

**Unfinished Bridges over the Digital Divide:
A Case Study in Technology and Inclusive Education**

BY

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Table of Contents

Introduction	1
Literature Review	17
Research Questions and Conceptual Framework	39
Methods	48
Findings	80
Discussion	140
Conclusion	164
References	167
Appendix A: One Sample T Test Results	176
Appendix B: ANOVA	178
Appendix C: Correlations	179
Appendix D: Survey Protocol	180
Appendix E: Interview Informed Consent	200
Appendix F: Interview Protocols	204
Appendix G: Code Tree	207
Appendix H: Code Frequencies and Weights	210
Appendix I: University IRB Exemption	213
Appendix J: Copyright Permission	216
VITA	217

Abstract

While advocates for the increased presence of educational technology in schools cite the possibility that technology holds for transforming traditional modes of instruction, assessment, and interaction in schools, there is little research into how such a transformation could impact traditionally marginalized student groups. The ways in which the infusion of technology into schools interacts with attitudes toward Inclusive Education in those settings has not been explored, despite the tendency to promote technology as a means of promoting access to quality educational opportunities for all students. Utilizing survey, interview, and documentary data, this case study sought to understand how a 1:1 laptop program and its resulting environmental changes influenced teacher sensemaking around Inclusive Education in a predominantly Latino, predominantly low-income school district. Additionally, it explored personal and organizational factors which could account for the observed relationship between technology and Inclusive Education. Survey and interview data suggested that pervasive technology appeared to have a positive relationship with redistributive efforts via the improvement of student engagement, student access, and differentiation. However, broader movement toward Inclusive Education as evidenced by increased recognition and representation in response to student and community diversity was not evident. Findings indicated the need for new, sociologically-based theories to explore the potential impact of educational technologies.

Introduction¹

In 2005, journalist Thomas Friedman's bestselling book *The World is Flat* prompted widespread discussion around the relationship between globalization, technology, and equity. Playing on a historical fallacy, Friedman suggested that the modern world represents an increasingly level playing field in which historical, geographic divisions are increasingly irrelevant. The book was among the first to trumpet the unprecedented speed of technological advancement and globalization occurring in the last decade as a primary impetus for changing the way we think, act, and plan in the world. This new world was one in which increased technology would usher in remarkable opportunities for sharing and innovation globally. Although his thesis received much critical acclaim, it was not without its detractors. Many argued that he grossly overestimated the degree to which the changes described had reached the developing world. Others focused on the ways in which the factors which Friedman identified had actually served to perpetuate exclusion for many via globalization (Stiglitz, 2007). Despite the logic behind the argument that technology could promote a flatter, more inclusive world, everyone was not convinced that it was fully supported by the evidence.

Why begin a study of the relationship between technology and Inclusive Education with discussion around globalization? In many ways, rhetoric in the debate over the degree to which technology-supported globalization supports the movement toward a more inclusive global community shares a common language with debates in the world of education around the role of technology in ushering in more open and inclusive schools and classrooms. On one side,

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proponents for a dramatic profusion of technology into schools voice strong support for the potential of technology to transform the ways in teachers support students as they access and demonstrate knowledge in new ways. They cite the possibility of expanding learning outside of the classroom and the ability to access and provide meaningful learning materials to a student population with tremendously diverse needs. Finally, educational technology supporters cite the ways in which an increasingly technology-reliant world demands students that are equipped, in terms of technological access and mastery, to engage with that world.

Those who advocate for a more tentative approach to the wholesale adoption of pervasive technology in schools, question the degree to which technology is the answer to what they see as more basic problems facing public education in the United States. Dramatic inequity between student groups in terms of resources, opportunities, and outcomes is undeniable; for poor students and students of color in this country, the world is far from flat. In the United States, exposure to chronic instability and violence, inequity of access to basic resources such as housing, food and healthcare (Berliner, 2009; Anyon, 2005) impacts our schools from without. And, with many low-resource schools serving already resource-scarce communities, students' disadvantage is often multiplied from within (Darling-Hammond, 2006; Kahlenberg, 2006; Anyon, 1997). These realities do not negate efforts to prepare students for an increasingly tech-oriented reality or to seek solutions to the exclusion created by limited access to technological resources (Chan, 2011; Anderson & Ronnkvist, 1999). And yet, for many, it is difficult to imagine the role that computers could play in addressing issues of exclusion based on race, class, language, ability and other factors.

The notion that technology could serve to level educational playing field is not novel. Within the field of special education, the concept of the universally designed classroom (also

known as Universal Design for Learning or UDL) has long been held up as a model for increasing equity between students with disabilities and their peers. The proposition that designing classrooms and curricula in a way that allows for flexible goals, methods, materials and assessments will allow schools to meet the needs of the greatest number of individuals while also allowing all students to benefit from the innovations that are essential for students with disabilities (Rose, Meyer, & Hitchcock, 2005). While UDL is not wholly reliant on technology, it is undeniable that technology offers unparalleled potential for creating truly universally designed educational settings. Thus, inasmuch as technology has often been at the center of discussions around UDL, the relationship between technology and inclusive models of education is not entirely new.

However, deeper dialogue exploring connections between the ideological foundations of movements in educational technology and inclusive education have been sparse. This is especially troubling given that proponents of educational technology and inclusive education seek similar de-normalization or disruption of traditional modes of education. Just as proponents of the ed tech “revolution” seek to redefine the notions of what and how students “should” learn, so do advocates of inclusive education. In an effort to begin a dialogue between these disparate yet interrelated fields, this study sought to assess whether the phenomenon of technology increasing access, opportunity and voice described by Friedman (2005) and others (Warschauer 2004) as occurring globally, can also occur more locally, in schools and school communities. At the core of this study was the exploration of whether educational technology-like other “disruptive” technologies (Christensen, 2013)-has the capacity to disrupt existing beliefs, practices and dynamics that create exclusion in schools. Does technology have the potential to promote access to quality educational opportunities for students that have been

historically disadvantaged? Or, it is more likely that the profusion of technology into the classroom, while altering modes of learning or interacting, represent a fairly superficial change which does little to fundamentally alter educational opportunities?

In service of these big questions, this study probed the experiences of one predominantly low-income, predominantly Latino, and historically under-resourced school district implementing a 1:1 laptop program (one device for every student). The voices of staff in this setting were used to answer the following questions:

- Do teachers in schools with a high degree of technology integration demonstrate a paradigm shift away from traditional models of education characterized by the use of summative assessment, large-group/undifferentiated instruction, low parent-engagement, and access to knowledge in the classroom alone?
- Do teachers in this setting reflect an inclination toward Inclusive Education? To what degree is this inclination (or disinclination) influenced by the impact of technology?
- Are there personal or organizational factors which appear to influence teacher sensemaking with regards to the Perceived Impact of Technology, Inclination toward Inclusive Education and/or the relationship between the two?

The first question was based on a model (Weston & Brooks, 2008) which proposed four major areas in which technology had the potential to change prevailing educational paradigms. After determining the degree to which technology had engendered these changes, further analysis served to assess the ways in which observed changes did or did not result in an inclination toward more inclusive beliefs and practices. Final analysis investigated ways in which the observed relationship between technology and Inclusive Education were the result of factors unique to this school district as an organization or personal characteristics of staff there.

Although this study reflected the experience of one school community, the answers to these questions in this setting served to lay a foundation for future, larger-scale explorations into the relationship between technology and Inclusive Education.

Unlike much research in educational technology, this study was not aimed at examining the impact of particular programs or interventions. Rather, it considered whether the structural or environmental changes that pervasive technology is *proposed* to bring were observable and the degree to which those changes also facilitated a staff inclination toward promoting access and meaningful participation in quality educational opportunities for all student and family groups. Acutely aware of the elusiveness of terms such as “meaningful participation” and “quality educational opportunities”, it is important to note that they are used here to explore the degree to which staff in this study reflected efforts toward making improvements in the school-experiences of students and families who have traditionally had more than their share of negative experiences. Indeed, a truly inclusive framework for education allows for the representation of these students and families in creating their own definition of quality educational opportunities. To this end, the study was limited in that it explored whether staff 1) believed in and advocated for access for all groups even if this meant reconsidering norms and 2) believed in and advocated for students and families to have such a voice although it did not assess the degree to which such representation actually occurred. Still, the ways in which teachers make sense of and respond to issues of access and representation represent a critical area for inquiry. Selwyn (2012) made the case for a new theoretical analysis of technology that would account for the varied- and often inequitable- educational experiences of students in the US and abroad. The interaction between technology and Inclusive Education *within* teacher sensemaking represents one potential but important direction in which to pursue such analysis.

The Digital Landscape: What's at Stake for Students?

If we accept the assertion that the world is indeed flattening and that technology is a driving factor in this change, it is precisely communities and students who have been historically excluded that stand to lose (or potentially gain) the most. In the current political and economic environment, schools are struggling to sustain current funding levels, much less pay to purchase new technologies and implement them well (Olif, Mai, & Leachman, 2012). This disconnect often means that students with existing access to the resources needed in the flat world are more likely to attend schools in which these resources are available and well-utilized while students without these resources or skills remain excluded from them at school. Linda Darling-Hammond (2010) asserted that the chances of success for American children and, indeed, our own nation's future, are dependent upon our society's commitment to educational equity. While her analysis focused more highly on traditional factors and drivers of inequity-such as race, school funding, and teacher quality-and the impact they have on meaningful access to society of which technology is a part, she brings to light the notion that with every passing day, equity and technology become increasingly interdependent. This is to say that not only does inequity impact access and participation with technology, but that the quality of that interaction with technology may significantly impact opportunities for equitable participation in other areas. In this way, technology and inclusion can be seen to have a fairly symbiotic relationship in society at large.

While there is much to be said about what defines meaningful or quality interactions with technology, there is a general consensus around the idea that technology as a tool to replace previous tools- for example, typing instead of writing, online quizzes instead of flash cards-

yields little value added. On the other hand, educational tasks which use technology to transform the nature of the way instruction is provided or transform the way students demonstrate their knowledge are thought to build the skills necessary for future success in a tech-dominated world. (Puentadura, 2010). Within this framework, students without access to technological tools necessary to participate in society and without the ability to use these technologies efficiently, effectively, and innovatively will continue to fall further behind. However, access and integration of technology into their lives via school holds the potential to allow students who come from non-dominant backgrounds access to dominant modes of learning, communication, and production which may have been previously inaccessible to them. If the discourse around preparing our children for the future continues to center on technology, the connections between these policy-priorities and social justice must be highlighted.

Until now discourse and research around technology in schools has largely remained independent of larger discussions around equity. The study of technology in education has generally limited itself to questions centered on the instructional core- the learning interactions between students and teachers in classrooms. Program evaluation data suggests that particular uses of technology yield more direct academic benefit than others. The SAMR (Substitution, Augmentation, Modification, Redefinition) model (Puentadura, 2010) has become a widely-accepted standard for implementation of educational technology; this model urges the use of technology to modify or redefine traditional modes of learning rather than using computers to replicate existing tasks. Additionally, a significant body of work highlights the importance of implementation, particularly attention to staff attitudes, preparation, and support to ensure that technology is not simply a physical resource in the classroom but rather a new mode of learning (Apple Computer, 2005; CDW-G as cited by Blazer, 2008; Cooley, 2001; Dunleavy, Dexter &

Heinecke, 2007; Dynarski et al, 2007; Penuel, 2006). While we have generally strong models of what technology implementation “should” look like- both in terms of administrative activities (training, support, development) and teacher activities-the goal of these models is often unclear. Using technology to “redefine” learning, classrooms, and even schools is the goal, but why? What, exactly, is this redefinition in service of?

Situating Inclusive Education

While there is not one resounding answer in the literature, this study proposes that one potential reason for this redefinition comes from to the increased necessity of technology for social inclusion in the digital age. If we accept the premise that access to and mastery of dominant, technology-based forms of knowledge and communication are essential to inclusion in equity in larger society, it is plausible that 1) schools which seek to prepare students for this world should facilitate participation with it and that 2) technology may be equally critical to inclusion in school (for children) as it is critical for inclusion in society for adults. In 1995, Tyack and Cuban described the phenomenon of schools changing little despite decades of attempted reform. Referring to a structure which they named the “grammar of schooling”, they highlighted the ways in which most attempted changes ended up having little impact on the core of what happened in classrooms between teachers and students. Their work suggested that there is a certain paradigm in terms of how school functions that has been generally impermeable to reform. In many ways, models like SAMR seek to disrupt the “grammar of schooling” and strong advocates of infusing technology into schools do so in hopes of ushering in a new order in classrooms and schools (Weston and Bain, 2010). What these models lack, however, is a clear vision of the purpose for this new order. Whereas past reform movements may have held well-articulated aims but lacked attention to fundamental realities of implementation, the so-called

“laptop revolution” has been criticized for “having no clothes” (Cuban, 2011) generally due to the lack of a cohesive purpose. This study seeks to employ the strong knowledge base of *how* to use technology in service of the articulation of a stronger theory of *why*.

In measuring the relationship between inclusive education and technology in an effort to understand whether the promotion of social inclusion is a viable articulation of the purpose of educational technology, this study will, to some degree, conflate the notion of social inclusion broadly with inclusive education specifically. This can be both helpful and problematic. The connection between specific educational reforms (increasing technology and inclusive education) and broader sociological aims (social inclusion) serves to situate the study within a larger context and to draw parallels between what happens in schools and what happens in society. However, as many in the field of inclusive education would argue, inclusive education (specifically) and inclusion (broadly) are not one in the same. Whereas social inclusion (as a sociological theory) and inclusion (as an approach to the placement of students with disabilities in general education settings) are often primarily concerned with issues of access, the field of inclusive education is primarily concerned with disrupting notions of normalcy (of which access for all is but one component).

Specifically, it seeks to determine whether the ways in which teachers’ interpretation of policies around technology can serve to support movement toward a more inclusive model of education in the same way that the diffusion of technology has been proposed to have altered the dynamics of access and power in larger society. The decision to focus on the relationship between Inclusive Education and technology in schools grows not only from scholarship which links technological access and competency with increased inclusion in society generally (social inclusion), but to research which seems to link positive social outcomes, more open learning

environments, and the integration of technology (Cooley, 2001; Hawkes and Cambre, 2001; Waddoups, 2004; Bebell, 2005; Texas Center for Educational Research, 2006; Bebell & O'Dwyer, 2010). Returning to the basic premise promoted by Friedman that a sort of leveling of the world has or could result from the profusion of technology, this study asks whether such a phenomenon might occur in schools, especially for students who have traditionally experienced exclusion. By looking at the ways in which the integration of technology has influenced staff attitudes and activities around Inclusive Education, the potential leveling effect of technology for students will be assessed and presented as one potential metric by which we can measure the impact of technology policies.

Before going further, the definition/ clarification of terms to be used throughout this inquiry is critical. This study approaches the question of whether technology can influence the social dynamic of schools via the concept of Inclusive Education. However, it is important to acknowledge that in practical use, Inclusive Education has more than one common meaning. The passage of the Education for All Handicapped Children Act (EAHCA, 1975) brought with it the requirement (among others) that schools educate students with disabilities in the least restrictive environment. This requirement helped to pave the way for a movement in research and policy which employed the term “inclusion” to refer to the education of students with disabilities in classrooms alongside their non-disabled peers. Despite the tendency to associate “inclusion” with questions around what type of classrooms students with disabilities are educated in, more recent scholarship in the field has begun to broaden its aim in an effort to move away from limiting the discourse to such a place-based notion of inclusion. While recognizing the significance of physical inclusion and the unique importance Inclusive Education holds generally for students with disabilities or significant difficulties—who have had a long history of both

physical and social exclusion- many are arguing that these concerns cannot reflect the entirety of the movement toward Inclusive Education.

As such, advocates of Inclusive Education, while supporting the notion that students with disabilities deserve opportunities to access general education classrooms, cast a wider net. They propose that truly Inclusive Education requires changes in the way disability is defined and interpreted while also emphasizing the inherent connections between the notion of disability and other social factors such as race, culture, and poverty. Even the term “inclusion” can be problematic in that it requires a definition of “otherness” and begs the question of how individuals deemed as other can be included into classrooms, schools, society etc. (Graham & Slee, 2008). In contrast, Inclusive Education as a concept holds a transformative agenda, asking schools and educators to redefine the ways in which they understand and respond to the myriad of differences that students brings to the classroom; in this manner inclusivity requires a redefinition of the institution rather than a definition and acceptance of the individual. Artiles, Kozleski, Dorn, and Christensen (2006) seek to explain the core elements of Inclusive Education:

Inclusive Education is an ambitious and far-reaching notion that is, theoretically, concerned with all students. The concept focuses on the transformation of school cultures to (1) increase access (or presence) of all students (not only marginalized or vulnerable groups), (2) enhance the school personnel's and students' acceptance of all students, (3) maximize student participation in various domains of activity, and (4) increase the achievement of all students (Booth, Ainscow, Black-Hawkins, Vaughan, & Shaw, 2000; Kalambouka, Farrell, Dyson, & Kaplan, 2005).

