead healthier lives. She also talked about the importance of giving students space to talk about health-related issues like sexually transmitted diseases in a safe space. She encouraged students to think critically, to weigh multiple sides of an issue, research factual data, but she also wanted them to seek out and recognize biases within online seemingly credible sources. Within this lesson and the larger unit, she held high expectations for her African American, LatinX students and pushed them to think beyond the curriculum content, connecting their learning to their everyday lives. Her use of technology and skills related to the standard curriculum; however, her goals were much bigger than the content itself. Her efforts were grounded in empowering students and wanting them to live healthier lives with an understanding of disproportionately negative health outcomes for members of their communities.

This lesson could have overlapped into the infusion level because the technology was readily available, used frequently by students, and many students were comfortable with engaging in tasks like this with their Chromebooks. However, Maxine had students on so many different technology proficiencies, that not all of her students could do the activity completely on their own or with their own choice of tools.

Table 16

Adoption Level of the Technology Integration Matrix

Adoption	Active	Collaborative	Constructive	Authentic	Goal Directed
	Adoption	**Adoption**	**Adoption**	**Adoption**	**Adoption**
Definitions: Teacher directs students in the conventional and procedural use of tools	Conventional, procedural use of tools. Students are engaged and not passively using tools.	Collaborative use of tools in conventional ways. Students working collaboratively instead of individually only.	Guided, conventional use for building knowledge. Students use technology to connect new information to prior knowledge.	Guided use of tools with meaningful context, using technology to connect to the outside world rather than working on decontextualized assignments.	Conventional and procedural use of tools to plan or monitor with reflection. Setting goals and evaluating results rather than completing assignments only.
	Julianna	***Maxine***	***Maxine***	***Charlie***	***Julianna***
	High School ELA	High School Health/P.E.	High School Health/P.E.	High School Science	High School ELA
	Students analyzed the statements and messages related to the concept of justice within digital images of LadyJustice and a Youtube video on Carter G. Woodson's work They considered their own experiences and what they viewed to develop their own definition of "Justice." and what a "Just society is." Students wrote a paragraph defining justice and developing an argument with evidence and reasons. Afterward, students submitted their first drafts via *OneNote*.	Students share their findings in pairs after using the C.R.A.P test to evaluate Health-related resources from researching websites and online articles.	Students shared their findings after engaging in an online Wellness Webquest for teenagers and discussing how this new knowledge can inform the everyday Health-related choices they make and confirm or disprove their existing what they knew prior. Students chart their thinking via *Google docs*.	Use of technology, *Youtube* to connect Biology/Chemistry concepts in the curriculum with concrete, relevant, and community-based examples in students' real lives.	Use of *One Note* for feedback to students after assessments. Students and teacher exchange back and forth conversations and co-evaluate growth.

				Andrea	
				Middle School ELA	
				Students demonstrate their writing competencies via a Power Point presentation; teacher uses this as a writing assessment and a community-building activity as students use their creativity and also introduce themselves how they preferred to be seen and acknowledged in the classroom community.	

Similar to the adoption level, there were multiple examples of technology use that were mapped onto the adaptation level. One activity at the constructive adaptation sub-level was part of a high school Biology lesson designed for students to observe cells [cheek and onion] and determine how highly folded membranes were an advantage for the function of cellular parts. Students also compared mitochondria and chloroplast. Students had a choice as to which lab they wanted to do first. This lesson was categorized as adaptation constructive because the teacher determined the activity, but students had a choice as to which lab they wanted to do first. They were also working in small groups and building upon their prior knowledge while using technology-based simulations. In this case, technology was also used to reinforce content knowledge and skills while having students chart their thinking on a Google doc graphic organizer. In our interview, Charlie discussed the importance of giving students opportunities for

hands-on, wet labs, but also giving them different ways to interact with science concepts in a practical way. This could be through computer-based simulations, virtual labs, or *YouTube* videos for students to see concrete examples to supplement their textbook reading. At the adaptation level, students have less guidance from their teachers, more responsibility, and they are comfortable in their independent use of technology tools. Whenever he could, Charlie searched for visuals and videos where students saw representations of themselves or engaged with content linking Science concepts to problems that students and their families faced in their communities. Charlie wanted all of his students to know that even in a low SES school with LatinX and African American students, they would be well-prepared for whatever they chose in their future.

> if they look at me, they know they that I tried and I did the best I absolutely could do and that they get as much of education for me as they would anywhere else.

He believed that all students were capable of learning science concepts, even if they were reading below their grade level. And, instead of lowering his expectations, he provided learning scaffolds to build their confidence and their stamina so they would find small wins and continue to push themselves to grow in science. Charlie alternated between a position as instructor and facilitator of learning where students could ask questions and problem-solve with his guidance.

Another example at the authentic adaptation sub-level was in Julianna's class where her students created time capsule projects, which students submitted digitally or physically if they chose to. In this time capsule project, students created a digital or physical presentation (Google Slide show/video, podcast, etc.) sharing who they were at that particular time in their life, significant current happenings, challenges they were facing, and what social-justice issue they

would help to solve in their communities. This assignment involved writing, researching and creative expression; it was also important to the social justice focused school as it exemplified their stated values. This lesson was categorized at the authentic adaptation sub-level because students were using technology with less guidance from their teacher, they had choice in which tools they used, and the project itself was directly connected to their outside world. At this stage of the unit, students had already developed the draft of their writing portion and were creating the outline for their end product. Julianna acted as the facilitator and students were comfortable with technology tools as well as the project requirements.

Table 17

Adaptation Level of the Technology Integration Matrix

	Active	**Collaborative**	**Constructive**	**Authentic**	**Goal Directed**
	Adaptation	**Adaptation**	**Adaptation**	**Adaptation**	**Adaptation**
Definitions Conventional independent use of tools; some student choice and exploration	Conventional independent use of tools; some student choice and exploration. Students work independently in conventional ways.	Collaborative use of tools; some student choice and exploration The teacher selects and provides technology tools for students to use in collaborative ways.	Independent use for building knowledge; some student choice and exploration Teacher creates instruction in which students use of technology tools is integral to building an understanding of a concept.	Independent use in activities connected to students' lives, some student choice and explorations. Teacher creates instruction that purposefully integrates technology tools and provides access to information on community and world issues.	Purposeful use of tools to plan and monitor, some student choice and exploration. Teacher facilitates students' independent use of the technology tools to set goals, plan, monitor progress, evaluate outcomes, and reflect upon learning activities
			Mindy	***Julianna***	***Julianna***
			Middle School Math	High School ELA	High School ELA
			Google Jamboards. Math-talks to make learning visible and collaborate in groups verbally.	Time Capsule assignment where students create a digital or physical presentation (Google	Use digital notebook to provide feedback and dialogue digitally back and forth with

			Students comparing and contrasting how they solved problems/pathways in their thinking.	Slide/video, etc.) sharing who they were, significant current happenings, challenges they were facing, and what social-justice issue they were helping to solve.	students about their progress and growth on writing assessments.
			Charlie		
			High School Science		
			Students work in small groups during technology-enables simulations labs or real labs to complete Google doc graphic organizers to chart their thinking and their findings.		

School Structures and their Connection to Planning and Technology Use

All participants indicated that school expectations were a factor in the use of technology for instructional planning and instruction. Three of the four participants were expected to use the suite of *Google* products along with a handful of other district-wide technology applications and tools in their 1:1 classroom. These expectations were communicated to teachers through communication from building administrators. Teachers, administrators, students, and families were finding the right balance of technology after a year of online learning that was thrust on them due to COVID. The school districts in which participants worked all had substantial infrastructures for devices and technology access; however, they were still improving teachers' comfort in using technology to as not to revert back to pre-COVID instructional norms.

Some schools even monitored teacher and student use of these applications by generating monthly school wide data reports, particularly with reading and math skill-building programs. Two out of five participants were required to use Microsoft products and tools, and a small collection of school sponsored tools such as *CommonLit*, *Brainpop*, or *Nearpod*. These were in addition to operational tools such as *PowerSchool*, *Aspen*, or learning management system tools like *Canvas*. For technology tools where professional development was provided, there was an expectation that those tools would be used frequently.