It is within this broader notion of Inclusive Education that this study is situated. As such, it explores the ways in which teachers understand and respond to various aspects of student and family identity in light of or in spite of technological changes to the classroom environment.

The Centrality of Sensemaking

While there may be many ways to assess the relationship between technology and Inclusive Education, this study employs teacher sensemaking as one potential measure of responses to technology and Inclusive Education and the possible relationship between the two. This decision asserts that teachers can play a critical role in both the elimination of and perpetuation of exclusion among students, not only through personal interactions but in the ways in which they interpret and implement policy. Certainly, inequality of opportunity and resources that exists for students *outside* of school in this country (Berliner, 2009) in light of the limitations schools face in addressing social problems (Labaree, 2008) largely account for inequities experienced by students. Still, to the degree that schooling does have an impact on outcomes, it is critical to understand the ways in which teacher sensemaking around policies-especially those with explicitly inclusive aims- serves to promote or inhibit inclusion.

Research around policy implementation highlights the significance of factors such as existing beliefs/attitudes, policy messaging, peer interactions around policy and interaction with training/support in the ultimate effectiveness of the policy; these factors, taken together and used to construct meaning around experiences, constitute what we refer to as sensemaking (Bertrand & Marsh, 2015; Coburn, 2001; Spillane et al., 2002; Weick, 1995). Policies are enacted by people; the process by which teachers make sense of policies fundamentally shifts their response and subsequent implementation. As Sutton and Levinson (2001) put it, policies are not created and implemented but are rather “appropriated” via a process of making sense and implementing according to that particular narrative; the nuances of this appropriation have powerful impact on their outcomes. The introduction of a particular student into a new classroom setting may not change the way the student is treated, the instruction he/she receives, or the social interactions

he/she has depending on the ways in which the teacher makes sense of this student's place in his/her classroom. Similarly, the infusion of computers into a room can mean as little as a new cart cluttering the space or as much as a new way of students learning and interacting. In both cases, the ways in which staff integrates their existing attitudes/beliefs with the messages about and implementation practices of the policy determine the outcome.

The ways in which teachers engage in sensemaking largely determines the ways in which policies are enacted. If the teacher receiving a student with a disability into his class makes sense of the policy as something that is positive for all students, feels supported in carrying it out, and finds peer discourse around the policy to be generally supportive, he/she may appropriate the policy in a manner which reflects the intent. However, absent factors to support sensemaking which are in line with the policy's intent, appropriation may include unintended actions. Whether the teacher devotes his efforts to ensuring that the student is accepted and successful or, instead, spends time documenting the ways in which the student is experiencing failure as a result of the new environment are largely dependent on the ways in which the teacher's own beliefs, policy messages, training/support, and his interactions with other staff have interacted with this policy. When we understand fully the significance of sensemaking in determining policy outcomes via appropriation, the use of teacher sensemaking as a measure of response to technology and Inclusive Education makes sense.

With any policy, two potentially problematic approaches to implementation threaten to reduce efficacy. The first, which has been frequently observed with attempts at socially-based reforms, of which Inclusive Education may be considered a good example, tends to place a strong emphasis on theory, philosophy, and goals with less attention devoted to how it will actually change the practices of teachers who are implementing the reform. The second, which

seems to be common to technology-based reforms, emphasizes process and programs with little clear articulation of theory or purpose. Both fail to independently recognize core dimensions of sensemaking; namely, the reciprocal interaction between beliefs/attitudes, interpretation, and activities. This interaction is central to this study as we seek to determine whether a particular policy (1:1 technology) and the way it is implemented has an influence on inclination toward Inclusive Education. In agreement with Singh's (2009) suggestion that "the challenge of educational change is...primarily about dealing with emotions and feelings of members of the school...the realization that any transformation in a school must be seen within the framework of the process of character change is often completely overlooked," (pp. 18) the study treats staff interpretation of policies around Inclusive Education and technology with primacy. While recognizing the importance of measuring student outcomes, this study makes a deliberate choice to measure factors that mediate student outcomes- sensemaking in this case-in order to determine whether the proposed relationship between the changes required for transformative implementation of both technology and Inclusive Education is even evident in the ways in which staff make sense of these approaches.

Inclusive Education and the Paradigm of Educational Technology

On the surface, it may be somewhat counterintuitive to discuss technology and Inclusive Education as two different yet potentially reinforcing approaches to school change. The common thought is that whereas Inclusive Education is certainly an approach or set of beliefs, technology is a tool or a resource. One major premise of this study is the notion that while technology initiatives such as 1:1 programs require technological resources, their implementation requires dramatic changes to teaching, learning and interacting. As such, rather than asking how computers change the environment to make it more inclusive (as is suggested by the notion of

Universal Design for Learning), the study seeks to understand how a *technology-supported educational paradigm shift* influences teacher Inclination toward Inclusive Education. This is to say that the study is not merely asking how computers make environments more accessible, but whether the changes to teacher sensemaking that occur as a result of pervasive technology are aligned with the type of paradigm shift required for movement toward Inclusive Education. The question that emerges, then, is whether technology and Inclusive Education can, when taken together, prove to be mutually reinforcing. Technology research has borne much criticism for representing an approach without a purpose while the reverse has been true of reforms around inclusion. Knowing this, the possibility emerges that the types of beliefs and practices required for both technology and inclusion policies to have their intended effects are not only similar but are mutually reinforcing and that a focus on sensemaking is an appropriate mediating factor to measure when assessing this relationship. The importance of considering teacher attitudes, perceptions, policy message, and ongoing support is clearly endorsed in the technology literature (Apple Computer, 2005; Cooley 2001, CDW-G as cited by Blazer, 2008; Dunleavy, Dexter & Heinecke, 2007; Dynarski et. al, 2007; Penuel, 2006). Although there is little direct evidence of the impact of teacher sensemaking on implementation of inclusion, the abundance of studies seeking to evaluate teacher attitudes toward inclusion (Avramidis, Bayless, & Burden, 2000; Avramidis & Norwich, 2002; Silverman, 2007) and the proliferation of scales to assess teacher perceptions of students with disabilities and inclusion suggests that teacher sensemaking is critical in this area. While it would be difficult to directly measure an effect of technology on inclusion (or vice versa), we can, measure how staff interprets and responds to these initiatives in order to obtain one potential indicator of a relationship.

If we accept the assertions that the integration of technology is (increasingly) critical to social inclusion in society (Warschauer, 2004) and that Inclusive Education is an essential component in the movement toward educational equity, it is not difficult to understand the importance of gaining new understanding of the way these types of initiatives work together in schools. Is there evidence that technology can promote positive attitudes toward Inclusive Education in a school setting? If so, what mechanism accounts for this change? What types of factors in policy design and implementation for both technology and inclusion policies contribute to the development of such a mechanism? In order to begin to answer such questions, a new understanding of educational technology that focuses on the social dimensions of technology-based approaches is necessary, and the ways in which it interacts with other methods or approaches needs further exploration.

Literature Review²

The following chapter reviews the literature in the fields of educational technology, Inclusive Education, and teacher sensemaking. It begins with a broad survey of what we know about educational technology, how it is being used, what its measured effects have been, and current areas of debate and discourse in the field. Utilizing current debates around the purpose of technology as opportunity to move into discussion around Inclusive Education, it will also provide a general survey theoretical underpinnings and emerging frameworks in Inclusive Education. Finally, the review will use literature exploring teacher sensemaking within implementation to establish the critical importance of teacher sensemaking to policies concerning technology as well as Inclusive Education. This chapter provides the foundational knowledge necessary to understand the major contours in the fields of educational technology, Inclusive Education, and teacher sensemaking while suggesting potential ways in which they interact; the ways in which these three areas of research may work together are further explored in the research questions proposed for this study and the conceptual framework advanced in the next chapter.

Educational Technology: What we know

While this study strongly asserts the need for a movement toward a critical, socially-based scholarship of technology, a foundation in the existing scholarship is necessary to warrant such an assertion. This review will initially explore the broad landscape of educational technology in the United States, asking the following general questions: what types of technology are being used? Where are they being used? What are the general goals and

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outcomes for these programs? What factors appear to influence implementation and outcomes? Having established a foundation in what is known, several of the more common critiques of the movement toward pervasive educational technology will be discussed. In light of these critiques, the review will conclude with an exploration of the problematic ways in which research around technology has been traditionally situated while exploring alternative frameworks for assessing and theorizing the goals and outcomes of educational technology.

The rapid and shifting nature of technology itself makes it difficult to compose a definitive review of “what we know” about educational technology. Blazer (2008) provides a bird’s-eye view of the field, ultimately concluding that the story of educational technology presents a mixed bag in terms of approaches, goals, implementation, and, ultimately, outcomes. Much of this is due to the reality that there is significant diversity in programming types and goals. As of 2008, in the U.S. there was an average of 3.8 students per computer and that the rate of computer access at school was, surprisingly, not significantly discrepant between low and high socioeconomic school communities; there are, however, significant discrepancies that continue to exist in home computer use and the types of technology programming provided by school which has a major impact on student outcomes (Warschauer, Knobel, & Stone, 2004). While it is difficult to find up-to-date data, in 2006 it was reported that nearly 24% of the nations’ districts were transitioning to a 1:1 (one device per student) computer model (Blazer, 2008). Of course, presence of a 1:1 model is not the sole measure of educational technology in a school although the so-called 1:1 revolution does represent one of the most lauded, criticized, and commonly researched approaches to integrating technology into schools. Even within 1:1 programs, features- such as the option for students to bring their computer to and from school with them- vary significantly depending on programming goals. Bonifaz and Zucker (2004)

identified multiple different- and sometimes competing- goals for school-based technology initiatives including increasing student economic competitiveness, reducing unequal access to computers, raising student achievement, increasing student engagement, creating a more active learning environment, and improving differentiation via the broadening access to multiple modes and sources of information and facilitation of an environment which reflects the principles of Universal Design for Learning.

Given the wide variability in types of programs and their specific goals, research on efficacy of school-based technology initiatives has generally taken the form of program evaluation. This is to say that most empirical studies of the impact of computers on student outcomes are case-based analyses. The majority of these analyses have focused on the correlation of a computer initiative to academic outcomes, especially scores on standardized tests with highly inconsistent results. Meta-analyses of these cases have generally demonstrated a small positive effect for computer-enhanced instruction (Valdez 2005; Waxman, Lin, & Michko 2003) while Kulik's (2003) analysis found that there could not be firm conclusions drawn about the impact of computers on reading, math, or science but that a strong positive impact on writing was observed.

Three large-scale state initiatives are also available for analysis. Missouri's eMINTS (Enhancing Missouri's Instructional Networked Teaching Strategies) program-which integrated technology use with inquiry-based learning- demonstrated higher outcomes by 6-10 points for students enrolled in the program on the state assessment (Bickford, Hammer, McGinty, McKinley, & Mitchell 2000) and had an especially strong impact on low-income students (Huntley & Greever-Rice 2007). In Maine, the MLTI (Maine Learning Technology Initiative) provided computers to every student in the state. While statewide scores increased significantly

after implementation, Bowen (2007) critiques the data for this study. Still prior to full implementation, Muir, Knezek, and Christianson (2004) found significant differences in test performance between pilot schools and control schools, which had not previously existed. However, the TIP (Texas Immersion Pilot) had somewhat different results. After providing every student and teacher in economically disadvantaged Texas middle schools a laptop as well as wireless access, online tools, and professional development, there was no positive effect on math or reading achievement and students in TIP schools actually performed at a lower level than those in control schools (Texas Center for Educational Research 2006).

One explanation for the variability in outcomes noted by researchers has been the significant variability in the type and quality of training and support provided to teachers during implementation of new technology initiatives. Teachers' own attitudes toward technology can greatly influence the degree to which they integrate it into their instruction as well as the types of activities it is used for (Apple Computer, 2005; Penuel, 2006). Despite this, a review of the literature around teacher implementation (Dunleavy, Dexter & Heinecke, 2007) and a study by the US Department of Education (Dynarski et al, 2007) found a general effect of movement toward a more constructivist approach and facilitative role by teachers who have increased access to technology in their classrooms. Still, Cooley (2001) explored the ways in which money spent on technology can go to waste if there is no investment in training and support throughout implementation. Indeed, data from the 2005 Teachers Talk Tech survey which indicated that 28% of teachers felt that they were not trained or not adequately trained to integrate computers into their instruction (CDW-G as cited by Blazer 2008).

Some general conclusions appear to emerge from the research across cases. These include the critical nature of in-depth teacher training, professional development, and technical

support during implementation (Chaika, 2006; Jackson, 2004; National Education Association 2008; Valdez, 2005), the increased effectiveness of initiatives that encouraged the use of technology for research, collaboration and other inquiry-based endeavors- as opposed to remediation or drilling (Valdez, 2004; Wenglinsky, 1998)- and the tendency to observe higher scores among students who report high access to computers at home (Wenglinsky, 1998; Ravitz, Mergendoller, & Rush, 2002; Jackson, Von Eye, Biocca, Barbatsis, Zhao, & Fitzgerald, 2006). Still, the situational nature of most program analyses and the significant role implementation has on success or failure of school-based technology initiatives make it difficult to make broad conclusions about the impact of technology initiatives. This inability to make strong conclusions has been one major critique of the growing emphasis on school-based technology initiatives. Indeed, the inability to make a well-supported claim for widely improved academic outcomes coupled with the seemingly high costs of implementation make these programs targets for criticism.

Weston and Bain (2010) presented a summary of what they have termed “technocritique”, describing and answering the most common questions and critiques of 1:1 laptop programs in schools. While many scholars have been ambivalent or even supportive of 1:1 programs, they have continued to raise significant questions about these initiatives. Several have focused on questions of usage. Knowing that the use of technology to replace existing practices, or primarily for remediation and “drill and skill” provides little to no improvement over doing such activities in more traditional methods, they have questioned whether and how the devices are being used effectively- or at all (Bianchi, 2004; Hu, 2007; Lei & Zhao, 2008; Vascellaro, 2006). Another significant area of criticism concerned the cost of laptop initiatives and whether they provide a worthwhile return on the investment necessary (Fitzgerald 2003;

Means & Haertel, 2004; Mowen, 2003; Oppenheimer, 1997; Ricadela, 2008;). Others presented a less favorable opinion regarding the current enthusiasm over laptop programs (Cuban, 2006), asserting that it is unwarranted based on existing evidence and that these initiatives take the focus away from meaningful changes to teaching and learning that must occur in order for schools to truly improve.

In response to this wave of criticism, Weston and Bain (2010), used Cuban's own work on the nature of school reform and the historic inability for even the best-intentioned and well-planned reforms to penetrate the daily practices of teachers or the so-called "grammar of schooling" (Tyack & Cuban, 1995). While they agreed that the evidence for 1:1 programs is mixed, they cite a long list of other reforms (charter schools, comprehensive school reform, high stakes testing and accountability, and standards) that hold a similar mixed bag of results when it comes to scaling-up success. Furthermore, they suggested that very few other reforms (when implemented with fidelity) possess the same potential reach as 1:1 initiatives which hold the promise to impact every teacher, student, and possibly every family. They proposed that the use of technology initiatives has the power to disrupt the existing equilibrium of school and classrooms; changing the roles of teachers and students and creating a "new vision" for education.

Within this vision, Weston and Brooks (2008) articulated four dominant features of schooling today which technology has the potential to disrupt. (1) Non-differentiated large-group instruction: universal access to technology for students and teachers has the potential to facilitate differentiated work which can occur in multiple modes. (2) Access to information in classrooms alone: whereas historically teachers gained knowledge from teachers in classrooms, technology has the potential to allow students to gain access to knowledge on their own in the

classroom or in other settings. (3) Non-engagement of parents: pervasive technology shared between home and school could facilitate not only communication but opportunities for parents to directly interact with curriculum along with their students. (4) Summative assessment of performance: technology affords educators, efficient, real-time access to student performance promoting the use of formative and ongoing assessment. These identified areas support the notion that the real potential for technology comes in changing modes of interaction rather than simply replacing former modes of gaining and demonstrating knowledge. If this is the case, we may hypothesize that some of the most notable effects technology has will not be found immediately in test scores but rather in changes in the nature of staff and student beliefs and interactions. While largely theoretical, such scholarship calls for new questions to be asked, questions which focus on the social context of technology and technology-based reforms.

Toward a Critical Study of Educational Technology

In calling for a new, critical study of educational technology, Selwyn (2010) grappled with what have been the traditional limits of the field:

...the academic study of educational technology has grown to be dominated by an (often abstracted) interest in the processes of how people can learn with digital technology....greater attention now needs to be paid to how digital technologies are actually being used... with researchers and writers showing a keener interest in the social, political, economic, cultural and historical contexts within which educational technology use (and non-use) is located (p. 66).