Some schools had technology instructional coaches to support technology integration for planning and instruction, while others had in-house technology leads who served in dual roles as full-time teachers. Both Maxine and Charlie provided teacher professional development on edtech tools and served as resources for their departments and other teachers who needed support to integrate a specific ed tech tool into their planning. They both embraced the change that technology brought to education, and they sought out ways to increase their own learning on their own. In this process of increasing their technology competencies, they increased their self-efficacy related to technology use. Having access to an abundance of tech did not mean that every tool had to be used; they chose selectively. They used technology most days during instruction and chose to streamline communication, grading, and even small group collaboration using technology. Their beliefs about technology helped them to see the opportunities that technology afforded instead of viewing technology as a burden, or an overwhelming learning curve imposed by their school administration.

Planning and Instructional Design

Planning. In considering teachers' process for planning and designing instruction, the primary starting point for three out of five participants was considering curriculum content and state standards. Andrea began her planning by deciding which books she would teach first, while Mindy and Charlie began their planning by consulting the district's curriculum guide. They were expected to cover specific tops and teach specific skills in a given sequence. In this regard, the expectations from their district were a factor as all teachers in a given grade-level were to teach the same units around the same time, not just covering the same standards. Even with those parameters in place, there still was still some degree of flexibility in personalizing the districts' standardized units. For example, teachers could choose to design their own lessons with the same core content and integrate additional content and activities as they saw fit.

Maxine and Julianna began their planning through a backwards design process, first determining what they wanted their students to be able to know and do; and afterward, they decided how students would demonstrate their knowledge and skills. Maxine shared that her principle valued the UBD [Understanding by Design] method and encouraged teachers to design units and lessons with it in mind, although it was not mandated.

In both of their schools, there was some flexibility in choosing the content they taught and in the order in which they taught it; however, there was a balancing act of ensuring that enough of the required school curriculum was used. Additionally, in Maxine's interview, she talked about needing to prepare students for high stakes exams yet also choosing content that mirrored students' experiences. Some of the advanced placement tests in her state specifically referenced material that the test-makers assumed students would have already read, and knowing

this fact required Maxine to ensure that certain texts were read. Both Maxine and Julianna consulted with their departmental team for which standards everyone would be covering for cohesion from one grade level to the next. No single participant's process was exactly the same compared to others; however, there were similarities in key areas of focus in their planning. For example, there was a clear focus on using content area standards, assessing student needs, and considering the best supplemental resources and tools for a specific classroom. All participants described their steps in planning which mirrored a variation of conventional planning processes. Figure 4 below shows a visual representation of the general planning process by participants as well as the similarities and distinctions between participants regarding how they planned for instruction routinely.

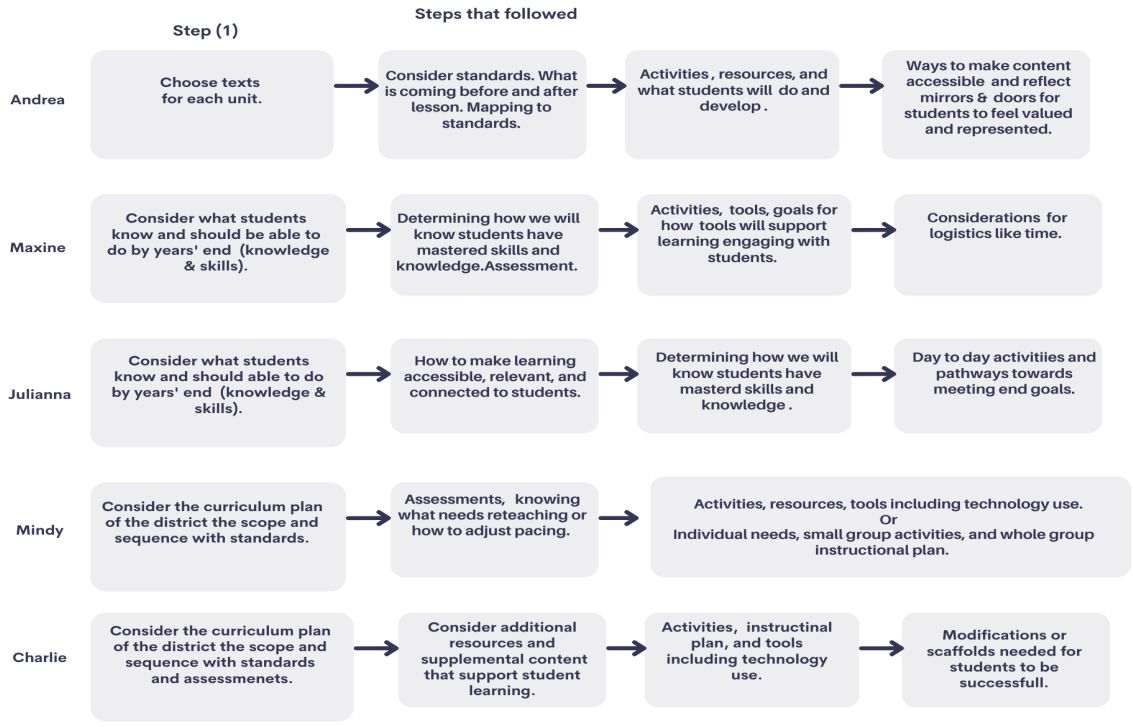

Figure 4. Planning process and instructional design of participants

Characteristics of a Culturally Responsive Lesson Design Using Technology

Within instructional design, the characteristics of a culturally responsive lesson plan with technology was determined by the unique context and the specific teacher; across the spectrum of possibilities, participants integrated technology in culturally responsive ways within content and resources, instructional activities, and assessments. For example, when Mindy chose to integrate the use of TikTok, as a social media technology tool in her class, she was touching multiple design elements. As an overarching goal, she wanted her African American students to see themselves as Mathematicians while challenging them to strengthen their competencies in Math. This instructional activity with TikTok was designed to have students engage in collaborative, critical thinking in ways that were authentic and relevant to her students. In the specific lesson objectives, students compared properties of two functions algebraically, graphically, and numerically. Following this, students worked collaboratively to interpret equations, which allowed students to demonstrate their knowledge and understanding of Math standards using culturally grounded interactional norms. In this example, the content and the instructional activities used technology in culturally responsive ways. The overarching goal was connected to the high expectations she held of her students by requiring them to make their thinking visible, to engage in critical thinking; but she sought to do so in ways where students could bring different dimensions of their identity. Students could integrate music, dancing, text, diagrams, and even integrate culturally based phrases while explaining Math concepts.

In my interview with Maxine, she talked about using technology in her instructional planning and unit design to connect with students and to seamlessly build in culturally responsive content through normalizing choice.

> give kids choices in the assignment things, everything from like I used the example earlier of having the three different videos about three different cultural groups talking about stigma of mental health.

In this particular unit, one of Maxine's larger goals was for students to develop strategies to improve mental and emotional health for lifelong wellness. And by the end of the unit, students would have used their learning to support friends and family members who were experiencing mental health issues. Although Maxine used technology to search out and use videos with different cultural groups talking about the stigma of mental health, technology was a tool towards larger goals of wanting students to be empowered and help those in their community. In this same unit, students used technology in culturally responsive ways to research city-wide mental health demographic data that was pertinent to her students. By the end of the unit, students were to have completed two assessments using technology.

Table 18

Examples of Student Choice in Assessments from Maxine

Assessment #1	Assessment #2
● Create an advertising campaign that promotes the mental and emotional health of young people and confronts the stigma associated with mental illness and mental health challenges.	● Write a letter to a member of city council asking them to allocate more money for mental health supports in your community/school.

In Maxine's unit plan, students used technology to think critically, research, and use in-school knowledge immediately to solve timely and relevant problems outside of school. This integration of advocacy further prepared her students to become change agents beyond her

classroom. Some of the culturally responsive elements in her unit plan were content and resources as well as assessments. Similar to Mindy, her overarching goals aligned with culturally relevant pedagogy.

None of the participants shared that culturally responsive teaching, or culturally responsive teaching with the use of technology were an expectation from school administrators. Teachers were expected to use technology for learning management and for strengthening content area knowledge and skills. Teachers who integrated technology in culturally responsive ways did so independently and without a professional learning community to support them. Julianna even noted in her interview that when she shared resources on implementation of culturally responsive content using technology, her colleagues chose not to use them. Culturally responsive teaching was a part of her teaching practice; and she did not view her efforts as extra work.

Culturally responsive teaching with technology was found embedded within one or more areas of participant's lesson plans: (a) to access or research content, (b) within instructional activities, or (c) assessments. Table 19 provides additional details on these three core areas which emerged from interviews and lesson or unit plan analysis.