While Selwyn's use of the term "critical" was not explicitly tied to equity, his desire to broaden the field certainly asks us to consider it. The so-called Digital Divide is perhaps the most often-used application of equity issues to technology. Despite its usefulness in highlighting the uneven distribution of technological access (Becker 2000; Hoffman, Novak & Schlosser 2001), the term has been critiqued for its simplicity and has evolved over time. More recent work has explored the limitations of placing *access* to computers or internet at the center of discussions around

technological equity. Warschauer (2004) asserted that, “In today’s society, the ability to access, adapt, and create knowledge using information and communication technologies is critical to social inclusion” (pp. 9), noting that even when access is equitable, gaps in the way technology is used may perpetuate inequity. Araque et al., (2013) supported this notion, finding that individuals’ cultural and socio-economic backgrounds significantly moderate the ways in which they utilize technology. While social divisions around access to technology remain, scholarship is in search of a deeper conception than the “haves vs. have nots”- one which explores the intersection of technology with race, class, disability status, and environment (Dimaggio & Hargittai, 2001; Leonardi, 2003; Norris & Conceicao, 2004).

Despite the need for such work, research that explores the interaction of factors such as race, class, or disability status with technology in education is limited. Work from Warschauer (2002) and Valadez & Duran (2007) suggested that for students from low socioeconomic backgrounds, technology often served as a digital substitute for traditional methods of instruction and resulted in activities designed to prepare workers in contrast to more scholarly tasks presented to students in high-income settings. Studies which looked at the educational outcomes of minority and low-income students who were provided computers (access only) have found some significantly positive effects on grades, homework completion, math scores, and self-esteem, although positive effects in other areas- such as reading- were not observed (Chan 2011; Fairlie, 2012; Jewitt & Parashar, 2011; Page 2002). Given these mixed findings, Selwyn et al., (2001) and others urge caution to those who may view proliferation of technology as a panacea for the legacy of inequity in schools and society.

Two terms which are critical to understanding the potential use of technology for promoting inclusion, especially for students with disabilities, are Assistive Technology and

Universal Design for Learning. Assistive technology (AT) refers to the use of specific technologies to improve access or bridge a “gap” for students with disabilities (Alper & Raharinirina, 2006; Marino, Sameshina, & Beecher, 2009). This might include the use of particular apps or devices to allow increased communication for students with limited verbal skills or other technology-supported interventions. AT is used for a specific purpose to address a specific need of a specific student or group of students. Universal Design for Learning (UDL), by contrast, refers to the idea that educational tools could or should be designed in a way that would allow accessibility for all types of learners- with or without disabilities (Rose, Meyer, and Hitchcock, 2005). While the principles of UDL are not the inherently technology-related, new technologies have dramatically enhanced their practicality and effectiveness. As such, an electronic textbook which naturally has text to speech or magnification capabilities features represents an example of a tool which is more reflective of universal design. All students are able to use it, although it has features that especially enable access for diverse learners. The principles of Assistive Technology and Universal Design for Learning help to explain potential mechanisms through which a 1:1 program could have an impact on Inclusive Education via providing more numerous, effective, and easily implemented means of differentiation. Although the 1:1 program may enable some assistive technology applications that were not previously available, the ways in which access to these devices, their applications, and the resulting change in instructional techniques reflects a movement toward Universal Design for Learning could provide one potential explanation for a positive correlation between technology and Inclusive Education.

Despite the theoretical connection between technology and increasing access via UDL, the data on the actual impact of technology on achievement generally and more-specifically for

low-income students, students of color, and students with disabilities is varied and incomplete. Implementation issues, including training and teacher attitudes, may account for much variability (Frank, Zhao & Borman 2004; Windschitl & Sahl 2002; Roschelle, Pea, Hoadley, Gordin & Means 2000; Singh 1993; Zhao & Frank 2003), and the consideration of staff attitude towards both technology and their students' backgrounds are key factors that deserve increased attention. While it cannot be said that the existence of technology has a significant impact on educational equity in the US to date, two realities remain: 1) Students today exist and must be prepared for a world in which digital technology is the primary means of accessing, communicating, and creating knowledge 2) Vulnerable student populations- students of color, low-income students, and students with disabilities, to name a few- continue to encounter barriers which exclude them from full and meaningful participation with education generally and educational technology specifically. As technology becomes increasingly central to the world around our students, schools will be compelled to employ technology in order prepare students for this world. It is time that a body of research exploring how to do this in a way that empowers and provides opportunities for traditionally excluded student groups to emerge.

The empirical evidence around the effects of pervasive technology on student attitudes, motivation, and relationships provides a basis for this type of work. Despite mixed results in terms of student academic achievement as measured by test scores, studies into the relationship between technology and factors such as student attendance, dropout rates, discipline referrals, student confidence, peer relationships, self-esteem, student engagement/ motivation, and problem solving skills have demonstrated almost universal positive correlations (Cooley, 2001; Hawkes and Cambre, 2001; Waddoups, 2004; Bebell, 2005; Texas Center for Educational Research, 2006; Bebell & O'Dwyer, 2010); even more notably, several of these studies found the

effect to be greater for students who were from a low-socioeconomic background or who had been previously lower achieving (Bebell, 2005). These findings are more than just a nice corollary to the mixed findings about academic achievement; they provide critical insight into the true potential of technology initiatives and into the type of research needed to further this potential. If technology initiatives changed the way students felt about school and themselves, how did they do so? Was there an impact on staff and student-staff relationships which mediated this observed effect? Indeed, when school reform in the urban environment is discussed, student engagement, relationships (between peers, between students and teachers, and between schools and communities) are often identified as an area in need of improvement. While the importance of relationships in schools is often overlooked, research has shown that if change in these areas does not take place, other reforms which have a more direct effect on the instructional core (curricular alignment, high academic standards etc.) simply cannot take hold (Bryk, Sebring, Allensworth, Easton, & Luppescio, 2010). Given this knowledge, the literature suggests that it may be time to replace the exclusive focus on how technology can change academic achievement with attention to how technology can remove barriers and build bridges that allow students meaningful access to quality academic instruction via changes in social structures and interactions in schools.

The most critical voices opposing a wholesale attachment to pervasive technology and laptop programs as a ready-made solution to the problems of public education seem to find their grounding in the lack of a clearly articulated purpose for the so-called “laptop revolution.” While the generic goal of increased achievement looms ever-present, a clear theory of impact presenting a viable mechanism through which technology could support this goal is often lacking. The following section provides an outline of the field of Inclusive Education and

begins to make the case for this field as a potential explanation for the way technology could have a foundational impact on achievement via changing educational paradigms in order to promote inclusion.

Inclusive Education as a Theory of Impact for Educational Technology

Given the case for a socially-oriented approach to research in educational technology, new theoretical frameworks through which to approach research are necessary. Whereas in the past institutional or economic perspectives have been common modes of inquiry, new dynamics in the field require the application of new or previously disregarded theoretical frameworks for analyzing educational technology with attention to equity, social justice and inclusion. It is true that the problem of equity in education has been frequently reconstructed and that the terms equity, social justice and inclusion are not necessarily interchangeable although they are often used as such. North (2006) presented a detailed analysis of the discourse around the term social justice noting a sort of dualism within the field, citing the work of Fraser (1997) and O'Connor (2001) both of which recognized the relationship (and tension) between values of recognition and redistribution in working toward justice. Whereas many efforts at social justice focused on acknowledging injustice and considering diverse perspectives, others tended to emphasize a more economic perspective focused on redistributing resources and opportunities. In seeking to articulate a more expansive definition of social justice in education which fully accepts the importance of both values, North (2006) proposed:

...a reinvented human consciousness, borne from expanding and challenging our dominant notions of relationality and subjectivity, has the potential to develop political strategies that do not shy away from making generalizing redistributive and recognition claims but that also historicize, make subject to revision, and question the exclusionary forces of such claims (pp. 527)

Social Exclusion Theory (or, alternately, Social Inclusion Theory) presents another

potential way through which to explore issues of social justice in education. Globally, these terms have been used to articulate the ways in which individuals or groups experience barriers that work together to prevent them from participating in the community or developing their capabilities (Hills, LeGrand, & Piachaud, 2002). This theory has many connections with theories of social and/or cultural capital (Bourdieu & Passeron, 1977), although social inclusion theory tends to consider the ways in which barriers to physical, social and cultural resources *intersect* to prevent particular groups from gaining the full benefit of participation in society (Littlewood, 1999) while cultural capital theory is ostensibly less concerned with physical resources. This tension between socio-cultural and economic equity is echoed in Fraser's (1995) work seeking to understand social justice. While noting the interconnectedness of economic and cultural injustice, proposed that they called for distinct remedies, with economic injustice requiring a redistributive solution while cultural injustice requires a solution focused on recognition. The paradigm of Inclusive Education, then, seeks, in many ways, to unify what are often disparate yet related discourses around issues of recognition and redistribution, social justice and equity. Moving into the field of education, globally the term Inclusive Education has grown to represent a field that advocates for a holistic approach to ensuring educational justice for all students. In contrast to what may be framed as a focus on the remediation of social problems associated with the terms equity or social justice, Inclusive Education is a far reaching paradigm which advances access and achievement for all students as a primary goal via the elimination of exclusionary beliefs and practices.

While the ideas are not foreign, use of this paradigm is not as common in the United States where the term Inclusive Education has come to be commonly associated with the field of special education (Artiles, Kozleski, & Waitoller, 2011). Out of the history of the struggle for

students with disabilities to be educated alongside their peers, the tendency has been to view *inclusion* as a specific policy or an educational placement, and one that pertains only to students with disabilities. While a robust debate about the costs and benefits of this place-based notion of inclusion for students with disabilities continues to play out (Kavale & Forness, 2000), the theory behind Inclusive Education holds broader implications and many argue for a broader application of the term.

It is within these broader implications that this study finds its grounding. Answering Thomas' (2013) call for a "new kind of inclusive thinking", it will employ Waitoller and Artiles' (2013) definition of Inclusive Education as,

A global movement that emerged as a response to the exclusion of students who were viewed as different (e.g., students with disabilities, students of color, students from lower caste backgrounds, students from low socioeconomic backgrounds) by educational systems; these constructions of difference are highly consequential for they have mediated over time student access and participation in education (p. 321).

This expanded definition of Inclusive Education it asserts that because race, culture, or socio-economic status impacts the way in which students are sorted or excluded, then these factors must be addressed in building inclusion, promoting equity, and improving outcomes.

Thomas (2013) expands on the connection between diversity and exclusion via the application of gradient theory to inclusion, asserting that this process of sorting and exclusion is what prohibits many students from succeeding in education as it currently exists. He suggested that it is not necessarily the direct effect of poverty, race, or different abilities which causes problems for students but the value assigned to these statuses and the resulting devaluation of particular students which contributes to failure. To use students identified as having disabilities as an example, Thomas would suggest that a particular student's learning disability or ADHD does not inherently prevent them from gaining necessary knowledge and skills in school.

However, their performance compared with others, the resulting perception of deficiency and rigidity in the educational environment which expects all students to respond similarly to particular modes of instruction/interaction would likely cause barrier for this student. Slee (2011, 2001), Allan (2008, 2003), and Ware (2004) share in the construction of a more comprehensive vision for Inclusive Education. Common to these was the notion that meaningful participation in quality opportunities to learn requires educational structures (and educators) to strive for universal access while enabling that access via recognizing student differences and allowing for unique modes of instruction and interaction to facilitate this access. Given the ways in which a paradigm of Inclusive Education requires progress what might be considered a norm of differentiation and the redefinition of normalcy, analysis of whether such a paradigm has taken hold is one critical step toward measuring Inclusive Education as a whole.

It is important to note that the main goal of this review around Inclusive Education and the study that follows is not to insert itself into a debate about the best places or methods for educating particular students. Rather it is to support the notion that a certain type of inclusive thinking is, in fact, an essential feature of the types of social changes which must occur in schools in order for historically disadvantaged groups to find success. While there are certainly practices that are more or less reflective and supportive of such a belief system, assessment of the *quality* of these practices is not the goal of this study. Rather, it is a paradigm of or inclination toward inclusion, which emphasizes access and voice for students and families and the responsiveness of school environments, to which this study will refer. In an effort to bound this inquiry in order to make findings more reliable, this work acknowledges that inclusive attitudes and inclination toward Inclusive Education does not inherently imply that practices are inclusive. However, relying on literature from the field of sensemaking and studies on teacher

attitudes towards inclusion (Avramidis, Bayless, & Burden 2000; Avramidis & Norwich 2002; Silverman 2007), this study does make the assumption that inclusive practices are not likely to take hold among staff who are not inclined to support them and seeks to assess the degree to which technology influences this inclination.

Given the need for critical, in situ analyses of educational technology and given the promise of assessing equity through the lens of Inclusive Education this study seeks to further the work of Linda Darling-Hammond (2010) in exploring the critical role of equity as we reconceive education for the flat world. Using a framework suggested by Waitoller and Artiles (2013), this study will seek to assess the impact of 1:1 computer technology on teacher Inclination toward Inclusive Education in one school community by examining the presence or absence of movement toward:

- (a) the redistribution of access to and participation in quality opportunities to learn (redistribution dimension); (b) the recognition and valuing of all student differences as reflected in content, pedagogy, and assessment tools (recognition dimension); and (c) the creation of more opportunities for nondominant groups to advance claims of educational exclusion and their respective solutions (p. 4).*

This framework provides three dimensions through which to assess progress toward Inclusive Education which is based on larger principles of social justice. While each of these dimensions presents diverse opportunities for analysis, this study will focus on the degree to which teachers reflect concern for ensuring access for all students (even if this means that some students require additional resources), whether there is a norm of understanding and being responsive to student differences (a norm of differentiation), and whether student and family voice is valued and acted upon. Ultimately, this study seeks to understand the degree to which technology has supported growth in these dimensions or the degree to which a technology-supported educational paradigm is aligned with these dimensions.

In returning to the original premise that Inclusive Education could provide a new lens through which to examine the potential and actual effects of technology initiatives on promoting equity in schools, it is especially interesting to note the alignment between the dimensions described by Waitoller and Artiles (2013) and Weston and Brooks (2008) description of the features of the prevailing paradigm in education which technology-rich classrooms have the potential to disrupt: (a) non-differentiated large-group instruction, (b) access to information in classrooms alone, (c) non-engagement of parents, and (d) summative assessment of performance. A clear connection between the redistribution dimension and the diffusion of information beyond the classroom can be made, as can a strong connection between the recognition dimension and the dismantling of non-differentiated large-group instruction and summative assessment. Finally, a connection between parent-engagement and the creation of opportunities for non-dominant groups to advance claims of exclusion and solutions emerges. The strong theoretical connections between the promise of technology initiatives for building a more responsive, inclusive school environment and the principles of Inclusive Education, the strong empirical evidence to support the positive impact of technology on social outcomes for students, and the established assertion that such social outcomes are foundational to academic improvement all serve to warrant further explorations into the ways in which Inclusive Education and technology interact in the real world of policy implementation.

Despite these plausible connections, it is significant to note that given the multi-dimensional framework for Inclusive Education used here, it is plausible that growth toward a more differentiated and responsive school environment may not be reflected of an overall Inclination toward Inclusive Education if teachers continue to adhere to rigid definitions of normalcy. Thus, the degree to which responsiveness in answering questions of what and how

students should learn will be critical to my analysis. Given the ways in which the field of Inclusive Education places understanding of normalcy and diversity at its center, it makes sense that analysis of Inclusive Education would place teacher sensemaking at the center of that analysis. If the process of labelling, sorting and responding to diversity using a comparative or deficit model is a central driver of exclusion for students, it stands to reason that assessing the ways in which teachers view students and their role in responding to student diversity would provide data which is critical for understanding their overall inclination toward Inclusive Education. While, chapter three will establish a model which presents specific ways in which 1:1 laptop technology could foster Inclusive Education via its impact on teacher sensemaking, the following section will provide grounding in the area of sensemaking specifically before incorporating these ideas into a new conceptual framework exploring the relationship between technology and Inclusive Education.

Teacher Sensemaking: Critical Factors in Implementation

Literature has suggested that staff attitudes/beliefs and the ways in which they understand and respond to policy are an integral and overlooked factor in the implementation of educational policy. This body of organizational research provides grounding for the proposal that further examination into how teachers interpret and make sense of policies whether they relate to Inclusive Education, technology, or both is warranted. Deal & Celotti (1980) and Cuban (1993) among others have written about the ways in which teachers and individual classrooms can be largely shielded from outside reform efforts. This so-called “decoupling” of the classroom from the institutional environment of the school has been used to explain the failure of many reform efforts to fundamentally change classroom practices (Tyack and Cuban, 1995; Elmore, 1996). This image of the decoupled classroom holds strong implications for assessing how teachers

have responded to pervasive technology and explains much of what is known in regards to the implementation of technology in schools. Are teachers inclined and able to simply leave computers on the shelf? This theory also engenders questions for policies centered around inclusion. How do teachers interact with diverse students and families outside of formally sanctioned communication?

While the decoupled classroom has been a popular image of the relationship between teachers and institutions, recent literature has brought new dimensions to the understanding of how and why teachers respond to change in the school environment. Coburn (2004), highlighted the limitations of decoupling; data from her own research on teachers' implementation of changes in reading instruction suggested that, "the nature of teachers' interaction with messages plays a crucial role in the degree to which pressures from the environment influence classroom practice" (pp 235). As Coburn suggested, the degree to which the activity in particular classrooms is in line with or decoupled from policy intentions may be largely due to the ways in which teacher beliefs and practices interact with the messages they receive around that policy. Honig and Hatch (2004), discussed how policy coherence informs the way schools or individuals respond to external demands and suggested that policy must be co-created in a dynamic process in order for coherence to be achieved. Similar studies have also explored the ways in which formal and informal networks influence the ways in which teachers collectively understand, carry out, dismiss, or transform policy directives (Coburn, 2001), suggesting that sensemaking occurs at both the individual and group level.

Sutton and Levinson (2010) introduced the term appropriation to refer to the phenomenon that policy is not created and implemented in distinct phases but is dynamically interpreted, changes, and carried out by staff. This process, they argued, demands a sociocultural approach

to policy analysis. Rather than assessing how the policy was created or how it was implemented, research needs to find tools that explore the ongoing interactions between creation and implementation as policy plays out. Within this newer body of work around teacher sensemaking, we find a strong emphasis on the ways in which policy messaging and teacher interactions with the policy, administrators, and one another during implementation can hold strong implications for its ultimate result.

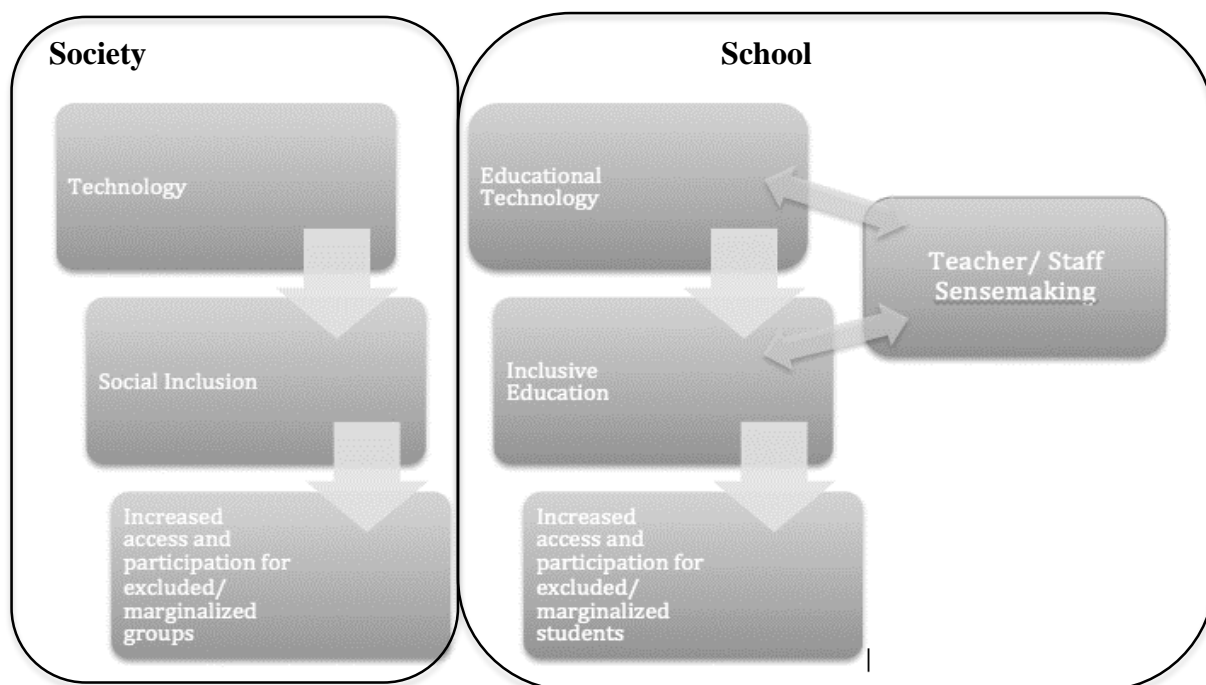
One final contribution to this body of literature comes from the field of psychology. Beyond organizational research, research into the ways in which individuals interpret and respond to challenges and difficulties has proven to be highly informative in understanding how teachers respond to policies that are disruptive or challenging in nature. Dweck (2006), described her finding that the degree to which individuals understand their abilities as fixed or malleable and the degree to which we interpret challenges as evidence of deficit or opportunities for growth largely determines our outcomes in responding to those challenges. Dweck coined the terms “fixed mindset” and “growth mindset” to describe these variations which are largely informed by early messages individuals receive about themselves and their abilities. She found that these inherent aspects of personality are critical, deeply-rooted, yet malleable. Although she did not explicitly make a connection between the ways in which these factors influence response to policy within an organization, a strong case can be made that understanding staff mindset and its interaction with policy messaging can suggest important factors to consider during implementation.

Taken together, this body of research suggests that whether we understand teachers as largely isolated from the organizational environment of schools or see them in dynamic interplay with the policy messages they receive, the relationship between teachers and reform cannot be

overlooked. Given that the proposed aims of policies relating to technology and Inclusive Education are relational in nature- that is to say that the goal for each approach is to change educational interactions- staff (and teachers specifically) are the key variable through which to examine the impact of these policies. The ways in which their beliefs/attitudes and their own classroom practices interact with policy messaging and interactions with other implementers and administrators is critical.

While the integration of three distinct fields of literature is no simple task, it is this type of scholarship that has been largely missing from the study of educational technology. The following graphic seeks to make explicit to hypothesized connections between the fields covered in this review and provide a warrant for their integration via the study proposed in the following chapter. In this visual explanation, I utilize the premise from general literature about the potential for technology to build social inclusion to suggest that a parallel relationship between educational technology and Inclusive Education could exist while teacher/staff sensemaking interacts with both technology and Inclusive Education policies in a bidirectional manner. The potential *product* in each of these chains of impact is an altered social environment with increased access and participation for previously excluded or marginalized groups.

Figure A: Rationale for Integration of Educational Technology, Inclusive Education, and Sensemaking



Research Questions and Conceptual Framework³

The preceding review of the literature has covered three areas of educational research- educational technology, Inclusive Education, and teacher sensemaking- which currently exist within largely independent spheres. The goal of this research is to illuminate existing connections between these areas of inquiry, policy, and practice in order to broaden the existing conversation around promoting inclusion in 21st century schools. The study which follows seeks to answer Selwyn's (2010) call for greater attention to the reality of how technologies are being used in schools and classrooms and understanding of the social context in which technology use is located by looking at the ways in which technology policies and others interact as they are interpreted and implemented. Specifically, this study employs a framework which suggests that the ways in which teachers make sense of the changes technology brings to the educational environment influences their inclination toward Inclusive Education. Using the experiences of those whose are experimenting with the profusion of technology in schools that serve historically marginalized populations, the study explores this notion through the following questions:

- 1) Do teachers in a successfully implemented 1:1 computer program reflect a technology-informed educational paradigm shift?
 - a. How do teachers generally feel about the program?
 - b. Do they report changes to student outcomes? If so, what are they?
 - c. Do they report changes to their practices with regards to assessment, differentiation, student access to knowledge, and parent engagement? If so, what are they?

³ Portions of this section are reproduced with permission and have been accepted for publication in: Gherardi, S.A. (Forthcoming). Social divides, digital bridges: Exploring the potential of technology in Inclusive Education in L. Miller, D. Becker, & K Becker (Eds.) *Technology for Transformation: The Confluence of Educational Technology and Social Justice*. Information Age Press.

- 2) Do teachers in this setting reflect an inclination toward Inclusive Education? If so, to what degree is this influenced by technology-informed paradigm shifts?
 - a. How do teachers appear to understand notions of normalcy and diversity in education and how do they respond to student diversity?
 - b. To what degree do teachers see their school as supportive of inclusive beliefs and practices?
 - c. To what degree do teachers feel a sense of efficacy in responding to diverse students?
 - d. Do teachers endorse the potential of technology in promoting Inclusive Education?
 - e. Do teachers endorse a positive relationship between technology and Inclusive Education?
- 3) What personal or organizational factors appear to influence teacher sensemaking around technology and Inclusive Education or the relationship between the two?

Answering these questions will require a structure for assessing how staff has interpreted the impact of technology as well as a structure for assessing staff attitudes and practices around Inclusive Education. To address the first need, I will rely on a framework outlined by Weston and Brooks (2008) who identified four areas that transformative implementation of education technology- specifically 1:1 programs- could fundamentally alter. These were: (a) non-differentiated large-group instruction, (b) access to information in classrooms alone, (c) non-engagement of parents, and (d) summative assessment of performance (Weston & Brooks 2008). Targeting these areas, this study can assess how much teachers use small group or other modes of instruction that do not require all students to work on the same product at the same level, the

degree to which laptops in this setting have allowed students to access information independently of the teacher and even outside of the classroom, the degree to which these technologies have increased teacher-parent communication or parent access to educational tools at home, and the degree to which technology has led to the development and use of formative assessment by teachers. By assessing teacher-reported changes in attitudes and practices these four areas, we can initially determine whether or not the technology policy in this setting has had a transformative effect in this setting.

In order to address the second area of inquiry, we will rely on the structure suggested by Waitoller and Artiles (2013), which draws on the work of Fraser (1997, 2008). While this structure relies on a broad conception of Inclusive Education which goes beyond the inclusion of students with disabilities and looks at all potential forms of exclusion, for the purposes of this study, our inquiry will be limited to exclusion (or inclusion) experienced by students on the basis of ability. Limiting the scope of the study in this way will help to ensure that common language around inclusion is shared between researcher and participants who may not have familiarity with an expanded definition of Inclusive Education. Furthermore, given that special education practices are typically the primary area of impact for policies aimed at promoting inclusion, if effects are not observed in this area of belief/practice, they are unlikely to be observed elsewhere.

Within these boundaries, the research will focus on the beliefs and practices of teachers with regards to Inclusive Education in each of the following areas (Waitoller & Artiles 2013):

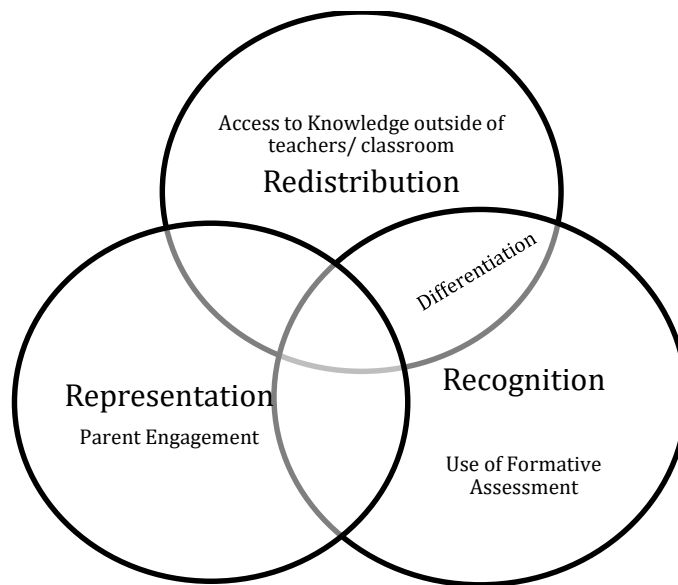
- 1) *Redistribution*: Do staff believe in, advocate for, and look for ways to allow students with disabilities access to modes of instruction, production, and social interaction which they had been previously excluded from? If so, how?

- 2) *Recognition*: How do staff members interpret and respond to student differences? Are differences in ability or development synonymous with deficit? Are differences ignored or covered over? Are differences recognized along with student strengths?
- 3) *Representation*: Do staff members believe in, advocate for, and look for ways to allow students with disabilities increased representation and voice in the school community? If so, how?

Within each of these questions, we will also be seeking to understand whether the existence of technology or the instructional changes that have occurred as a result of specific technology implementation factors have promoted or inhibited these aspects of Inclusive Education.

The conceptual framework upon which this study is built begins with the possibility that the infusion of technology into the school environment could bring with it a paradigm shift which disrupts traditional modes of instruction and interaction in schools (Weston & Brooks 2008) ultimately impacting inclination toward Inclusive Education in staff. It is not difficult to see the ways in which the activities that would characterize such a shift- differentiation, formative assessment, parent engagement, and access to knowledge outside of the classroom (Weston & Brooks 2008)- could also characterize three key features of Inclusive Education: redistribution of access to quality educational activities, recognition of student differences, and representation of previously excluded groups/voices (Waitoller & Artiles 2013). Figure B lays out the ways in which the activities of a technology-transformed paradigm could fit neatly within each of the dimensions of Inclusive Education.

Figure B: Confluence of Inclusive Education and Features of Technology-Supported Educational Paradigm



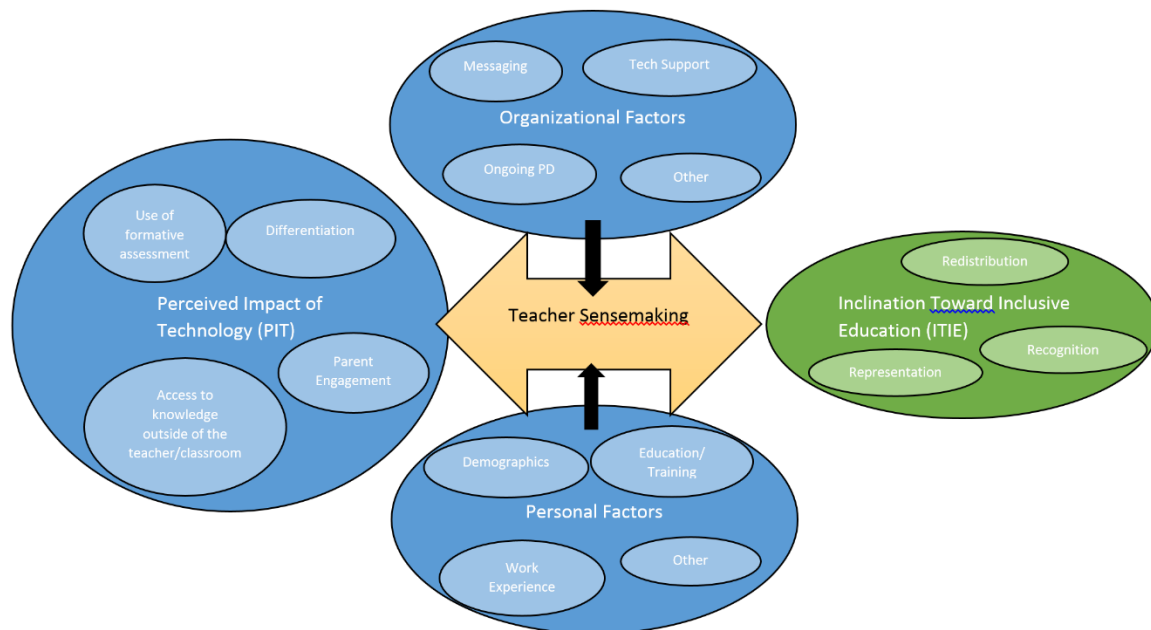
This figure serves to highlight the ways in which technology-supported disruptions to dominant paradigms of teaching and learning can also be representative of the types of disruptions necessary for Inclusive Education to take hold. If the confluence of these two areas proposed in this model is correct, it is possible to envision the ways in which new “core practices” of the technology-rich school or classroom could promote Inclusive Education in that setting. As such, staff members who adopt these new paradigms due to the infusion of technology may be adopting inclusive practices, without knowingly doing so. This framework assumes that the technology policies in question are not simply the presence of computers, other devices or software, but rather a technology agenda which seeks to transform the learning environment via differentiation, broadened access to knowledge, parent engagement, and formative (vs summative) assessment. It is suggested that if this type of reform is able to take hold, the ways in which teachers make sense of these changes could have the effect of supporting the tenets of redistribution, recognition, and representation for students with disabilities and

difficulties as well as other diverse learners. As Rose and Meyer (2008) suggested, “students ‘on the margins’ for whom current curricula are patently ineffective can actually lead the way to true reform because they help us understand weaknesses in our educational system that impede teaching and learning for all...” (pp14).

However, given what we know about the centrality of teacher sensemaking to the ways in which they carry out any policy, one would be hesitant to characterize a setting in which people are acting in ways which might align with inclusive practices but are not themselves inclined toward Inclusive Education (in their attitudes, sentiments, and concerns) as an inclusive place. Indeed, teachers’ understandings of what Inclusive Education means, their feelings toward it, and their socially negotiated practices around it are central to the ways it is manifest in their setting (Ainscow 2005). The question then becomes whether teachers make sense of new modes of teaching, learning and interacting (which have been introduced and supported by the infusion of technology in to their environment) as inclusive, and whether their experiences with these changes has impacted their own inclination toward Inclusive Education. Put simply, teachers may be changing the way they practice, but what do they think about these changes? How do these changes influence the way they think about their approaches to diversity in their classrooms- especially as it relates to students with disabilities and difficulties?