Table 19

Culturally Responsive Teaching and Technology Integration in Planning: Core Areas

Area in the lesson design	Examples
Content and Resources	Using technology to access content with diverse viewpoints, perspectives, and content is representative of students' accurate histories and experiences to build knowledge and skills, make learning more relevant, providing cultural scaffolds using technology
Instructional Activities	Collaboration/problem-solving/critical thinking/co-creating using technology by students for higher-order thinking. Conferring/facilitating dialogue/delivering content/community-building, providing language and accessibility tools (e.g., talk to text, language translation) using technology by teachers synchronously or asynchronously.
Assessment	Digital assessments replacing traditional physical assessments, project-based or creative assessments where students demonstrate their knowledge and skills through multi-modalities incorporating culturally based content, formative assessment tools as learning is happening in the moment (e.g, *Jamboard, Padlet, Nearpod, Kahoot*) where students can use culturally grounded interactional norms and language expressions as well as culturally based images and content in the design.

Chapter Summary

This chapter reported findings from interviewing participants and analyzing their lesson or plans. These data helped to provide a more complete understanding of how culturally responsive teachers used technology in their classrooms serving African American and LatinX students.

CHAPTER V

DISCUSSION

Summary of the Study

Decades of research have documented the positive impact of culturally responsive teaching on academic outcomes for African American and LatinX students. However, as the field of education has become increasingly embedded with technology as a powerful tool of instruction, more attention is needed to understand how culturally responsive teachers are using technology to close achievement gaps and prepare all students for post-secondary success. Although national public policy over the last 20 years has documented the negative impact of the digital divide on low SES, African American and LatinX students, large-scale efforts to intervene and close the divide have focused primarily on access to devices only. More recently, the second digital "use" divide has brought attention to examining teachers' instructional practices after the physical technology infrastructure is in place. This study, through its focus on culturally relevant pedagogy, instructional practices, and uses of technology does two-fold; first, it acknowledges this particular moment in time due to COVID, where schools that serve increasingly diverse public-school populations must move forward with scalable approaches for how teaching and learning intersects with technology use. Secondarily, this study brings a new lens to an existing body of literature where culturally relevant pedagogy provides the foundation for the ways in which technology is used in everyday practices. The range of teacher perspectives, grade levels, and content-areas in this study demonstrate the potential use(s) of

technology across 6th-12th grade urban classrooms so that these teachers' practices are not viewed as impossible or "herculean" feats, but possible, goal-driven, planned for, and intentional.

The first chapter of this dissertation introduces the problem of the digital divide, as both access to technology as well as the ways in which teachers use technology to close achievement gaps for African American and LatinX students. The second chapter presents the theoretical framework and a review of relevant literature; and the third chapter provides details related to the research design and methodology. This final chapter presents a summary of key findings from participant responses to research questions as well as a discussion of how those findings relate to the theoretical frameworks of Culturally Relevant Teaching and Critical Race Theory. Rounding out the chapter, I discuss implications as well as recommendations for future studies on technology integration in K12 urban schools.

Research Questions

1. How do teachers design instruction using technology in culturally responsive ways across content-areas in 6-12th grade classrooms?
    a. What are the characteristics of a culturally responsive, technology-enhanced lesson design across content-areas?
2. Why do teachers use technology in culturally responsive ways?
    a. What motivates them?
    b. How do they envision their role?
    c. Where do they see themselves and their instructional practices within the continuum of culturally responsive teaching?

3. What are teachers' understandings about the meaning of culturally responsive teaching in a technology-enhanced learning environment?
    a. How have teachers' identity, beliefs, personal experiences, professional experiences, or training shaped their understanding of culturally responsive teaching?
    b. What aspects of culturally relevant pedagogy, if any, influence teachers' instructional design choices when integrating technology?
4. What are the characteristics of a culturally responsive, technology-enhanced lesson, design?

Summary of Findings

Influencers and Motivators for Teachers

All the participants with the exception of one were African American, and they spoke about how their own personal experiences were motivators for the longer-term outcomes they sought for their students. More specifically, they were influenced by prior schooling interactions whether positive or negative. For example, Mindy shared that in the predominantly White high school she attended, she earned acceptable grades, but felt that there was a cultural disconnect between her and her school. On one hand the curriculum had no relevance to her life experiences; and on the other hand, her teachers taught their respective subjects in a specific way and were unresponsive to students who did not grasp concepts as they were presented. She also felt that they did not create the type of learning environment where she felt comfortable asking questions when she faced challenges. In later years, once Mindy attended college, she learned that Math was a natural strength of hers that had not been cultivated. This surprised her as in

former years, she struggled with Math. As a result of this newfound knowledge about herself, she made one of her personal teaching goals to build relationships with her students to truly know them. In doing so, she could build the foundation to develop their strengths and capacity for leadership.

Julianna shared a personal experience related to a wonderful middle school teacher whose actions tremendously impacted her schooling trajectory. This teacher saw potential in her and encouraged her to take a placement exam to get into a selective high school. After taking the test and doing well, Julianna was able to attend a school that many of her peers did not. This school was on the other side of town, and she considered herself to be one of the lucky few to get in. Although there was a positive outcome, there was a tension that stayed with her throughout the years; she regretted that this teacher pulled her aside individually instead of announcing details about the placement exam to the entire class. Julianna wondered why she was given an opportunity while others had no knowledge of it, and therefore, had a slim chance of going to a higher-rated school of choice. As a result of this experience, she carries a responsibility to open doors and share as many opportunities as she can with her students.

Maxine demonstrated that who you learn from can be just as important as what you learn when seeking to create responsive learning environments for students. Maxine spoke about formal school-based learning, learning that took place in the communities she lived, knowledge passed down from other educators in her family, as well as knowledge she acquired from coaching sports. She even learned a great deal from her father who was a business owner. She had been exposed to many different forms of knowledge and this shaped her ideas of what learning looked like. She brought all of those experiences with her, and she did not believe that

there was one right way to teach all kids. Additionally, she not only recognized that her students came to her with different learning preferences, but she also knew that their place-based history and the communities they lived in came into classrooms with them. For example, the rural African American students she taught in one district experienced different challenges than her African American urban students she taught in another school district. She used her knowledge of their prior experiences to teach them (Gay, 2000).

Three participants in this study shared that African American female educators shaped their instructional practices and helped them on their journey in becoming culturally responsive educators. Andrea, who happened to be White shared how she was mentored by an African American woman at her school who was an exemplary teacher and was well respected by students, staff, and families. In this relationship, Andrea was able to discuss issues of race, biases, and different dimensions of her identity related to how they interacted with her teaching practices. This professional mentor held a deep knowledge of students and the communities they came from. Because Andrea had limited exposure and experience interacting with Black people prior to teaching, she lacked first-hand background knowledge to draw from and leverage in the classroom. An experiential knowledge gap existed, and this mentor's guidance was invaluable in helping her to ask questions about herself and her interactions with students that she would not have been able to do otherwise. Although Andrea was actively seeking professional development and reading literature on culturally responsive practices, she benefited from having actual conversations about direct situations in her classroom.

These findings suggest that who teachers learn from and their experiential knowledge support teacher's growth. Teachers who lack positive experiences with African American and

LatinX communities are unable to draw from prior knowledge to integrate within their instructional practices. It has been noted in the literature that White, middle class teachers fail to recognize invisible cultural codes they bring into the classroom, often devaluing the experiences of those who do not mirror them (Delpit, 1988; Goldenberg, 2014; Hyland, 2005). As schools have become more and more racially and ethnically diverse, there has not been enough emphasis on learning from individuals who live in those communities. In fact, Delpit (1988) argues that non-White people have been absent from discussions on "how to best educate children of color" (p. 282) and more dialogue is needed between those in power, who are buy and large White, and those who are othered.

Dispositions and Critical Reflection

Teachers in this study possessed a willingness to be adaptable, responsive to the needs of their students, and were critically reflexive. They saw themselves as co-learners alongside their students, and they were excited to both learn new things and implement their new knowledge. For example, Julianna recognized the need to increase her technological competencies in response to problems she had seen during the pandemic. Her students' gaps in technology-related skills became more and more evident with COVID-related remote-learning. She wanted to model using technology with her students because she recognized that the world was becoming more and more dependent on technology. She did not want the next generation of change-agents and leaders in her classroom to leave her classroom without skills that would set them up for success in college.

She also talked about finding the right balance between how much technology to use, with what goals, and with what variety of tools. She described a problem in her school with

COVID-related technology adoption. She stated that students were being “Near podded to death,” and that many teachers in her school saw one particular tool as a game changer. If teachers could get students engaged in learning using Nearpod, that was a win for them, especially because they were seeing passive student interactions in their classes. Julianna partially agreed but using Nearpod to increase active participation was one aspect of something greater. She recognized that her students had learning gaps, and she was responsible to develop core skills and prepare them for college. Engagement was one aspect of learning, but the critical thinking and learning that happened within engaged communities was more important. This problem of surface-level approaches resonated with what she’d seen in other classes where teachers would play a game or do a rap as the end result, missing learning opportunities to engage students in deeper learning that could be linked to skills they could leverage and use in college.

Another dispositional noting that emerged within interviews, was the willingness to engage in critical reflexive practices. Specifically, Julianna discussed the imperative for deep reflexive thinking and the need for teachers to be willing to “undo” the things that are not working as their mindset shifts. She had read literature focused on the negative impact of the school-to-prison pipeline on young African American boys, and she saw herself in some of the literature. This new knowledge of how she unknowingly may have negatively impacted her students motivated her to be part of disrupting the pipeline. This finding supports the need for critical reflection as a professional practice.

Uses of Technology

Conventional and Culturally Responsive Uses of Technology

Teachers used technology more often than not in conventional ways and integrated culturally responsive practices into instruction towards meeting their goals. Across the spectrum of possibilities, there were 16 uses of technology described by participants; these ultimately fell into six larger categories that encompassed the following: (a) learning management, (b) creating instructional materials, (c) knowledge-building, (d) assessment, (e) relationship building and positive social-emotional learning, and (f) active engagement, learning with students. All but the category of learning management was found to have culturally responsive practices embedded with it as noted in Chapter IV.

There was often more than one reason as to why an activity was chosen or why a specific technology tool was used. There were often multiple goals. For example, introducing content and developing students' knowledge and skills to meet Common Core standards may have been coupled with critical thinking and creating solutions for problems impacting students' communities. These goals did not compete with each other. They co-existed. Teachers did not develop a new pedagogical lens; they were using newer technology tools toward aims that already existed. For many participants, technology integration with culturally responsive intentionality was a direct extension of how they already taught.

Most noteworthy were the ranges of adaptations from teachers in their uses of technology, which allowed for taking risks and engaging in practices that mixed conventional with non-traditional uses. Mindy exemplified this concept with her uses of both *Google* Jamboards and *TikTok* for critical thinking and collaborative learning. Mindy did not view

herself as an expert with technology by any means. Like many other teachers during COVID, she began to increase her knowledge of technology to fulfill the expectation of her administration. However, across all the interviews, she was the most innovative [with the levels of TIM technology matrix]. Instead of focusing on the process of reproducing the right answers with her African American students (Ladson-Billings & Tate, 1995), Mindy was incorporating higher-level thinking and problem solving into her Mathematics instruction aided by technology. Her practices cultivated rich mathematical discourse while simultaneously bringing in students' cultural forms of expression. Mindy's efforts also incorporated elements of youth culture and culturally based forms of communication which is related to what Ladson-Billings' (2014) described with bringing Hip-Hop into classroom learning. This innovative use of technology was even more surprising given the range of technology proficiencies and roles within the sample of teachers. More specifically, two out of the five participants were proponents of using technology extensively, serving as coaches and facilitators of professional development in their school focused on educational technology tools.

School Expectations

For many of the study's participants school expectations played a role in their choice of technology tools and their planning priorities. Teachers operated within their school's structure and complied with the expectations of their administrators for curriculum and use of resources including technology. Some participants sought out technology tools on their own through individualized professional development; however, most participants also discussed using the available technology their school district purchased. For example, both Charlie and Andrea's school district used the *Google* for education suite of tools and provided teachers with

professional development at the beginning of the year along with access to technology coaches from an outside *Google* vendor. Mindy's school district purchased tools like *Achieve3000*, *MathIXL*, *Desmos*, and *NearPod*; and Julianna's district used Microsoft products, expecting teachers to use tools like *OneNote*. Additionally, tools like *Youtube*, *Playposit*, *Kahoot*, or *Flocabulary* were on approved district lists, and many teachers felt confident in using them over time. So, they were adopted and used frequently.

A common thread across participants was their administrators' expectation that technology would be used in three primary areas, for learning management, skill reinforcement, and engagement, none of which map to the ways in which participants were using technology with culturally responsive intentionality as noted in Chapter IV. Using technology in multiple ways is supported in the literature, as Sweet et al.'s (2004) multiple case study found that high-performing, low SES schools used technology across a spectrum from basic skills through higher order thinking activities. However, the success of these schools was linked to a number of factors, including effective leadership, professional learning communities, a school-wide focus on creating challenging and caring learning environments, and a commitment to culturally responsive practices. In contrast to Sweet et al., participants discussed their efforts to integrate culturally responsive practices with technology at the individual level. The school-wide adoption of a comprehensive approach was missing. Teachers had access to technology-focused professional development at the beginning of the year; however, participants made no mention of professional development specifically focused on technology as an ongoing focus throughout the year. The foundational blueprint for technology's role in closing the achievement gap for African American and LatinX students was not clearly defined. Tteachers are left to do with it as they see

fit within the parameters of compliance. Teachers who had some school-based training emphasized learning the tool itself, not the use of a tool towards a great goal.

School expectations also emerged regarding lesson planning as most participants adopted a conventional process whereby, they began with curriculum and content area standards before making all other planning and instructional decisions. Teachers like Andrea discussed the expectation that curriculum, scope and sequence would be followed, which connects to the historical pressure to cover content within a given time range. Technology use towards meeting goals and objectives was not a planning priority. Teachers, consequently, discussed their go-to tools for collaboration, assessment, and differentiation.

Connections to the Theoretical Framework

Culturally relevant teaching was the theoretical framework employed in this study encompassing both culturally relevant pedagogy (Ladson-Billings, 1995, 2014) and culturally responsive teaching (Gay, 2010a, 2010b). Culturally relevant teaching seeks to dismantle inequities in education and close the distance between home experiences and schooling experiences for African American students who have been historically underserved (Ladson-Billings, 1995a). This study centered pedagogically grounded approaches for using technology, providing evidence of teachers' uses of technology, more specifically why they used it, the choices they made, and with what outcomes in mind.

Interviews afforded participants the opportunity to discuss their pedagogy, practices, their uses of technology, and their goals for students. Document review in tandem with interviews allowed participants to locate these goals within their instructional plans, explain their choices, and provide a contextual picture of a bounded time period in which they implemented their uses

of technology. Participants were able to reflect on their intentions and the difference between what they had intended and what actually happened.

Ladson-Billings (1995b) found that culturally responsive teachers held specific beliefs about students more specifically, they rejected deficit thinking (Lewis et al., 2008). They believed that all students were capable of "academic success," and that it was their responsibility to adjust their teaching and provide necessary support for students rather than to blame students for underachievement. Evidence of this was seen with Charlie's approach to providing learning scaffolds for his African American and LatinX students who were reading below grade level; a part of his planning process was to incorporate teaching difficult concepts using images, online resources, and videos wherever possible. He also integrated shorter reading passages and provided thinking organizers. He required students to demonstrate their learning verbally and in-writing; and for English Language Learners, he allowed them to complete first drafts of their writing in Spanish, use Google translate, and then work with a partner to review their work before submitting a final draft. Just as in Ladson-Billings (1995b) study, her teachers did not allow their students to "choose failure," Charlie communicated to his students that he would not lower the bar, but that he would meet them where they were at and build their confidence and skills so that they were continuing to grow in their science proficiency.

Julianna also talked about teaching with the mindset of making learning relevant and linking it to things her students care about. One of the ways she used technology was to access historical content, videos, and speeches to provide students with the socio-political context related to what was happening during a given time period. For example, when she teaches her students about persuasive writing and using Shirley Chisholm's speech, specifically the one

where she describes herself as “unbought” and “unbossed,” Julianna asks her 11th grade students to think about what it would take for them to take on that mindset and consider themselves “unbossed” and “unbought.” She notes,

> I think that a lot of folks kind of miss out on is that in order to be culturally responsive, you have to, you know, show students that they have a role in the system and a responsibility and that it's not enough to to learn, you have to then do something with what you have learned.