Figure C seeks to represent the potential relationship between the perceived impact of technology (PIT), teacher sensemaking, and inclination toward Inclusive Education (ITIE) while recognizing the contribution of both organizational and personal factors to the process of teacher sensemaking.

Figure C: Proposed Relationship between Technology, Sensemaking, and Inclusive Education



This model begins with the variable of perceived impact of technology (PIT). While this variable could easily be categorized as simple technological impact, because this study is focused on teacher self-report and sensemaking around policies and practices, it will be examining whether teachers report or perceive impact in these areas as a result of the 1:1 program. As the model suggests, if these changes are reported by teachers, the ways in which they interpret the changes could influence their inclination toward Inclusive Education. Although this study is ultimately interested in whether it promotes an inclination toward Inclusive Education, it is possible that the effect is neutral or even adverse. Thus, one element of the model that this study will test is whether the relationship exists and, if so, what direction it goes in. It is important to note that sensemaking here is a bi-directional arrow, suggesting the possibility that if inclination toward Inclusive Education is affected, this could result in a sort of feedback loop, reinforcing

the technology-support practices identified in the PIT bubble just as these practices continue to support the paradigm identified in the ITIE bubble. Finally, the model highlights the ways in which organizational factors surrounding policies as well as personal factors inevitably impact sensemaking and seeks to identify which particular factors are most salient within each bubble. As this study unfolds, it will seek to determine whether the relationships proposed in this model exist, and, if so, to assess their directionality.

Any evidence regarding the nature of these complex relationships is most likely to be found within the walls of schools that are currently engaged in the work of implementing significant technology initiatives that also have a commitment to Inclusive Education. While an increasing number of schools and districts have begun to adopt policies that promote the use of technology in the classroom, the number who have committed to pervasive technology (through the implementation of programs such as 1:1 initiatives) remains a minority. For those that have, they are often highly observed and scrutinized to assess whether their significant investment in technology has paid off in terms of student performance- specifically, student performance on standardized tests. While this metric is unlikely to go away, there is also a growing trend toward using more qualitative methods to assess the ways in which these programs actually impact the type of instructional interactions that occur in that setting. Still, the focus of these projects tends to be evaluative in nature, asking “is it working?” rather than “what is the impact it is having?” This tendency limits researchers’ abilities to assess potential unintended consequences (positive and negative) of technology policies, something that is critical to policies which are in their early stages of evolution. Furthermore, the relationship between changes in technology implementation and other co-occurring initiatives has been largely ignored, again narrowing our understanding of the way technology influences the school environment broadly.

A sufficient body of literature exists to establish some critical features of utilizing educational technology in ways that bring about changes for the way students interact with teachers, with one another and with content. What has not been established is whether even transformative implementation of educational technology manages to transform learning and, ultimately, opportunity, for the students who may have been marginalized by dominant educational paradigms of the past. Even in those places where technology initiatives are determined to be “working”, questions such as “working for whom?” or “working for what?” have not been asked. It is here that this study finds its grounding. If technology will be critical to social inclusion in an increasingly “flat” world, how is it impacting the beliefs and practices of educators around Inclusive Education? The study described in the following section seeks to exploit the success of one school district lauded as a model school for its implementation of 1:1 laptop technology in order to begin articulating answers to these questions.

Methods

Case Description- Southern School District⁴

Case Study Rationale. While educational research's frequent reliance on naturally occurring data sets can pose a dilemma, the close examination of educational practices and outcomes as they naturally occur can also provide rich, complex data sets that may not be available via strictly experimental or quantitative methods. The experience of one school district, referred to here as Southern School District, with 1:1 implementation comprised one such data set which provided an ideal space in which to seek answers to the questions articulated in this study. Because this study sought to determine the plausibility of an initial hypothesis- that the attitudes and practices required for transformative implementation of education technology may promote positive attitudes and actions around Inclusive Education- a single case study presented a logical structure for this inquiry (Yin, 2008). This choice presented limitations. The study was not be able to suggest the statistical causality of any relationship observed, nor was it able to suggest that such a relationship will be or should be observed elsewhere. Rather, it was an effort to understand the dynamics that come into play as technology interacts with Inclusive Education so that those factors can be considered in further research, policy or implementation. Despite the inability to make clear causal statements, this case study can draw conclusions about the ways in which staff make sense of the relationship between technology initiatives and technology and extrapolate ways in which this process of sensemaking reflect factors related to implementation and impact the outcomes of these policies.

⁴ Portions of this section are reproduced with permission and have been accepted for publication in:

Gherardi, S.A. (Forthcoming). Social divides, digital bridges: Exploring the potential of technology in Inclusive Education in L. Miller, D. Becker, & K Becker (Eds.) *Technology for Transformation: The Confluence of Educational Technology and Social Justice*. Information Age Press.

Site Selection. In order to answer the questions articulated in this study, it was necessary to identify a school setting that is currently in the process of implementing a significant initiative with regards to educational technology but is also committed to Inclusive Education. Southern School District (SSD) is a mid-sized district just outside of a large, urban center serving students in grades pre-kindergarten through eight. At the time of this study Southern was in its third year of implementing a district-wide Apple 1:1 (one internet-enabled device for every student) laptop program; all students in grades 1-8 were assigned MacBooks while kindergarten students were assigned iPads. The district earned national recognition as a Distinguished Program by Apple Education and frequently cites this award in its publications and messaging to staff, community members, and others. It is important to note that this award does not reflect outcomes related to technology but is given based on the ways in which technology-based initiatives are implemented with attention to whether schools and districts reflect five practices deemed critical within the “Apple Ecosystem”; they are visionary leadership, innovative learning and teaching, ongoing professional learning, compelling evidence of success (the use of data to measure progress), and flexible learning environment (Apple in Education, 2015). Programs are invited to submit an iBook presenting their program and the ways in which it demonstrates these practices in order to be considered for distinguished status. Thus, while the award reflects a high degree of implementation fidelity in the ways that Apple deems critical for effective 1:1 usage, it does not inherently imply that this level of implementation has impacted student or staff outcomes.

The district has been committed to building a more inclusive approach to student differences through the implementation of new policies relating to special education and intervention for struggling students, especially over the last 5 years. Perhaps the most significant

reason for selecting SSD is that this predominantly low-income, predominantly Latino district had attained status as a model for the implementation of 1:1 technology while simultaneously pursuing Inclusive Education as a goal. As such, this place presented as a unique natural laboratory in which to explore the interplay of technology and Inclusive Education. Through probing the perceptions and experiences of staff at Southern as they have implemented the 1:1 program and continue to implement policies to promote Inclusive Education, this study was able to deeply explore the ways in which technology serves to promote or inhibit Inclusive Education in this setting and the factors that contribute to this effect.

Several unique features of Southern make it an ideal site for the study of the interaction between inclusion and technology. Geographically, its location just outside of a major city represents the changing face of what has been traditionally referred to as *urban* (Wacquant, 2008) education. Studies exploring social inclusion have historically focused significantly on urban centers experiencing a high degree of social problems or rural locations which are geographically excluded. However, in the US, poverty and many other related social problems- which had been euphemistically described as *urban* have increasingly migrated to the suburbs (Kneebone & Berube, 2013); from 2000 to 2010, the number of poor individuals living in the suburbs rose by 53% while the poor population in urban centers grew by 23%. While the growth in both areas is concerning, little has been done to specifically address the rapid changes in the economic reality of many suburbs.

Demographics. Indeed, several features of the Southern School District trouble the notion of what “suburban” schools really look like. The district as a whole is comprised of approximately 4,000 students about 80% of whom are considered low income. In terms of the racial/ethnic makeup, 80% are Hispanic, 4% are black, and 10% white; 25% of students are

considered English Language Learners and the district has 13% mobility (Illinois School Report Card, 2015). Despite being a “suburban” district, funding for Southern and all of the schools in the district is lower than the state average with an annual per pupil instructional expenditure of \$6,500 and an operational expenditure of \$11,000. For reference, the large, urban, neighboring district has a population which is 85% low-income, 45% Hispanic, 40% Black, and 10% white with 18% English Language Learners and 17% mobility (Illinois School Report Card, 2015). Despite the reputation of urban districts as having significantly fewer resources than their counterparts, the urban district neighboring Southern has an instructional expenditure of \$10,000 and an operational expenditure of \$15,000 per pupil annually. It is within this context that Southern’s uniqueness is apparent. Although it is technically suburban, it is demographically very similar to frequently studied urban districts. Even more interesting, it expends significantly fewer dollars than both the neighboring urban district and most neighboring suburbs, although it is the only district in the immediate area, which has committed to a 1:1 model for education. Table 1 provides a comparison of demographic characteristics and per-pupil spending between Southern School District and a neighboring large, urban district.

Table 1: Comparison of Southern District and Neighboring Urban District⁵

		Southern School District	Neighboring District
Student Race	Hispanic	80%	45%
	African American	4%	40%
	White	10%	10%
Student low-income %		80%	85%
English Language Learners %		25%	18%
Mobility		12%	17%
Per-Pupil Spending		\$16,500	\$25,000

⁵ Numbers rounded to protect identity of school district

The district's demographic history also provides a unique opportunity to study the ways in which school staff respond to diversity. While limited long-term data on the racial makeup of the community is available, state reporting indicates that the number of Latino students has increased by about 1% per year over the last five years. Moreover, staff who have worked in the district for 15 years or more describe what has been an almost wholesale reversal in student demographics. Whereas they recall a population that was 75-80% white 15-20 years ago, it is now 75-80% (or more) Latino. Furthermore, the percentage of low income students has increased 10% over the last 5 years alone and staff report an economic shift of the same magnitude as the racial changes noted over a longer period of time. While many would describe this place as welcoming of diversity-the city brands itself as such-this change has not always been met with open arms. Many staff described the struggles of the community to adapt and respond to its changing population and there are undoubtedly geographic and social divides in the community between newer, poorer residents and white middle-upper class individuals who have been in the community for decades or more.

The Policy Environment in SSD

The district began piloting the 1:1 program in selected first grade classrooms in each school during the 2010-2011 school year. In the 2011-2012 school year, students who had used the laptops the previous year were again placed in 1:1 second grade classrooms while several other first and fifth grade classrooms were added in every school. By 2012-2013, the decision to go with a fully 1:1 educational program was made. Students in grades one to eight were each assigned a MacBook laptop while kindergarten students were assigned an iPad. Devices were all fully enabled with wireless connections throughout school buildings. Students whose families were able and opted to pay an \$80 insurance fee per device were allowed to bring devices home

with them daily. In the first year of the program this fee was waived for homeless families; in the second year, the district emphasized payment plans and provided assistance on a case-by-case basis. In the 2012-2013 and 2013-2014 school years, the district was nationally recognized as an Apple Distinguished Program by Apple computers as an education program that is using Apple products to innovate education.

Several other policy decisions made by the district prior to implementation of the 1:1 plan also contribute to its status as a strong site for collecting data around the impact of technology on Inclusive Education. Six years ago, the district committed to a new approach to discipline and promoting positive student behavior by adopting the principles of PBIS (Positive Behavior Interventions and Supports). As opposed to zero tolerance or other approaches to discipline that have seen increased adoption over the past decade, PBIS focuses on teaching students behavioral expectations, providing positive recognition, and changing staff attitudes and behavior in order to positively impact students. Through the use of PBIS, schools seek to build a more inclusive environment where students who present with challenging behaviors are given increased support and attention rather than the routine responses of detentions, suspensions, or expulsions. While these responses still occur at Southern, their commitment to PBIS has also meant an articulated desire to reduce them while reducing the overall impact of challenging behaviors on school settings.

Perhaps most directly-related to Inclusive Education, the district began moving toward a co-teaching model for providing special education services over the last 5-6 years. This model replaced traditional resource rooms (classrooms staffed by special educators where students with disabilities would go for part of the day to receive specialized instruction) and several self-contained special education classrooms (classrooms taught by special educators in which only

students with disabilities were assigned and would spend all or the majority of their school day). By the 2011-2012 school- year, the district had a co-taught classroom at every grade level where students with mild-moderate disabilities received extra support from a special educator in a classroom with their peers while four small classrooms remained in order to provide extensive support to students with significant cognitive disabilities and often co-occurring physical/medical needs; a small number of students (generally students with significant cognitive or behavioral disabilities) remained placed at private schools outside of the district due generally to parent preference. This meant that 6 students were placed out of district and 34 students were placed in more restrictive classrooms within the district out of the enrolled population of 4,020; this represented 11% of the students with diagnosed disabilities or 1% of the district population as a whole. In addition to the staffing and placement changes that co-teaching brought, the district invested significant time and attention to training special and general educators about effective practices in this type of a setting and continues to articulate a desire to ensure that students are in the most inclusive environment possible. Since the initial shift to co-teaching, two additional classrooms have been established which serve students with severe emotional disabilities. While this may represent a shift back to the more exclusive mode of education, it is notable that many of the students in these rooms had been or were going to be placed in alternative school settings. Thus, while they have remained in separate classrooms for much of their day, they have remained included in their community school setting.

These two co-occurring policy initiatives serve to highlight the district's willingness to adopt policy measures that were at least oriented toward inclusive approaches to education. While this was helpful in establishing the fact that this site was ostensibly concerned with inclusive practices and saw their 1:1 initiative as another step in that direction, the ways in which

these policies interacted made it more difficult to isolate the effects of technology from the effects of PBIS and/or co-teaching on teacher inclination toward Inclusive Education. Thus, the study relied on content analysis in which participants were asked to make explicit ties between technology. Furthermore, it assessed the degree to which technology supported or inhibited these other policies and their aims.

This brief snapshot of the demographic and policy environment in SSD outlines its strengths as a site for study. As a place that has already earned accolades for the ways in which it has implemented a move toward pervasive educational technology, there was much room to explore the ways in which this endeavor influenced other factors there. We know that schools often engage in multiple concurrent approaches to improvement; often with a common goal in mind. At SSD, the rapid influx of pervasive technology and the slower but still significant commitment to Inclusive Education (at least where discipline and special education were concerned) were an example of this. The literature supports the notion that each of these approaches may hold promise for increasing social inclusion and, ultimately, promoting educational equity. The study described in the following section outlines specifically, how the researcher sought to use the experiences of SSD to understand this relationship.

Data Collection

This study utilized the traditional model of an exploratory single case study in order to fully analyze the features and experiences of Southern School District which represent a unique occurrence used to create a working articulation of a phenomenon in this setting (Yin, 2009). Specifically, by probing the experiences of staff at Southern, this study sought to establish a working model of the relationship between technology integration and Inclusive Education in a setting which has achieved widespread recognition for its implementation of 1:1 technology.

Such a model may be applied in further research to determine the degree to which Southern's experiences are unique or have relevance to schools serving similar populations or may be used to further the theoretical literature base around technology and equity. In order to fully explore this setting, data collected reflected a mixed-methodology given the desire to explore issues of technology and Inclusive Education both broadly (district-wide) and narrowly (by groups and individuals).

Preliminary data sources: Documents, principal interviews, site visit. Documentary data and principal interview were the initial data sources for this study. School-board minutes, website text, presentations given by district to share their experiences with outside groups, and information given to parents about the program were collected and analyzed in order to articulate key features of the policy's design, implementation plan, and current messaging. Additionally, the results of a yearly internal survey which deployed to assess the degree to which staff members consider their own use of technology to be transformative (used to modify and redefine learning tasks rather than simply replacing or augmenting existing instructional methods) was reviewed.

These data, in conjunction with an initial principal interview, were aimed at gathering a broad picture of how the initiative came about, how it has been implemented, how it is presented, how staff have responded, and the administration's perceptions of its effects on the district generally and on particular student and family groups. Initial interviews with school principals were conducted in order to 1) gain entry into each school as a research site and 2) provide school-specific context regarding the 1:1 program and the general approach to Inclusive Education in that building. Six of the eight district principals were interviewed with the remaining two not responding to interview requests or being unable to meet at scheduled times

after multiple attempts. The sample protocol for principal interviews is included in Appendix B although interviews were purposefully semi-structured to allow for further discussion of issues unique to each building or administrator as they arose. Principal interviews also provided an opportunity for the researcher to schedule a time at which the next research phase (staff survey) could be presented to staff in person. One additional administrator interview was conducted with the district administrator in charge of the 1:1 program. This individual had been largely responsible for the introduction of 1:1 laptops as a teacher who had piloted such a program and was subsequently instrumental in the program as it evolved district-wide. Because her efforts were critical in the decision to implement and her leadership a key driver in the process of implementation, this interview provided critical background information regarding the goals of the program and critical factors in its implementation.

The researcher also participated in a conference devoted to educational technology sponsored and run by Southern School District. The two-day event consisted of school site-visits, speakers, administrative panels, and focus sessions which discussed the district's experiences with 1:1 technology as well as broader issues around the implementation of such programs. Most participants were from schools or districts in the surrounding area (or nearby states) seeking to implement 1:1 programs. During the site visit portion of the conference, the researcher elected to visit the two schools for which principal interviews were not available which afforded a chance to meet these administrators and ask some general questions in addition to the opportunity to visit classrooms in their building. Field notes were taken during site visits and sessions.