Multiple participants believed that their African American and LatinX students were capable of great things, that they deserved high-quality instruction and worked to create a learning environment where their students knew they were deeply cared for. Because of this, teachers like Maxine built strong relationships with students and created opportunities for students to engage in their own learning. She learned what her students were experiencing outside of class throughout the year to better understand their out of school experiences; she also asked for their feedback on improvements she could make in her instruction. This was in addition to assessing students’ content knowledge and understandings. Technology also afforded her ability to build a positive social-emotional culture in her classroom through digital Google forms, polls, and SEL based technology-enhanced games. Often, she chose technology tools that served multiple purposes, and she made real-time adjustments to her instruction.

Other participants believed that students should not have to erase their identities inside of school to be successful. This was a theme that surfaced within all five participants. As such, all participants discussed the importance of cultural competence and bringing in curriculum and resources that reflected their students’ racial, ethnic, and cultural backgrounds. Technology aided

in their efforts, but technology itself was not always a key factor in order for this to happen. For example, Andrea noted “I try to have both mirrors and windows for kids,” as an English teacher. She filled her physical classroom library with multicultural books and actively sought out different versions of canonical text which she believed were more relevant and would connect with students’ experiences in a more meaningful way. Similarly, Julianna and Charlie also intentionally incorporated curriculum, media, and resources [with and without the use of technology] that tapped into students’ prior cultural knowledge and reflected the experiences of the students they served. Unfortunately, these efforts were not the norm among colleagues in their schools. When Julianna shared culturally responsive resources with her school-based professional learning community, they chose not to use them. even though it required no additional planning effort on their end. Charlie’s colleagues also believed he was going above and beyond what was needed by providing cultural scaffolds. Consequently, multiple teachers in this study were often outliers in their school as their beliefs and their practices were notably different than their peers.

This finding reveals that teacher beliefs influence practices and decision-making, providing the “why” behind the teachers' methods and instructional practices (Howard, 2007). This study supports Ladson-Billings’ (1995a) assertion that teacher beliefs and ideologies form the foundation of culturally relevant pedagogy. Participants in this study confirmed this as their methods and their uses of technology tools were rooted in how they thought about their students, their beliefs about which knowledge(s) should be valued in the classroom, and their beliefs about how they should engage with and alongside their students.

Ladson Billings (1995b) study also found that teachers developed communities of

student-leaders and had “reciprocal” and “fluid” relationships with students. Teachers were facilitators of learning, but students were also expected to take on leadership roles. An example of this found in this study was Mindy’s focus on students leading *Jamboard* discussions for analyzing Math equations; she encouraged students to work in small groups and lean on each other’s understandings as peers.

Teachers encouraged students to not only learn about and analyze problems in their community, but they also encouraged students to consider solutions they could be a part of; this focus on critiquing existing systems and cultivating students’ social justice change agents is central to culturally relevant pedagogy (Ladson-Billings, 1995b). And although it was the element of culturally responsive teaching that was underutilized in lesson plans and least described among participants, socio political awareness emerged within two participants. Julianna shared,

> I love teaching, but I don't teach for the love of teaching, I teach because I really care about the future of black and brown people. And I feel that our kids are the ones that have to be armed with the knowledge to be able to, you know, solve these systemic issues.

One example of this was evident in Maxine’s approach to teaching about infectious and communicable diseases in her health class; her students were not only learning about different diseases, but they were also investigating and analyzing local health-related data and discussing social injustices in the way diseases were spread as well as what their own communities could do to prevent the spread of diseases. One of her assignments was to have students create a presentation to inform their communities on how to prevent the spread of diseases citing both community factors, behavior factors, and preventative measures. Students also had to consider

the audience and how to talk to each other as teenagers about these issues as well. Maxine's students had choices, and although they used technology for research, they could use technology or low tech for their presentations. Her students were encouraged to take their learnings beyond the classroom and into their communities.

van Ingen et al.'s (2018) study, much like what Maxine shared, supports the notion that culturally responsive practices and technology can be intertwined and reinforce concepts, skills, and content. Within their study, teachers developed integrated STEM lessons once a quarter where students used a problem-based learning approach, investigated a problem in their community, designed a model to solve the problem, tested and refined their model; then they presented their findings using various media and technology. As part of the process, students also communicated the extent to which their solutions could potentially impact the environment or existing resources. Admittedly, this kind of lesson plan design was much time intensive to enact and required much planning on the front end as reported by teachers and administrators; however, this type of project strengthened teacher-student relationships. For example, teachers were able to learn a great deal about their students and their students' communities through "community walks" while gathering background information on the types of problems students were most interested in. And elements of the project such as designing a new park in their community required students to use Mathematics in an authentic way. Because students viewed the problems as highly relevant and directly impacting their lives, they were highly engaged while learning high-level Science and Mathematical skills.

Participants in this study shared a number of stories from their personal and professional experiences to describe the situations they were highly motivated to change. They described

structural barriers that lived in school policies perpetuating academic underachievement, awareness of things like the school to prison pipeline, disproportionality in special education referrals for African American boys in their schools, and the academic gaps students entered their classrooms with. These concerns were carried with them, and they viewed themselves as catalysts for change. A shared sentiment among participants was that despite these barriers, they could create the classrooms and the conditions for learning where students would want to be there. One of the central ways they did this was to infuse culturally connected resources, curriculum, and materials with critical caring. For many, this caring was not connected to a "feel good" approach (Ladson-Billings, 1995); it was evident in their willingness and commitment to support the academic well-being of students while valuing and bringing in their culturally grounded funds of knowledge (Villegas & Lucas, 2007).

There was a range of how participants conceptualized culturally relevant teaching, and this translated into a variety of ways technology was used with culturally responsive intentionality as noted in Chapter IV. Additionally, several participants discussed a shift in their role as teachers, now compelled to teach with technology in response to changing demands of the world.

Connections to the Literature

Despite technology integration policy mandates over the last 20 years on the importance of high-quality public education with technology, those most impacted by the digital divide continue to be African American students, LatinX students (Darling-Hammond et al., 2014). The digital divide, once characterized by access to technology, has now shifted to the uses of technology in classrooms (Gorski, 2005; Gorski, 2009). As discussed in Chapter II, research has

shown that schools with higher populations of African Americans have used technology for lower-level, non-academic enhancing purposes and that race, socioeconomic status, and high-quality instruction are often intertwined in school settings (Warschauer & Matuchniak, 2010; Cheema & Zhang, 2013). According to Warschauer (2003), technology is an element of social inclusion and asserts that more attention should be placed on pedagogy and curriculum rather than on technology tools or applications. The participants in this study demonstrated the importance of integrating technology with the populations most impacted by the digital divide through a different pedagogical lens than what has been documented in the research thus far.

Existing research has investigated ways to help teachers learn to integrate technology (Brown & Warschauer, 2006; Hew & Brush 2007; Mishra & Koehler, 2006), but few studies have looked at the technology with culturally responsive pedagogy. Technology use in classrooms is influenced by a number of factors such as available resources, teachers' attitudes & beliefs, technology knowledge and skills (Brikerhoff, 2006; Hew & Brush, 2007; Inan & Lowther, 2010; Ertmer et al, 2012). In this study, teachers' beliefs played a significant role in how, why, and in what ways they used technology; however, the literature regarding technology integration and teacher beliefs has not been consistent. A number of studies have found that teachers' beliefs influence how they use technology (Miranda & Russell, 2012; Ottenbreit-Leftwich et al., 2010; Tondeur et al., 2017). However, Ertmer et al. (2012) found differing results whereby teachers' espoused beliefs did not necessarily align with their enacted beliefs. To illustrate this, the authors noted that teachers who believed in student centered learning were found to use technology primarily in teacher-directed ways in their classrooms. Thus, their beliefs and their practices were mismatched. Some factors cited to account for this misalignment

were things such as competing priorities, balancing the needs of large classrooms, and other external constraints (Ertmer et al., 2012). This is significant and demonstrates the complexity of teaching with technology.

Contributions to the Literature

There are two areas that may contribute to the growing literature. First, this study contributes to the literature by investigating the relationship between teacher pedagogy and teacher practices specifically related to technology use with African American and LatinX students. This builds off existing research telling us that pedagogical considerations for technology use can lead to conscious instructional planning decisions (Hughes, 2005; Janssen et al., 2019; Mishra & Koehler, 2006; Pierson & Cozart, 2005). The interviews and lesson plans capture rich descriptions of how teachers used technology in culturally responsive ways compared to conventional ways. Also, within the study, teachers described their planning process, both the sequence and steps and what was most important to them. Thus, this research expands upon existing literature on both areas, culturally relevant teaching, and technology use in diverse classrooms.

Additionally, findings from this study brings attention to the role of school leadership on technology use, planning expectations, and capacity-building for teacher development; this includes mentorship, training, as well as school-based learning communities related to technology use. Teachers in this study were outliers and were not learning in a community at their school. Participants engaged in critical reflection and learned from mentor relationships along their teaching journey; however, they primarily engaged in self-directed learning related to culturally responsive practices and engaged in self-directed learning related to technology

integration. This is unfortunate because the ways they engaged with their students' using technology has implications for developing culturally responsive teachers in our 21st century, technology enhanced classrooms.

Implications

Implications for Practice

From this study, implications emerged that speak to four distinct groups. First, implications of this study can inform teachers of African American and LatinX students in K-12 classrooms. Next, the findings of this study have implications for administrators who support teachers at the school level as well as teacher-educators in higher education. And the last group with implications are policy makers at the state level that influence district-level policy.

Implications for Teachers

As a starting point, findings in this study uncover several factors that influenced teachers' ability to integrate technology in culturally responsive ways: physical technology structures in place, general knowledge of culturally relevant pedagogy, foundational knowledge of how to create an instructional plan, a willingness to try new things, a desire to build authentic relationships with students, and finally, a desire to adapt and change when needed. These represent both internal and external elements that were evident across all participants. All participants worked in districts with consistent, reliable internet and adequately working devices for teachers and students. This speaks to the essential conditions related to access that must be in place before considerations for examining the "uses" of technology can be considered. The other factors were related to education, training, and disposition. Teachers can increase their knowledge of culturally relevant pedagogy to better understand the distinctions and overlap

between what they already know about constructivist or student-centered learning. This can help teachers not to generalize or adopt a superficial understanding of what CRE is. Furthermore, in the prior section of this chapter, teacher beliefs were documented.

Considering mentorship possibilities and peer to peer learning potential in the future, teachers' tenure, experiences, and dispositions were all factors in their ability to use technology in culturally responsive ways. They had solid foundations with at least five years of teaching experience; this group of teachers was well past the initial stages of learning how to teach, and they were comfortable with routines and expectations. Additionally, several teachers had taught the same course more than once, and they mentioned ways they adapted prior lesson plans over the years (e.g., swapping out materials, trying a new sequence, adjusting project criteria). Incorporating culturally relevant materials was embedded in their planning as a habit, and they actively looked for ways to connect learning to students' everyday lives. Two of the teachers were viewed as teacher-leaders in the schools and were comfortable serving in those leadership roles. Moreover, these teachers were well respected, having had solid classroom management routines, were consistent relationship-builders with students, had deep content and curriculum knowledge, and were able to balance their administrative work responsibilities well. One of the participants mentioned that their principal rarely bothered them; and another participant mentioned that their principal often looked to them to provide feedback on school-level initiatives. Additionally, three out of the five participants mentioned that prior to COVID, they had begun incorporating media and technology into their teaching practices. They were not thrust into a completely new mindset; therefore, they were more responsive to change than some of their peers had been.

Implications for School Leaders

School administrators and district leaders play an important role in supporting the professional development of the teachers who directly serve and impact their African American and LatinX students. Research has shown that professional development can address technology integration barriers (Brinkerhoff, 2006). Much like strategies or tactics without strategic thinking to situate them within an overarching strategy, technology use has become separated from both the teachers and educators that use it, and the students that are meant to benefit from it. Through the prioritization of technology-focused professional development, teachers who are resistant or lack knowledge of how to integrate technology effectively can learn in an ongoing community. Feedback from teachers and teacher teams can help administrators to better understand teachers' needs along their learning journey, capture experiential data to compliment trends in technology use across the school, and help teachers find solutions for contextual barriers. Current research has shown us that access to technology along does not lead to high quality technology use by teachers (Darling-Hammond et al., 2014; Warschauer et al., 2014; Tichavakunda & Tierney, 2018); but capacity-building mechanisms such as coaching, professional learning communities, and learning walks with formative feedback have the potential to buffer against surface-level, compliance driven change (Brinkerhoff, 2006). Some of the teachers in this study worked in schools with technology focused coaching or access to training at a minimal level at least in the beginning of the school year. And three out of the five teachers talked about grade-level PLCs. But many teachers in this study sought out their own professional development as they were intrinsically motivated.

Aligning professional development for teachers with existing processes that they are

familiar with can prove beneficial, more specifically if they are focused on technology use within instructional planning. This can be facilitated through existing structures such as UBD development, as a backwards design approach. If teachers are familiar with and have been trained with the backwards design instructional design process, asking key reflexive questions about where technology use lives within the areas of skills conceptual understandings, goals, and instructional scaffolds [as some examples] can allow teachers to be more intentional about how and why they use specific tools. Participants in this study were familiar with and used conventional processes for planning. And, with limited time, and often competing priorities, linking technology use with intentionality within planning structures is one way sustainability can be achieved.

Implications for Teacher-Educators and Schools of Education

Preparing preservice teachers for full-time teaching roles in the changing landscape of public education requires a shift in program design for those who continue to operate with outdated models. Many teaching programs, Loyola included, do not require their pre-service teachers to develop their pedagogical knowledge related to technology use. Technology use for teaching and learning is not prioritized within the mandatory course sequence, and therefore candidates can matriculate through the program underprepared to teach with technology. Recent studies have pointed to this gap in training for novice teachers and the absence of pedagogical rationale for learning design choices and activities using technology (Nguyen & Bower, 2018; Zalavra & Papanikolaou, 2019). Instead of positioning technology use as an optional body of skills and competencies, embedding it into the course sequence allows candidates to examine their attitudes and beliefs towards technology, design lessons with technology, implement them,

and reflect on their choices in a low-stakes environment.

Additionally, this approach better prepares candidates to recognize the digital use divide in their school placements, especially those who choose to teach in urban areas where access and use of technology can be barriers to high-quality instruction.

Implications for Policymakers

Policymakers must recognize that technology use should align with equity and school-improvement initiatives as technology is intertwined with several aspects of schooling. The way technology is positioned both within the field at large and within schools is impacted by policy initiatives designed to close the digital divide. A forward-thinking mindset involves considerations for technology use that does not view technology itself as a silver bullet, but instead proposes the use of technology with pedagogically informed choices by trained teachers within a school-based infrastructure and ongoing professional learning.

Policy documents in the last five years have been developed to support technology integration; however, there are gaps between policy implementation and practice. At the national level, the National Educational Technology Plan outlined activities that support the effective use of technology (Title IV A) of Every Student Succeeds Act authorized by Congress in 2015 (U.S. Department of Education, 2017). At the state level, we see technology language in Common Core Career Readiness, English Language Arts Writing and Speaking, and Listening Standards. Additionally, organizations like the International Society of Technology in Education have created standards which serve as a framework for how teachers, students, and administrators should be using technology. However, there are challenges with both of these. Content area teachers in the upper grades, from 6th-12th grade are considered content-area experts with less

training on how to teach their content with technology. Also, the ISTE standards are optional for schools as they are not state mandated. Furthermore, there is an underemphasis on use of technology in culturally, racially, and ethnically diverse classrooms within the ISTE standards.

One way to address these challenges is to create a comprehensive long-term technology plan at the school policy level to serve as a guide. Such a blueprint, informed by the needs of all local stakeholders including teachers, administrators, parents, and students, can outline a clear rationale and explicitly laid out implementation process as well as support mechanisms for teachers. Such a plan could outline how technology directly connects pedagogy with content knowledge, how technology is used in a number of ways to meet the needs of the students they serve.