Survey data. Upon completion of the principal interview phase, an online survey (Appendix E) was administered to the teaching staff in the district in order to assess the general

perceptions and responses to the 1:1 program. A link to the survey was sent via the district teacher list-serve soliciting participation. The researcher also attended staff meetings at five of the eight schools in order to explain the study and solicit participation in person; the remaining three schools did not respond to requests to request participation in person. Initially, staff were offered the opportunity for their names to be entered in a drawing for two \$25 Amazon gift cards upon survey completion, and the school staff with the highest percentage of participation was offered a breakfast provided by the researcher. After one month, survey results were reviewed and follow-up solicitations sent to schools which had low participation; follow-up solicitations offered the opportunity to win two additional \$15 gift cards. Names were not collected as part of the survey although staff who were interested in the gift card incentives could make the choice to email to request to be entered in the drawing. While this did reveal the names of some staff who participated, they were self-disclosed and names were disaggregated from survey responses.

The survey (Appendix E) included four major components. The first, demographic data, gathered information about staff characteristics that could potentially impact their interaction with both the technology and inclusion policies. This included items relating to race, linguistic background, type of teaching assignment, school assignment, previous experience in the district and elsewhere, and educational background; in order to ensure that data is not identifiable, staff will be asked to respond by selecting where they fall into pre-identified groups. For example, when asking about their current assignment, categories of pre-k through 1, 2-3, 4-5, and 6-8 will be offered rather than asking for an exact response. It is acknowledged that this method still allows the possibility that participants could be identified via their unique constellation of demographic responses. Knowing this, only the researcher had access to disaggregated survey responses and only aggregated data is included in the findings.

The second section of the staff-wide survey included a brief series of items regarding the nature of technology use in the district. Information from this section was intended to provide a picture of how often teachers are relying on technology, the degree to which students were using school-provided devices both in the classroom and at home, and the degree to which students in the district had access to both devices and internet connectivity at home. Naturally, soliciting this information via teacher survey was not intended to provide reliable data regarding the nature of student use outside of school but to provide a picture of how teachers see their own technology use interacting with use outside of school. While survey data was expected to vary, the extreme amount of variance on these items rendered this section less useful than anticipated and results from this section were insufficient to draw meaningful conclusions.

A third section of the survey sought to assess how teachers have made sense of their own experiences with the 1:1 initiative. Opinions of the program upon introduction and currently were solicited as well as opinions regarding the effectiveness of tech support, training, and infrastructure in the district. Using a framework which suggests four ways in which educational technology has the potential to transform schools, the survey included multiple items which asked teachers to rate the degree to which they felt that 1:1 technology had changed or improved differentiated and small-group/individualized instruction, the ability to access information and instruction outside of classrooms and teachers, engagement of parents, and use of formative rather than summative assessment (Weston & Brooks, 2008). The majority of these questions required responses with a 5-point scale reflecting the degree to which they agreed or disagreed with various statements regarding the impact of technology on their teaching, their school, and their students. This section also included one open-ended item. Here, respondents were asked to describe their experiences with the 1:1 program, how it has impacted them and their students,

and any positive changes or challenges it has brought. This item provided the opportunity to gain some context for survey results from a larger number of people than could be solicited for interviews.

The final section of the survey utilized a similar design while focusing specifically on issues relating to Inclusive Education. This section consisted largely of items asking respondents to provide information about their attitudes toward particular student groups and specific relationships between technology and particular aspects of student identity or potential sources of exclusion. This included soliciting information about teacher sentiments toward different socio-economic, racial, ethnic, linguistic, or ability groups and teacher beliefs around the appropriate role of schools/teachers in responding to diverse needs that these groups may present. It also sought to assess teachers own sense of efficacy in working with diverse students. This section also included items asking respondents to assess the degree to which their school as a whole reflected an inclination toward principles of Inclusive Education; the goal of these items was to attempt to provide some data regarding the school climate separately from the individual's own inclinations in order seek to address the degree to which responses reflected personal or organizational factors.

Because of the frequent confluence between the term Inclusive Education and the idea of inclusion as the placement of students with disabilities in general education classrooms and because Southern School District has been explicit about its efforts at promoting *inclusion* of students with disabilities in this regard via co-teaching, the survey included several items from the SACIE-R (Sentiments, Attitudes, and Concerns about Inclusive Education Scale- Revised, Forlin, Earle, Loreman & Sharma, 2011). This scale has been primarily used to assess pre-service teachers' attitudes toward Inclusive Education with regards to students with disabilities

and difficulties. While it draws on an earlier scale which had been more strongly tested for validity (ATIES: Attitudes Toward Inclusive Education Scale, Wilczenski 1995) the SACIE more closely measures the complexity of sensemaking as it addresses three factors in teacher responses to Inclusive Education:

- 1) Sentiments: measures staff core feelings about differing abilities
- 2) Attitudes: measures staff beliefs about Inclusive Education
- 3) Concerns: measures staff concerns/apprehensions about implementation

Thus, rather than simply asking whether or not teachers support a policy, the scale provides a way to assess whether attitudes toward inclusive attitude are primarily related to core sentiments or implementation concerns which will support the aim of identifying factors which contribute to observed patterns in sensemaking. Questions around specific sentiments, attitudes, and concerns were be taken from the SACIE-R with the addition of questions which ask respondents to assess whether concerns and attitudes are impacted by the availability and implementation of 1:1 technology.

Staff interviews. While survey data provided a broad picture of the ways in which teachers at Southern had responded to technology, their attitudes toward Inclusive Education, and their beliefs about the relationship between the two, it offered only limited insight into understanding how these patterns of sensemaking emerged and what factors might have contributed to them. In order to provide context for survey findings, teacher interviews were solicited at the end of the survey and via direct email requests. While initial requests were aimed at providing a broad picture of experiences across the district, additional interviews were directly requested as a result of survey and/or interview results. For example, when it became clear that one school was in the process of making changes to the way it provided instruction for students

with disabilities, the researcher sought to ensure that a special educator from this school was interviewed. Similarly, when one interviewee provided strikingly different responses than others in the same position at different schools, additional interviews in that respondent's school building were solicited in order to seek to triangulate responses. It is understood that these approaches to participant selection cannot ensure either full representation or full triangulation of responses; however, they were successful at providing access to the experiences, thoughts, and sentiments of a wide range of staff while also allowing the researcher to investigate unforeseen issues that arose via the data collection process. On the whole, interview respondents represented a diverse group in terms of demographic characteristics (age, gender, race, linguistic background, experience, and education) and in regards to the schools/positions in which they were placed. Table 1 presents interview participant characteristics.

Interview participant selection ran concurrently with the interview phase of the study. Interview participants were largely self-selected via response to an online request for participation. Still, two participants were solicited directly by email in order to obtain representation from previously unrepresented grade levels or schools. In all, 16 teacher interviews took place; most were conducted individually although three interviews were conducted with two individuals simultaneously; this was done in situations where two teachers (one special education and one general education) were co-teaching in one classroom and both expressed desire to participate in interviews but had limited availability to do so individually. While this may have limited some ability to express uniquely personal opinions, it allowed for more in-depth exploration of the co-teaching relationship which represented a significant aspect of Inclusive Education for students with disabilities in the district. Overall, 19 teachers participated in interviews with interview group demographics described in Table 2.

Table 2: Interview Participant Characteristics

Demographic Characteristic	Category	Number of Participants
Gender	Male	2
	Female	17
Position	ESL/Bilingual	2
	General Education (not co-teaching)	4
	General Education (co-teaching)	5
	Special Education (self-contained)	3
	Special Education (co-teaching)	5
Grade Level	k-1	4
	2-3	7
	4-5	3
	6-8	2
	Multiple Grade Levels	3
Home School*	A	3
	B	4
	C	0
	D	6
	E	3
	F	1
	G	2
	H	0
Education	Bachelors	7
	Masters	12

*Home school denotes school where individual primarily worked

While participants were allowed to select the time and setting of their choice, all but two were conducted before, during, or after school in the participant's classroom; two participants met the researcher for coffee on a weekend at a time and place of their choosing. Informed consent protocols were reviewed verbally prior to interviews and participants signed prior to any discussion; participants were provided a copy of informed consent at the conclusion of the interview if possible or were emailed a scanned version that evening if necessary. While the interview consisted of a semi-structured protocol (Appendix G) to ensure that perception of

technology, inclination toward Inclusive Education, and the school's approach to Inclusive Education would be covered in each interview, flexibility was allowed to explore unanticipated issues that arose in discussion. For example, teachers working in specialized programs or teachers with unique backgrounds often presented novel ideas which were explored before progressing through the protocol; at times, the nature of a teacher's position (such as teachers in highly specialized programs) rendered aspects of the protocol less applicable, and they were skipped or modified. Interviews generally lasted between 30 and 60 minutes, and interview participants were provided \$15 Amazon.com gift cards in appreciation of their time. Interviews were recorded and later transcribed for analysis.

Data Analysis

Survey analysis. Here, it is important to highlight several general notes regarding responses to the staff survey in order to inform approach to analysis and, ultimately, the results from the survey. The first note concerns the rate of response for the staff-wide survey. In all, the survey was administered to 268 email addresses included on the district's list-serve of certified staff. Upon review of each school's staffing roster, it was determined that 9 of these individuals were currently on-leave or were no longer in their position in the district. An additional 7 staff members were screened out because they were preschool teachers and the preschool programs in the district did not have access to 1:1 technology. Thus, a target population size of 252 was established. Because these individuals represented the entire population of interest for this study, calculations suggest that in order to maintain a 5% margin of error at the 95% confidence level, at least 159 responses would be required. Despite multiple attempts at requesting via email, in-person solicitation, and the provision of incentives for participation, only 112 valid responses were obtained with 12 responses representing duplicates or containing omissions

which invalidated them. This number suggested that the confidence interval regarding sample representation was limited to 85%. However, the overall response rate of 44% was higher than the average response rate for email surveys in research of 33% (Nulty, 2008). Still, establishing a significantly representative sample size would have been desirable in strengthening the power of conclusions drawn from this data.

Given the difficulty in accessing additional survey responses, a different approach to assessing the survey response rate was utilized. This approach utilized the descriptive statistics and frequencies observed in the data which was collected in order to assess whether the sample appeared to be fundamentally biased or whether it could reasonably be presumed to represent the population in the district. This approach used demographics ascertained from the school's staff listings and the Illinois School Report Card and district website, comparing them with the demographic information collected by survey respondents (see Table 3). These numbers cannot be considered completely accurate as racial/educational background was only available for 2013-2014 and may have changed. Additionally, the use of websites listing staff to count the number of individuals in given schools or positions may have differed from staff self-reporting in some areas; for example, some classroom teachers were placed in bilingual classrooms with instruction occurring in Spanish; it is not possible to determine whether these teachers self-identified as bilingual/ESL teachers, classroom teachers, or both on the survey so fully accurate comparison is difficult. One significant weakness in terms of assessing representation was the omission of a survey item relating to respondents' gender which rendered the researcher unable to analyze representation by gender. A full comparison of demographics between the self-selected survey sample and the entire district certified staff is outlined in Table 3.

Table 3: Staff vs. Survey Respondent Demographics

Demographic Characteristic	Percentage of Certified Teaching Staff *	Survey Participant (Valid) %	Difference (+/-)
Racial/Ethnic Background: White	91.2%	84.7%	-6.5%
Racial/Ethnic Background: Black	.3%	1%	+7%
Racial/Ethnic Background: Hispanic/Latino(a)	8.1%	10.5%	+2.4%
Racial Ethnic Background: Asian	0%	1%	+1%
Racial Ethnic Background: Am. Indian	0%	1%	+1%
Racial Ethnic Background: Other	0%	1.9%	+1.9%
Racial Ethnic Background: Multiple	0%	0%	-0%
Racial Ethnic Background: Not Reported	.3%	0%	-.3%
Educational Background: Bachelor's Degree	38.4%	32%	-5.6%
Educational Background: Master's Degree	61.3%	66%	+4.7%
Position: General Education	47.3%	53.8%	+6.5%
Position: Special Education	21.7%	19.8%	-1.9%
Position: ESL/Bilingual	9.2%	5.7%	-3.5%
Position: Reading Specialist	6.5%	3.8%	-2.7%
Position: Specials Teacher (art, music, gym)	9.8%	6.6%	-3.2%
Position: Other Certified Staff	5.9%	8.5%	+2.6%
Grade Level: k-1	19.1%	18.9%	-1.2%
Grade Level: 2-3	21.7%	19.8%	-1.9%
Grade Level: 4-5	18.4%	17.0%	-1.4%
Grade Level: 6-8	23.8%	20.8%	-3%
Grade Level: Multiple	18.4%	22.6%	+4.2%
*Home School: 1	11.9%	29.2%	+17.3%
*Home School: 2	12.6%	18.9%	+6.3%
*Home School: 3	8.7%	1.9%	-6.8%
*Home School: 4	9.5%	13.3%	+3.8%
*Home School: 5	11.5%	4.8%	-6.7%
*Home School: 6	12.3%	12.4%	+1%
*Home School: 7	13.0%	7.6%	-5.4%
*Home School: 8	13.9%	7.6%	-6.3%
*Home School: Multiple	3.5%	3.8%	+.3%

*Home school denotes the school in which the staff member worked

In regards to racial makeup, educational background, years of experience and type of teaching assignment, survey respondents were within 5-6% of the district population as a whole suggesting a reasonable margin of error in representation. However, a major area of discrepancy existed in regards to respondents' home school. While there are eight schools in the district, the majority of respondents came from five schools; not surprisingly, these were the five schools which granted the researcher in-person access to staff to solicit survey participation. The remaining three schools did not have direct contact with researcher and reflected significantly lower rates of participation as a result. Indeed, one school was significantly over-represented most likely due to the strong support of the administrator in this building for the research project; while other administrators provided the researcher an opportunity to speak regarding the survey, this individual allowed a meeting time devoted to the completion of the survey (while researcher and administrator were out of the room). Although it was emphasized that people could decline participation by responding no to the informed consent page, the allowance of devoted time highly encouraged participation and likely resulted in a high degree of response in this building. It was encouraging to note that respondents from the researcher's home school were not overrepresented thus minimizing the impact of bias due to existing relationships with the researcher in regards to survey sample.

Overall, it is difficult to assess the potential impact of the unequal sample distribution among home schools, though several approaches were employed to assess the possible impact of this disparity. The possibility of conducting separate analyses excluding highly under or over-represented schools was considered, although the extremely low number of total responses from schools whose representation was more accurate would significantly inhibit the ability to draw any conclusions from these smaller samples. Although overall sample size limited the reliability

of any statistical analysis, ANOVA was used to measure the degree to which individuals from different school groups reflected significantly different means in regards to key variables measuring perception of technology and inclination to Inclusive Education (ANOVA results describing the variance between demographic groups in relation to several key variables can be found in Appendix C). Because no significant difference between means scores based on home school was found on these measures ($p > .05$), this test supported the notion that home school was not a significant determinant of teacher perception of technology or inclination to Inclusive Education. This finding, in conjunction with the fact that policies relating to technology and Inclusive Education were largely determined at the district level and were fairly uniform across schools, the decision to accept conclusions drawn from the existing survey sample was made. Here again, it is important to note that this was a primarily qualitative study in nature with the goal of the survey not to provide empirical evidence of the presence or absence of particular phenomena, but rather to provide the researcher with a broad picture of the way technology and Inclusive Education interact in this case; despite limitations in the ability to draw conclusive statistical inferences due to response issues, the survey still served to be a meaningful way to gather the thoughts of a large number of staff across the district which could later be probed into via staff interviews.

Online survey software provided results to the researcher in the form of a spreadsheet. Responses were then entered into SPSS once and reviewed for accuracy upon completion. While incomplete surveys were accepted, five responses were deleted as they were found to have been submitted twice with identical data. Following the entry of each survey item individually, additional variables were created within SPSS through the aggregation of particular groups of survey items. Aggregated variables are described below:

- Perceived Impact of Technology (PIT): Aggregated teacher responses on the entire section of the survey regarding the 1:1 program.
- Inclination toward Inclusive Education (ITIE): Aggregated teacher responses to the entire section of the survey regarding Inclusive Education.
- School Inclination toward Inclusive Education (SITIE): Aggregated selected items within the section on Inclusive Education which assessed school efforts at Inclusive Education.
- Potential for Technology in Inclusive Education (PTIE): Aggregated selected items within the section on Inclusive Education which solicited teacher belief that technology *could* support Inclusive Education.
- Outcomes for Technology in Inclusive Education (OTIE): Aggregated selected items within the section on Inclusive Education which solicited teacher support that technology *was currently* supporting Inclusive Education.
- Efficacy: Aggregated two items designed to assess teacher overall sense of efficacy.

While the majority of survey items which required responses on a scale of 1-5 were worded positively-indicating that higher scores reflected more positivity toward the 1:1 program or inclination toward Inclusive Education- there were some items which utilized negative wording; upon entry, scores on these items were reversed in order to maintain the integrity of aggregated variables. It is noted that while the SACIE-R is a measure with established validity, the use of items from this in conjunction with novel items in the survey used for this study have not been through processes to establish validity. Knowing this, results were intended to be interpreted along-side interview responses in order to provide a picture of sensemaking in this setting in order to affirm, reject, or modify a model for the interaction of technology and Inclusive Education. While statistical tests and correlations were used to provide depth to this picture, they should not be interpreted as empirical evidence.

Survey data was analyzed using SPSS to obtain descriptive statistics about survey respondents in order to ensure that responses collected could be considered to represent the wide range of experiences present in the setting. There exists significant debate about what can be considered a representative sample within the context of a case study. Indeed, cases where the population and the survey sample are one and the same, a determination of a sufficient response rate is difficult. As such, some have suggested an approach in which survey samples are compared to known population demographics in order to assess representation (Nulty, 2008). Frequencies and descriptive statistics were utilized for this purpose and were shared in Table 2.

In terms of statistical analysis, single sample T-tests were performed in order to evaluate items on the perceived impact of technology section of the survey and aggregated variables. These tests allowed the researcher to determine whether overall responses reflected significantly positive sentiments toward various survey items. These tests sought to measure whether sample means were significantly greater than the values of three and four with a value of three indicating neutral sentiment and a value of four indicating positive sentiment. One additional paired-samples t-test was performed in order to assess whether opinion at introduction of the 1:1 program differed significantly from current opinion. Additionally, correlations were run for all aggregated variables in order to determine whether significant relationships existed between these broad responses to technology and Inclusive Education and specific survey items or other aggregated variables. All tests were run using a confidence interval of 95%.

Document and interview analysis. All interviews, open-ended survey responses, field notes, and relevant documentary evidence were analyzed via coding in order to answer research questions while these sources provided a significant amount of the information for the Case Description. Relevant documentary evidence and notes, and all interviews were coded using a

two-fold method for analysis described by Saldana (2008). The first stage involved the coding of data which reflected concepts from the theoretical framework of the study; the second stage of analysis involved the creation of novel codes relevant to the research questions as they became apparent. Each source, whether a text source or an interview transcription was reviewed for relevant data in any of four major categories (Impact of Technology, Inclusive Education, Technology and Inclusive Education, and Implementation) and several sub-categories (Differentiation, Parent Engagement, Assessment, and Access to Knowledge) using a weighted coding method. Wheeldon (2010) described the use of “salience scores” in order to allow data to convey differences in responses which may not be apparent by the use of code counts. In this study, for example, two teachers may have discussed the impact of technology on parent engagement while one viewed it as a positive relationship and the other held a different sentiment. The addition of code weights allowed for the data to convey these nuances while also allowing the possibility of numerically describing responses of the data set as a whole.

In addition to using weighted codes, up-coding within categories took place so that any excerpt would be tagged for both the sub-category and larger category it belonged to. This allowed for the code tree to reflect the contours of both big ideas and unique sentiments shared by participants. This inductive/deductive approach allowed for analysis specific to the models for technology integration and Inclusive Education used to ground this study while allowing organic themes with implications for these models to emerge from the data. This method led to the creation of a large number of level 2, 3, or even 4 sub codes, some of which were only used once. However, up-coding meant that while these very detailed codes could help to explain nuanced differences to responses within each category, broader categories and trends in those

categories were still evident. Each category is described below along with a description of how coding weights were applied (if applicable). The final code tree is included in Appendix H.

- **Category One-The Impact of Technology:** This general code was applied when data referred to the types of changes (positive or negative) that have occurred in the district as a result of technology. Within this category, sub-categories of Differentiated Instruction, Parental Engagement, Formative Assessment, and Access to Knowledge Outside of the Teacher/Classroom were created initially although several others emerged through the coding process. Weighted codes ranging from -2 to 2 were applied to each excerpt in order to provide a measure of the degree to which the data indicated a technology-support paradigm shift. A score of 2 would reflect an excerpt in which a respondent independently described both a belief and a practice/example reflective of such a paradigm shift, a score of 1 would be applied if the respondent supported a belief but did not discuss practices (or vice versa) or if they expressed support for a notion in direct response to a probing question (as opposed to independently expressing such support). A score of zero reflected a somewhat neutral statement and -1 or -2 reflected varying degrees of support for maintaining the current paradigm with regards to the four sub-categories discussed. Novel codes/sub-categories which emerged from the data were not separately weighted although if they fit within a larger category, these excerpts were up-coded within the larger category which was assigned a weight.
- **Category Two- Inclusive Education:** This general code was applied when data referred individual or school attitudes or approaches to responding to student diversity. Weighted codes ranging from -2 to 2 were applied to each excerpt in order to provide a measure of the degree to which the data indicated an inclination toward Inclusive Education. A score

of 2 would reflect an excerpt in which a respondent independently described both a belief and a practice/example reflective of such an inclination, a score of 1 would be applied if the respondent support a belief but did not discuss practices (or vice versa) or if they expressed support for a notion in direct response to a probing question (as opposed to independently expressing such support). A score of zero reflected a somewhat neutral statement and -1 or -2 reflected varying degrees of disinclination toward Inclusive Education. Novel codes/sub-categories which emerged from the data were not separately weighted although these excerpts were up-coded within the larger category which was assigned a weight.

- Category Three- Technology and Inclusive Education:** This code was applied when data suggested a direct relationship between technology and Inclusive Education. For example, if a teacher discussed the ways in which technology-supported differentiation supported the ability of students with disabilities to contribute meaningfully to group projects or if a participant discussed the ways in which technology has limited their ability to meaningfully communicate with parents, this was coded within category three rather than categories one and two. Weighted codes ranging from -2 to 2 in this category were applied to assess the degree to which data reflected an endorsement of the impact of technology on Inclusive Education (with -2 reflecting a very negative relationship between the two and 2 being very positive). Novel codes which emerged within this category were created as applicable and were up-coded using the weighted coding system.
- Category Four- Implementation/Organizational Factors:** This category applied to data which discussed the district's approach to implementation of the 1:1 program and

general reactions to the program (as opposed to discussion of its impact). This category was not weighted and novel sub-categories were identified as they emerged from the data.

Once coding was completed, the data was analyzed by weight in order to assess the degree to which respondents' description of the impact of technology lined up with Weston and Brooks' (2008) paradigm shift, the degree to which respondents reflected an inclination toward Inclusive Education, and the degree to which respondents endorsed a supportive relationship between technology and Inclusive Education. Data was also analyzed by frequency to identify other outcomes of technology, issues around Inclusive Education, factors relating to the relationship between technology and Inclusive Education, and key elements of or responses to the district's implementation to the 1:1 program. It is important to note that the use of a weighted coding process was used as a means to assist in the description of the strength and direction of sentiments across respondents. As with any coding process, the assignment of a weight was a subjective decision on the part of the researcher despite attempts to structure this decision making as highly as possible. This being said, weights were only interpreted as means for comparing respondents or for reflecting overall trends and were not interpreted as any empirical measure of the categories/codes.

It is important to note that while the weighted codes served to provide what could be considered descriptive statistics for the entire data set, they did not tell the whole story. While mean code weights and code counts were used to describe salient sentiment which seemed to be shared across participants, the degree to which participants varied in their responses was a story in and of itself. Thus, while results are shared initially in regards to themes and shared findings, key differences in response patterns were also analyzed and described. This endeavor was

supported by examining the minimum and maximum weights assigned to codes; those codes which yielded minimums of -2 (the lowest possible rating) and maximum ratings of 2 (the highest possible rating) were areas which were investigated in order to seek explanations for this wide variation.

Ethical considerations. The decision to ask for home school and other demographic information made it possible to identify an individual based on their unique combination of responses to these demographic items. In order to ensure participant confidentiality, the entire constellation of demographic information linked to individual responses was only be available to the researcher and was not included in any results. This information was kept confidentially on the investigator's home computer and destroyed after findings were analyzed and written up. To the degree that results include some demographic information, the researcher made the decision to link response patterns or findings to only one demographic factor at a time to ensure that unique combinations of demographic information would not allow for indirect identification of participants. The decision to only share results relating to one demographic feature at a time should limit the potential for individuals to be identified to the strongest degree possible while allowing the study to explore the interplay of demographics and responses.

Furthermore, any data for which results at the level of the individual are published (generally only interview responses) does not include demographic descriptors with interview participants only being described for their group characteristics in order to provide some background on the sample without identifying participants' unique demographic makeup. While these decisions represent significant effort toward ensuring that results are not identifiable, they have not limited findings given that the core focus of the study was not the interplay of demographic variable and opinions. The goal of the study was to understand why this group has

generally responded to a policy in a given way with the collection of demographic data only serving to guide the researcher in exploring any major within-group differences that emerged.

Researcher positionality. In light of the ethical concerns addressed in the previous section, it is also critical that I disclose my own relationship to the site described in this study. I am an employee of Southern School District and had been employed as a school social worker there for four years prior to this study. Although all research was completed during a year of leave, I was not free from the impact of experiences and relationships formed prior to that period. Great efforts were taken to ensure the integrity of data by relying on data collected within the designated time frame for the study and by following the same protocol for all interactions during data collection despite the fact that I was more familiar with some sites/individuals than others. Despite these efforts, a claim to complete neutrality cannot be made. It is possible that some people were hesitant to share data due to concerns about my dual-role of researcher and co-worker. However, my familiarity with the site also brought increased access to many individuals and an understanding of context which certainly supported the amount and richness of the data that was able to be collected. Thus, while the impact of my position as researcher is acknowledged and considered as findings are discussed, it is not presumed that the position has precluded the collection of meaningful and valid data.

It is important to note that my own experiences in the district were critical in formulating this inquiry in the first place. While my own work has not been centered on technology, my experiences in working with teachers as they implemented the 1:1 program and the resulting changes in the educational environment, especially for students I worked with (predominantly students designated as having disabilities), triggered my curiosity in understanding if technology was serving a role in promoting a more inclusive educational environment. While it may be

argued that my previous experience may have colored my analysis, they also provided critical insight into the environment and into the formulation of the inquiry. As Piantanida and Garman (1999) explained:

...the researcher is as much a part of the inquiry as the intent of the study and the inquiry process. In fact, the researcher's thinking lies at the heart of the inquiry... (pp 24)

Research questions and data sources

Having described the methods used to collect and analyze data for this study, we will close this section by revisiting the original research questions and examining their alignment with the types of data collected and the approach to analysis. The first question-do teachers in schools with a high degree of technology integration demonstrate a paradigm shift away from traditional models of education characterized by the use of summative assessment, large-group/undifferentiated instruction, low parent-engagement, and access to knowledge in the classroom alone-was answered through data from staff surveys (specifically, the third section of the survey which focused on staff response to the 1:1 program) and staff interviews. A weighted coding method was used to highlight interview excerpts which reflected a shift toward this paradigm or adherence to a more traditional educational paradigm. The second question sought to determine whether any observed paradigm shift due to technology also reflected movement toward more inclusive beliefs and/or practices or whether the existence of technology appears to promote inclusive beliefs and/or practices independent of technological paradigm shift? This question was also answered via staff surveys (specifically the fourth section of the survey) and staff interviews which were analyzed using a similar weighted coding method to reflect inclination/disinclination toward principles of Inclusive Education. While principal interviews were considered in light of the first two questions, they were not a primary source of data; rather they were used to corroborate or contrast with staff accounts of the ways in which technology

and Inclusive Education impact their schools and their teaching practices. Finally, the study utilized documentary evidence, site visits, open-ended survey questions, staff interviews and principal interviews to determine whether personal or organizational factors which appear to account for any observed changes or the lack thereof. The table below further explains the relationship between the research questions/ sub-questions, variables investigated, and the data sources identified for this study.

Table 4: Questions and Data Sources

Research Question	Sub-Question	Variable	Data Source
Do teachers in successfully implemented 1:1 computer programs reflect a technology-informed educational paradigm shift?	How do teachers generally feel about the program?	Perceived Impact Technology (PIT)	Survey Items 19-23, 41 Teacher Interviews, <i>Principal Interviews</i>
	Do they report changes to student outcomes? If so, what are they?	PIT	Survey Items 24-27, 41 Teacher Interviews <i>Principal Interviews</i>
	Do they report changes in assessment practices? If so, what are they?	PIT	Survey Items 38-40, 41 Teacher Interviews, <i>Principal Interviews</i>
	Do they report changes to the use of large-group, undifferentiated instruction? If so, what are they?	PIT	Survey Items 31-33, 41 Teacher Interviews <i>Principal Interviews</i>
	Do they report changes in family/parent engagement? If so, what are they?	PIT	Survey Items 28-30, 41 Teacher Interviews <i>Principal Interviews</i>
	Do they report changes in the ways or places in which students access and demonstrate knowledge? If so, what are they?	PIT	Survey Items 34-37, 41 Teacher Interviews <i>Principal Interviews</i>
Do teachers in this setting reflect an inclination toward Inclusive Education? If so, to what degree is this influenced by technology-informed paradigm shifts?	How do teachers appear understand the notions of normalcy and diversity in education?	Inclination Toward Inclusive Education (ITIE)	Survey Items 44, 46-48, 50-52, 54-56, 58-71, 74, 77, 80, 83, 86, 88-89, 91 Teacher Interviews
	To what degree do teachers see their school as supporting inclusive beliefs and practices?	School Inclination Toward Inclusive Education (SITIE)	Survey Items 45, 49, 53, 57, 87, 90 Teacher Interviews <i>Principal Interviews</i>
	To what degree do teachers feel a sense of efficacy in responding to diverse student needs?	Teacher Efficacy (TE)	Survey Items 42-43 Teacher Interviews
	Do teachers endorse the potential for technology in promoting Inclusive Education?	Potential for Technology in Inclusive Education (PTIE)	Survey Items 72, 75, 78, 81, 84 Teacher Interviews
	Do teachers endorse a positive relationship between technology and Inclusive Education?	Outcomes for Technology in Inclusive Education (OTIE)	Survey Items 73, 76, 79, 82, 85 Teacher Interviews
What personal or organizational factors influence teacher sensemaking around technology, inclusive education, or the relationship between the two?	How do organizational factors influence teacher sensemaking with regards to these variables?	Organizational Factors	Documentary Data Principal Interviews Teacher Interviews Survey Items 19-23
	How do personal factors influence teacher sensemaking with regards to these variables?	Personal Factors	Survey items 2-13 Teacher Interviews

Findings

This study sought to determine whether the theoretical congruence between a technology-transformed paradigm of education and a paradigm of Inclusive Education could be observed in a school district which had, by all accounts, managed to achieve effective integration of 1:1 technology. The following discussion of study findings takes a categorical approach to analysis. Thus, data from documents, site visits, surveys, and interviews are grouped and discussed by theme or topic in response to specific research questions rather than findings from each data source being discretely discussed. While this approach is much more suited to providing a thorough and meaningful description of findings from this multi-faceted case study, the degree to which detailed statistical data is included in each section is limited in order to facilitate comprehension of the overall narrative. As such, complete statistical results including figures from all t-tests, ANOVA, and Correlations can be found in Appendices A, B, and C. Furthermore, conclusions drawn from interviews, observations, and open-ended survey responses were based on code frequency and weighting information. Frequencies and weights are reported within the narrative to the degree that they are helpful. However, Appendix F documents frequencies and weights for all codes applied and should be referenced to support those conclusions drawn.

Results here are presented in two broad sections: 1) Measuring the Perceived Impact of Technology and 2) Measuring Staff Inclination toward Inclusive Education. In the first section, survey items and interview analysis which assessed the ways in which staff had responded to technology in addition to personal and organizational factors which appeared to mediate this response are discussed; this discussion focuses on four areas (assessment, differentiation, parent engagement, and access to knowledge) as well as general sentiment toward the program. In the

second section, the ways in which survey and interview responses reflected inclination toward or away from Inclusive Education broadly (whether related to technology or not) are described with attention to each of the three dimensions of Inclusive Education: redistribution, recognition, and representation. The ways in which these discrete findings interact in order to answer research questions relating to the relationship between technology and Inclusive Education are explored in the Discussion section which follows the findings.

Measuring the Perceived Impact of Technology

My first research question focused on the ways in which the 1:1 program had influenced teachers' educational paradigms. In addition to understanding how teachers felt about the program and what types of outcomes they reported for their students, I asked whether the 1:1 program had influenced teacher beliefs and practices around assessment, differentiation, parent engagement, and student access to knowledge. Of course, assessing the ways in which technology had influenced instructional paradigms meant triangulating observation, and reports from multiple stakeholders. Perhaps not surprisingly, it quickly became clear that the answer to the question of what and how technology had changed depending on who and how you asked.