Recommendations for Further Research

Given that this case study occurred across teachers in different schools, there is a need for replication of the study within a single urban middle or high school over a sustained period of time (e.g., 1-2 years), which could involve multiple teachers across different disciplines as participants. Due to the COVID-19 pandemic, schools were limiting non-essential adults in their buildings; this impacted my ability to directly observe teachers' use of technology. In future studies, observations would add richness to interviews and document review for evidence of how teachers make instructional changes in the moment that are impossible to capture in planning. When considering technology integration as a school improvement initiative, the proposed longitudinal approach could follow phases of integration and developments over time related to mindset shifts, engaging in practice of planning for use of technology, using technology, and making adjustments or changes after lessons learned. This study also privileged the teacher's

voice, placing the teachers' experiences at the center of the investigation; future studies could entail the student voice and student experiences. Additionally, ongoing research into the factors that influence technology use with African American and LatinX students also needs to occur, with a focus on school leadership and the implementation of professional development and support mechanisms such as coaching and incentivized professional learning communities.

Through in-depth interviews, I was able to ask direct questions to teachers about their backgrounds and experiences integrating technology as well as their planning process. As a result, the findings can only be generalizable to the teachers in this study. Ongoing research in this area of culturally responsive teaching with technology could lead to the development of a survey instrument that could quantify the impact of the culturally responsive approaches in our more current, technology-enhanced environment. Kana'iaupuni et al.'s (2010) study surveyed five thousand participants including students and parents across sixty schools finding that culture-based educational practices positively impacted student outcomes related to self-efficacy, positive social-and emotional well-being, and belonging, which then translated to increased reading and math academic achievement scores. As the educational landscape has changed tremendously related to technology use over the past ten years, there is potential for an updated survey tool.

A final recommendation is to encourage research on teacher preparation programs, and an examination of the most relevant course sequences; schools of education are now tasked with preparing candidates for success in an increasingly diverse classroom with technology as an essential instructional tool. Participants who have recently graduated from their programs and entered the field could provide insights into benefits, challenges, and ways to improve schools of

education.

Closing Remarks

In her more recent writing, Gloria Ladson Billings (2014) discussed the need for pedagogies to evolve or time. More specifically, she discussed a need for teachers to embrace a dual role. In this role teachers focus on content and skills with an acknowledgement of the formal structures within the system, such as high-stakes testing, but also prioritize student-driven learning and affirming students' multiple identities. The goal of this, according to her, is to "ensure that those who have been previously disadvantaged by schooling receive quality education" (p. 83). I agree, and I am hopeful that participant's uses of technology in this study which may be viewed as innovative can become the norm.

Personal Reflection

Eight years ago, after I wrote a grant for a class set of devices; I was awarded the grant, and afterward I began using technology more intentionally in my classroom. I used technology in a number of ways. I garnered feedback from my students about what was working and what I needed to change, posting their feedback on a large *Promethean* board so that they knew their voices and words mattered. For planning, I actively searched for media and literature that reflected my students' cultural, racial, and ethnic backgrounds. I also used technology to incorporate engaging activities such as virtual and hybrid baseball for test review and Stevie Wonder dances when my high-school students had birthdays. I also used it to engage in dialogue with my students online to ask questions real-time as they were reading texts through an ELA *Facebook*-like application, and I used technology to provide students with preparatory activities before engaging in Socratic seminars. These things were in addition to the standard uses for an

English teacher which included writing papers and researching credible sources.

It wasn't until a young man who was in another class was transferred into mine, that I realized I was using technology in ways that were different from my colleagues. During one of my student conferring sessions, this young man told me that in his other class, he could have the tablet or Chromebook open in front of him, listen to a lecture, and then work independently. In this role, he could choose to disengage. He could choose to be invisible. But, in my class, he knew that he was expected to be active, and that I had high expectations for him to think about the work he was doing and to engage in his own learning. Technology was used for a specific time period with a specific purpose or goal in mind. This young man was right. For example, students who were more comfortable sharing their thoughts aloud could speak; and students who preferred to type their thoughts could share their thinking via a technology app. Students collaborated using technology, developed projects using technology, used technology apps for skill reinforcement as well as for scaffold and digital organizers. There were several ways that I used technology. I assessed what students were learning often both formally and informally; and their growth brought me joy.

In that same conferring session, I shared this young man's data with him. I had been collecting data on student engagement within our large-class discussion format and had developed a number of measures. I shared a chart I created in *Excel* that showed him a number of things including how many textual references he used when he answered questions, how many times he had initiated conversations with his peers, how many times he had piggy-backed off what another person said, how many times he had asked questions, and how many minutes total he had spoken. I used this data [his data] to tell him that I appreciated his preparation and

participation, but that I also wanted him to invite others to speak and that he could be instrumental in creating a classroom community where all voices are heard and valued. By seeing his pattern of engagement whereby he was often one of two people talking during classroom conversations, he told me that he did not realize the unintended impact of his actions. He also came to the conclusion on his own that others were not talking because they were short of ideas; they were not talking because they respected him and allowed him the room to talk without interrupting him. He was able to see the power in his actions and the next time we had a structured discussion, he consciously invited others to speak.

I mentioned this example to demonstrate that I used both high-tech and low-tech tools and strategies to build a classroom environment where students took ownership of their own learning, one that was challenging, engaging, responsive to my students' needs and focused on community-empowerment as well as collective success.

I never sat in my colleague's room to observe how they used technology; I only witnessed what was happening through brief episodes while I was standing in the hall. Or I heard second-hand accounts from other students about what was happening in their classroom. I did ask one colleague about how they were using technology on multiple occasions, and most often I heard about what they had developed instead of what they were doing in-service to or alongside their students. The cool technology apps they were using were interesting; but I was more interested in what students were learning, how they were developing knowledge, skills, and leadership capacities. I knew that the African American and LatinX students we both served would be setting foot on a college campus, and that whatever we did or did not do would make a tremendous difference in closing the opportunity gap (Milner, 2011).

Eight years ago, I did not have the language or knowledge of the research at that time to identify myself as a culturally responsive teacher. I was one of those teachers who preferred to close my door and teach. Looking back, I wish that I had done more to connect with others to learn how they were using technology specifically with Black and Brown children. My hope is that that dissertation does not sit in a digital repository, but that it can be used as a springboard for much needed conversations about how technology is being used in service to those who have been historically underserved.

APPENDIX A

INTERVIEW PROTOCOL

60-minute interviews

Interview (1) Questions

Teacher background and contextual information.

1.What were your experiences like growing up that shaped your journey towards becoming a teacher?

2.What kind of student demographics have you worked with over your teaching career?

3.How long have you been teaching? Where do you teach? What do you teach? What levels?

Culturally Responsive teaching

4.What does it mean to be culturally responsive in the classroom and in your unique context?

Prompts (if needed).

- *To be culturally competent*
- *To hold high expectations of students*
- *To care for students and build strong relationships with them, their families, and their communities*
- *To empower students by providing them with the skills and knowledge needed for long term outcomes and post-secondary sus.*
- *To build socio-political awareness and critical consciousness*

5.What has shaped your understanding of what it means to be culturally responsive?

Prompts (if needed).

- Personal experiences & background
- Organizational experiences
- Training and education on culturally relevant pedagogy
- Other

6.What does it mean to be culturally responsive in a technology-enhanced environment?

Lesson Plan Development

7.When you create lesson plans, what do you consider as you create them? Are there some things that are more important than others? If so, what?

Prompts if needed:

- Students' prior knowledge
- Student data
- Students' learning preferences
- Short-term outcomes
- Long-term outcomes
- Alignment with standards
- Current events
- Scope and sequence or curriculum mapping
- Organizational experiences
- Training and education on culturally relevant pedagogy

8.What is the general process in developing your lesson plans? What are the steps involved?

9.When developing lesson plans that are culturally responsive and use technology, what is important to you? Are some things more important than others?

Prompts below can be used (if needed) to review the four areas: socio political awareness, critical caring, high expectations, and cultural competence.

a. Preparing students to critically analyze the social and political context and to build their agency for affecting change. *[Socio Political Awareness]*

b. Caring for and connecting with students' lives outside of class; connecting with and building strong relationships with students' families and their communities. *[Critical caring]*

c. Incorporating ways for students to be creators and innovators. And, incorporating multiple forms of assessments and multiple modalities for students to demonstrate understanding. *[High Expectations]*

d. Incorporating multiple ways for students to collaborate, give meaningful feedback to the teacher, have voice and choice, and build classroom community. *[High Expectations]*

f. Incorporating culturally-based content, activities, and interactional norms that connect with and value students' identities. *[Cultural competence]*

g. Holding high expectations of students, viewing students as critical thinkers, and building cultural scaffolds when necessary. *[Cultural Competence]*

h. Recognizing equities in education and preparing students for long-term success beyond the immediate content objectives. *[Critical Caring]*

10. When designing your lesson plans, what do you consider when deciding how technology will be incorporated, which technology tools you will use, and what ways you will use them?

Prompts (if needed.)

- What motivates you?
- How do you envision your role in the classroom?
- How do you envision the students' role in the classroom?

Use of technology and goals

11.What are the different ways students use technology in your class?

12.What are your goals and objectives when using technology?

13.What role do you see technology playing in transforming student outcomes beyond the classroom?

Interview (2) Questions

Culturally Responsive Elements

There were areas in your lesson plans that I noted and wanted to know more about. [The researcher will point the teacher to a specific place in one of the two lesson plans.]

1.Can you tell me what you were hoping to achieve in this part of the lesson plan?

2.What goals did you have for students?

*Repeat the process if more than one area of the lesson plan had a culturally responsive teaching component in it.

Technology Integration

There were areas in your lesson plan(s) where you used technology that I noted and wanted to know more about. [The researcher will point the teacher to a specific place in one of the two lesson plans.]

3.Can you tell me why you chose to use technology in this part of the lesson?

4.Can you tell me more about the tool(s) that you used and why you selected it/them?

5.How did technology support your goals and objectives for students? What were you hoping to achieve?

*Repeat the process for each area of technology use.

APPENDIX B

LESSON PLAN ANALYSIS TOOL

Teachers will be asked to share two lesson plans spanning a time period of one year. Their lesson plans should be from two different time periods in the year (e.g., Fall, Winter, Spring).

Culturally Responsive Teaching Review

Each lesson plan will be carefully reviewed multiple times for evidence of any or all of the culturally responsive criteria below (a, b, c, d, e, f, g, h). The researcher will note each of the areas in the lesson plan where culturally responsive elements were found. The researcher will also note if there are similarities or differences in where culturally responsive elements are found among the two lesson plans (e.g., in content chosen, in assessments, in activities).

In the second round of interviews, teachers will be asked to discuss the area(s) of their lesson plans where culturally responsive elements were found. Teachers will be asked to explain why the teacher chose to incorporate specific elements (goals, objectives, and intent).

Culturally Responsive Teaching criteria developed from four areas:

- cultural competence
- high expectations
- socio political awareness
- critical caring

a. Preparing students to critically analyze the current social and political context to build their agency for affecting change. *[Socio political awareness]*
b. Connecting with and building strong relationships with students' families and their communities. *[Critical caring]*
c. Incorporating ways for students to be creators and innovators. And, incorporating multiple forms of assessments and multiple modalities for students to demonstrate understanding. *[High expectations]*
d. Incorporating multiple ways for students to collaborate, give meaningful feedback to both peers and their teacher, giving students voice and choice, and building classroom community. *[High expectations]*
f. Incorporating culturally-based content, activities, and interactional norms that value students' identities. *[Cultural competence]*
g. Building cultural scaffolds and creating engaging learning experiences and incorporating ways for students to share their lived experiences in the classroom. *[Cultural competence]*
h. Recognizing equities in education and preparing students for long-term success beyond the immediate content objectives. *[Critical caring]*

Technology Integration Matrix (TIM)

Each lesson plan will be carefully reviewed multiple times for use of technology using the TIM, technology matrix criteria. In this process, the researcher will note each of the areas in the lesson plan where technology was used and where those uses fell within the matrix categories and category descriptors. On one axis, student uses are categorized from active to goal-orientated technology use; and on the other axis, uses of technology are categorized from entry level to transformation.

(Technology Integration Matrix for Levels of Technology Integration in the Classroom, Florida Center for Instructional Technology, 2019)

	Entry	Adoption	Adaption	Infusion	Transformation
Active	Information passively received	Conventional procedural use of tools	Conventional independent use of tools; some student choice and exploration	Choice of tools and self-directed use	Extensive and unconventional use of tools
Collaborative	Individual student use of tools	Collaborative use of tools in conventional ways	Collaborative use of tools. Some student use and exploration	Choice of tools and regular use for collaboration	Collaboration with peers and outside resources in ways not possible without technology
Constructive	Information delivered to students	Guided conventional use for building knowledge	Independent use for building knowledge; some student choice and exploration	Choice of tools and regular use in building knowledge	Extensive and unconventional use of technology tools to build knowledge
Authentic	Use unrelated to the world outside of instructional setting	Guided use in activities with some meaningful context	Independent use in activities connect to students lives; some choice and exploration	Choice of tools and regular use in meaningful of activities	Innovation use for higher order learning activities in a local or global context
Goal Oriented	Directions given step-by-step and task monitoring	Conventional and procedural use of tools to plan or	Purposeful use of tools to plan and monitor; some	Flexible and seamless use of tools to plan and	Extensive and higher-order use of tools to plan and monitor

[redacted]		monitor	student choice and exploration	monitor	

In the second round of interviews, teachers will be asked to explain the technology their students' uses and their goals and objectives for technology use.

APPENDIX C

CULTURALLY RESPONSIVE COMPETENCY SELF-ASSESSMENT CHECKLIST

This checklist was adapted from Hsiao's (2015) Culturally Responsive Teacher Preparedness Scale.

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

____I infuse lesson plans and the curriculum with the culture of students represented in the classroom.
____ I review and assess curricula and instructional materials to determine their multicultural strengths and weakness, and relevance to students' interest and instructional needs, and revise them if necessary.
____I develop a repertoire of instructional examples that are culturally familiar to students to serve as scaffolds for learning.
____I find ways to support language acquisition and enhance culturally and linguistically diverse students' comprehension of classroom tasks.
____I use a variety of assessment techniques, such as self-assessment, portfolios, and so on, to evaluate students' performance in favor of cultural diversity.
____I design assessments to complement the culturally responsive pedagogical strategies that were employed during instruction.
____I utilize a variety of instructional methods to match students' learning preferences in learning the subject matter and maintaining their attention and interest in learning.
____I value and use culturally grounded discourse styles with students in an attempt to communicate in culturally responsive ways.
____I create a learning environment where students can use non-traditional discourse styles that are culturally grounded while engaging in higher level, critical thinking, and problem-solving conversations or activities.
____I communicate high expectations of success to culturally diverse students.
____I teach students to think critically about what they are learning, how it connects to their lived experiences, and how they can be change agents to solve problems impacting their communities and the world.
____I establish expectations for appropriate classroom behavior in considering students' cultural backgrounds to maintain a conducive learning environment.
____I develop and maintain positive, meaningful, caring, and trusting relationships with students and their families.
____I use alternative formats and varied approaches to communicate with children and/or their family members, including those with disabilities.

____I create a safe, and inclusive classroom environment for culturally diverse students through awareness and attention to my own biases and potential cultural mismatches between me and my students.
____I create a community of learners by encouraging students to focus on collective work, responsibility, and cooperation.
____I advocate for the review of my school's mission statement, goals, policies, and procedures to ensure that they incorporate principles and practices that promote cultural diversity, cultural competence and linguistic competence.
____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 students.
____I provide students with knowledge and skills needed to be successful beyond my classroom (within mainstream culture, within post-secondary environments, in jobs where students will be producers and not just consumers).

How to use this checklist
There is no answer key with correct responses. However, if you frequently responded "C", you may not necessarily demonstrate practices that align with culturally responsive teaching that create a culturally responsive learning environment for students.

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VITA

Elissa West-Frazier was born in Chicago, IL and raised in the south suburbs of Chicago where her formative schooling took place. She was raised in a home where education was valued and viewed as "the window to the world," and "the great equalizer" for a Black person living in America. Before attending Loyola University Chicago, she attended Saint Xavier University, Chicago, IL, where she earned a Master of Arts in Reading, with a Reading Specialist designation. Prior to that, she earned a Master of Arts in Teaching from Chicago State University, in Chicago, IL and a Bachelor of Arts from Lake Forest College in Lake Forest, IL in English-Creative Writing.

Elissa taught for a decade on the south side of Chicago serving primarily low-income African American and LatinX students, which she saw as her passion and her purpose. Her students, whom she saw as powerful, brilliant, and promising, often came from under-resourced and disinvested communities. Elissa worked together with her students to build their confidence, to strengthen their content area, technological, critical-thinking, and problem-solving skills; her goal was to prepare them for post-secondary success.

Currently, Elissa helps school systems, nonprofits, and municipalities improve their programs and policies as a researcher and evaluator with Education Development Center, which is an international nonprofit. She lives in Chicago, IL with her family.

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