During my site visit, one conference participant pointedly asked administrators present "How do you justify the cost of technology if test scores are not going up?" One administrator responded, "I don't think test scores have anything to do with justifying technology. In my opinion, if test scores stay the same, that should be enough. Our goal is to use the technology to change the way students learn and interact in the world that will exist when they leave school." Later that day, a principal would tell me "If we're teaching our kids the way we used to teach, we're preparing them for a world that doesn't exist." Statements such as these were common occurrences during administrator interviews and site visits. If such wholesale enthusiasm for

technology on the part of school-leaders was not enough to convince outsiders that a pedagogical transformation was occurring here, visits to classrooms of students quietly collaborating (even with peers who were sick at home) on projects while the initially-invisible teacher circulated, holding nuanced conversations about their progress, likely would.

Indeed, classrooms in SSD *looked* different, they *felt* different; and not just because of the presence of twenty-five or more screens. Students appeared engaged; they could tell you what they were doing and why. Teachers moved like coaches, providing resources for many while teaching a few. There were no stacks of paper and feedback mostly occurred in real-time whether from a computer program or a teacher. Of course, the usual issues arose. In one room, group presentations of movie-trailer-like book reviews devolved into arguments over which group was next and a series of shouted pop-culture references. In another room, one student sat in front of a basket of books, aimlessly flipping through the pages and alternately crawling on the floor, unseen behind a bookshelf. Classrooms in SSD were not perfect nor was the technology a panacea for the everyday challenges of teaching, but something different at least *appeared* to be happening here on observation. The difficulty, then, was in determining whether this was truly the case. Were teachers just “playing the game”- a phrase used by three different teachers to describe their approach to implementing 1:1 technology, or was I seeing the reflection of a true technology-supported paradigm shift? The following sections seek to outline findings around the Perceived Impact of Technology among teachers in SSD as evidenced by data reflecting the general opinion of the program and perceived impact on student outcomes as well as perceived impacts of the program on bringing about changes in the areas of Differentiation, Assessment, Access to Knowledge, and Parent Engagement.

Table 5 presents the One-Sample T-Test results for all items relating to the Perceived Impact of Technology as well as results for the aggregated variable by that name; Tests were run at test levels of 3 and 4 in order to determine whether survey responses reflected significantly positive results (t value significant at test level of 4). These numbers will be discussed in detail throughout the findings although it is important to note that only three items (changing how students access knowledge, accessing knowledge outside of the classroom, and demonstrating knowledge in new ways) were significant at the test level of 4. Furthermore, items relating to parent engagement were not significant at a test value of 3 indicating significantly negative sentiments.

Table 5: One-Sample T-Test Results for Items Measuring Perceived Impact of Technology (* indicates significance at 95%)

Item	N	Mean	SD	SEM	t(3)/ t(4)
Positive Opinion at Introduction	103	3.6117	1.16	.11397	*5.367/-3.407
Initially Prepared to Implement	101	2.7723	1.02841	.10233	-2.225/-11.998
Adequate ongoing training	105	3.4857	1.07519	.10493	*4.629/-4.901
Adequate tech support/infrastructure	104	3.4135	1.12008	.10983	*3.764/-5.340
Current positive opinion	105	3.667	1.05308	.10277	*6.487/-3.243
Positive impact on academic growth	105	3.5619	1.00884	.09845	*5.707/-4.450
Positive impact on engagement	103	3.8738	.88206	.08691	*10.054/-1.452
Positive impact on critical thinking	103	3.2524	1.08210	.10662	*2.367/-7.011
Positive impact on collaboration	104	3.2788	1.10125	.10799	*2.582/-6.678
Positive impact on parent engagement	105	3.1048	1.10003	.10735	.976/-8.339
Increased parent engagement with education	105	2.8095	1.06604	.10404	-1.831/ -11.443
Increased teacher engagement with parents	104	3.2212	1.14023	.11181	*1.978/-6.966
Changed differentiation for struggling students	103	3.8544	.97425	.09600	*8.900/-1.517
Made differentiation easier	102	3.8922	.97399	.09644	*9.251/-1.118
Made differentiation more effective	103	3.7767	1.02834	.10133	*7.665/-2.204
Changed how student access knowledge	103	4.1262	.95671	.09427	*11.947/*1.339
Use of laptops outside of classroom	100	3.86	.97463	.09746	*8.842/-1.436
Access knowledge outside of instruction	102	4.1765	.73675	.07295	*16.127/*2.419
Demonstrate knowledge in new ways	105	4.1429	.87077	.08498	*13.449/*1.681
Changed assessment	103	3.7864	.95641	.09424	*8.345/-2.267
Improved formative assessment	101	3.5545	1.08144	.10761	*5.135/-4.140
Increased access to formative assessment	101	3.6238	1.09409	.10887	*5.730/-3.456
Perceived Impact of Technology	86	78.6047	15.21940	1.64115	*7.680/-5.725

Table 6 represents all codes which were related to teachers' Perceived Impact of Technology and achieved mean weights higher than 1 or lower than -1. Codes weighted higher than 1 likely reflected positive movement toward a technology-supported paradigm shift while those weighted lower than -1 reflected resistance toward such a shift. While all codes achieving these means are included below, those which also achieved high code counts are discussed in more detail in the following sections. Interestingly, codes with the highest counts were

Differentiation (mean 1.3) and the Limits of Technology (mean -1.3); this finding mirrors the often-fragmented way in which teachers made sense of technology, emphasizing both the potential and potential challenges of the 1:1 program.

Table 6: Perceived Impact of Technology Counts and Weights for Codes with Means >1 or <-1.

Code	Count	Min	Max	Mean	Median
Assessment	33	-2	2	1.1	2
More useful data	17	1	2	1.6	2
Shift to formative assessment	14	1	2	1.6	2
Projects etc. vs tests	2	-2	0	-1.5	-1.5
tech not providing meaningful assessment	7	-2	0	-1.7	-2
Less whole group instruction	3	1	2	1.7	2
More Group Work	8	-2	2	1.1	1.5
Teacher as Facilitator/ Flipped Classroom	11	-2	2	1.2	2
Technology to support independent work/small grp	24	0	2	1.5	2
Differentiation	54	-2	2	1.3	2
New ways to demonstrate learning	9	-2	2	1.6	2
Increased student engagement	45	-2	2	1.6	2
kids as experts	8	-1	2	1.5	2
Limits of Technology	57	-2	2	-1.3	-1
Difficulty of Technology in Literacy	16	-2	2	-1.1	-1
Tech Developmentally Inappropriate for young children	20	-2	2	-1.3	-1
inability to replace teacher	10	-2	0	-1.2	-1
kids needing tech teaching	6	-2	0	-1.5	-1.5
loss of subject matter	10	-2	2	-1.6	-2
tech to support logistics	18	1	2	1.7	2

General opinion. The first measure of response to the 1:1 program was a simple measure of opinion. Survey participants indicated how they felt about the program initially using a Likert scale and at present while open- ended survey items asked them to share their experiences along with any benefits or challenges the program has brought. Interviews asked

teachers to talk about their initial response and how this has shifted over time. T-tests on survey data served to provide a rough estimate of overall teacher sentiment toward the program. All survey responses occurred on a scale of 1-5 with 1 representing strong disagreement with a statement and 5 representing strong agreement. T-tests assessed whether samples reflected means that were statistically positive by running one-sample tests with test values of 3 (indicating neutral opinions on the survey) and 4 (indicating positive opinions on the survey). Significant results at the test level of 4 would indicate statistically significant positive opinions for the population mean (>4); significant results at the test level of 3 would indicate generally neutral/slightly positive opinions (>3 but <4); this analysis was used for all t-tests run in order to assess the significance of sample means.

In terms of general opinion staff were asked whether they initially and currently had a positive opinion of the 1:1 program; the entire sample had mean score of 3.61(SD 1.16) for initial opinion and 3.67 (SD 1.05) current opinion. Findings for both items indicated significant results only at the test level of 3 suggesting that overall results could not be said to reflect a significantly positive opinion of the 1:1 program at introduction or currently although they were neutral/slightly positive. A paired t-test was run to compare initial and current opinion of the program to determine whether a significant change had occurred between these sentiments (Table 7). Here, t-values were not significant indicating no significant difference in the means. This finding is especially interesting in light of the fact that correlational analysis found no correlation between initial and current opinion. This does not simply imply that opinions remained static, for if they had a correlation would have been noted. It suggests that while the data reflected changes in opinion regarding the program, they did not go in a particular direction (positive to negative, or negative to positive) but varied. This finding is supported by the

statements of several individuals in response to the open-ended survey question. Of the four responses that discussed initial vs. current opinions, two teachers reflected initially negative/hesitant opinions which had evolved into significantly positive sentiments while two others discussed initial excitement and hope for the program which had devolved into disappointment and frustration.

Table 7: Teacher Opinion of 1:1 Program Currently and at Introduction, T-Test and Correlation

Variable Pair	N	Paired Differences Mean	Paired Differences SD	Paired Differences SEM	T	Df	Correlation	Correlation Significance
Positive opinion when program was introduced-current positive opinion of program	102	-.03922	1.42065	.14067	-.279	101	.178	.074

In interviews, most teachers reflected a fairly balanced opinion of the 1:1 program. While three individuals reflected overwhelmingly significant sentiments and four individuals reflected overwhelmingly positive opinions, the remaining participants tended to identify specific aspects of the program which they liked or found useful in addition to others which were troubling to them or had posed challenges. Positive opinions tended to be supported by a sense that teacher could accomplish more due to the ways in which technology supported both differentiation and work flow in their classroom. Negative opinions tended to be expressed along with a sense of loss for areas of curriculum or other activities which technology had come to replace.

Technology and student outcomes. While this study did not directly measure student outcomes as a result of technology, it did seek to assess the degree to which teachers had seen positive outcomes for their students as a result of the 1:1 program. Indeed, the belief that their

students had (or had not) improved in some area as a result of the technology proved critical to teacher's overall perceptions. Some teachers reflected that while technology had made many things easier and helped their students to create more professional looking products, "they still are reading two grade levels behind" which made it impossible for that individual to express an overall positive opinion of the program. On the other hand, several teachers- a majority of whom worked with students with disabilities-who shared examples of students being able to participate in ways they could not previously as a result of technology often held unabashedly positive opinions of the program.

It would be interesting to triangulate this variation in the perceived impact on student outcomes with actual student data. Unfortunately, the three school years prior to the study brought three distinct state assessments with 2012-13 using the ISAT based on Illinois Standards, 2013-14 using an ISAT based on Common Core Standards, and 2014-2015 using the new PARCC assessment. Test scores over this period have gone down in the district. However, they have done so state wide, rendering it impossible to disentangle the effects of new standards/approaches to assessment from any actual changes in student academic performance. Other areas of student growth (such as increased engagement, ability to think critically and collaborate) which studies have cited as positive outcomes of technology-supported learning are not (unfortunately) regularly assessed in schools.

Knowing that teachers appeared to vary in the ways they described the impact of technology on their students, the survey asked whether teachers had seen a positive impact on their students in four areas (chosen as a result of previous studies finding significant positive effects in these areas): 1) Academic growth, 2) Student Engagement, 3) Critical Thinking, and 4) Ability to Collaborate. Single sample t-tests were run with test values of 3 and 4 for each of

these four items, with significant results occurring at the 3 test level but not at the 4 test level.

Again, this suggests that we can say with certainty that the sample endorsed student outcomes in these areas at a level that should be considered neutral/slightly positive (>3 but <4).

Interview analysis indicated that student engagement, was the second most frequently used sub-codes within the category of Impact of Technology which described positive changes as a result of technology; only differentiation, which is discussed later, reflected a larger number of positive mentions. Analysis of code weights also indicated that this was generally discussed with strong support (weight of 1.6/2) and was often spontaneously discussed by respondents. What, then, accounted for the lack of a statistically positive opinion in survey data?

One potential explanation comes from the frequent references to the adverse impact of technology on student behavior found in open-ended survey and interview data. In terms of code counts, the social implications of technology and its impact on social skills, communication and behavior were the most frequently observed within the category of Perceived Impact of Technology. And, while engagement had a nearly universally positive weighting, weights assigned to discussion around the relationship between technology and these student outcomes were generally negative. It is likely that on survey data, where behavior/distraction and these types of concerns were not directly addressed, teachers considered them when responding to the item assessing student engagement, causing them to move toward a more neutral response. In interviews and open-ended items, however, teachers were able to discuss the nuanced relationship between student engagement and the potential distraction of technology, allowing them to endorse a positive effect on engagement while voicing concerns about the ways in which this engagement can become problematic. The frequently voiced concern around student misuse of technology (both at home and at school) as well as the implications this has on staff in terms

of requiring additional time and effort to monitor appropriate use of the devices was a critical finding from open-ended survey and interview responses, despite generally supportive findings of the impact of technology on student engagement.

In contrast to this, multiple administrators had voiced the opinion that student behavior had improved as a result of increased engagement due to technology; suggesting that office referrals and many types of behavioral problems had decreased because students were no longer bored or getting into conflicts with teachers over work refusals and things of that nature. One principal and two teachers reflected a similar support for a positive effect of technology on student behavior although they expressed that because computers could be taken away for poor behavior, they worked as a strong incentive for many students. This issue of the use of technology as an incentive or its removal as a consequence was complicated for many as it meant the loss of access to instruction in this tech-reliant environment. Still, those who discussed it generally saw positive effects for using access technology as an incentive. On the whole, interview respondents who were asked directly about whether they saw a positive or negative relationship between technology and behavior voiced mixed feelings which was reflected in notably positive weighting for codes relating to student engagement due to technology (1.6/2) alongside negative weighting for the impact of technology on behavior (-.6/2). On one hand, teacher noted increased engagement which often helped to prevent concerns in previously reluctant or challenging students. On the other hand, they expressed the constant access to highly stimulating (and perhaps inappropriate) content on the computer and the need to be vigilant against distraction or misuse.

In a similar vein, open-ended survey responses and interviews frequently yielded discussion around the relationship between social skills and technology, with code weighting

reflecting a mildly negative perspective in this area (-.4/2). While three special education teachers endorsed the ways in which technology has enhanced communication for their students, the majority of other respondents who mentioned any impact on social skills cited concerns for the ways in which technology could have an adverse impact or the belief that it has actually diminished social skills. Those who did endorse a positive relationship between technology and communication or social skills were teachers of students with disabilities who highlighted the ways in which devices actually allowed communication for non-verbal students or the ways in which students who struggled socially were able to interact in ways which might be typical for children their age via computer-based games.

Some of the most vocal opponents of the impact technology has had on social skills were teachers of younger students. Another code that emerged organically from the data concerned what teachers referred to as the developmental inappropriateness of technology; the mean weight for this code was -1.2/3 indicating notably negative sentiment around the appropriateness of a technology-centered educational paradigm for younger students. For individuals voicing this concern, time on the computer had come at the expense of time for handwriting, drawing, cutting and other tasks of early development. In their opinion, the loss of these skills in addition to the loss of time spent socializing face to face which was a result of expectations to use technology for most the day was having an adverse effect on their students' overall development. While one teacher of younger grades voiced support for the notion that technology skills had become part of students' development, others remained firmly opposed to such a notion. Indeed, both the sense of being "forced" to use technology when they felt that it was inappropriate and the very idea that extensive screen time was not in their students best interests were not only key findings in terms of the way teachers viewed technology as impacting their students but were also identified

(and will be discussed later) as key personal and organizational factors influencing overall teacher response.

While concerns about the potential or actual adverse effects of technology on behavior, social skills, or physical developmental tasks (such as writing and cutting) were identified as novel student outcomes for technology, the areas of academic growth, critical thinking and/or collaboration (which were identified as areas to assess in the original survey) went generally unmentioned in interviews. With the exception of three principals suggesting that their students are more critical and are better equipped to collaborate with peers, only two teachers out of 91 respondents to the open-ended survey question endorsed a similar belief. Additionally, no interview participants independently identified these as outcomes for technology in their experience. No principals suggested that their students had experienced genuine academic growth as a result of the 1:1 program and only three teachers (all teachers of students with disabilities) described observing new levels of academic growth in their students. When asked directly about these areas, teachers who voiced generally positive sentiments about technology tended to “agree” that they had seen improvements but no specific examples or elaboration were provided. Similarly, teachers with a more hesitant or negative perception of the 1:1 program tended to voice seeing no improvement in terms of academic growth, critical thinking or collaboration as a result of technology.

Taken as a whole, measures of the ways in which teachers perceived the impact of technology on their students varied dramatically although some trends emerged. While quantitative measures did not show significantly positive scores for any measure of student outcomes, qualitative measures almost universally indicated a positive opinion on the impact of technology on student engagement. Still, several novel areas of concern emerged including the

potential or actual adverse effect of technology on behavior, social skills, and exposure to/accomplishment of early developmental skills. Interestingly, the degree to which staff voiced these concerns showed some degree of clustering based on the ages or groups of students taught. Whereas teachers of students in grades k-1 or 6-8 voiced the most significant concerns in these areas, teachers of students with disabilities were often the only staff to voice positive opinions of the influence for technology on growth and/or social functioning. The implications of these clusters will be further explored in the discussion of personal and organizational factors influencing the perceived impact of technology.

Technology and assessment. In addition to the desire to understand how teachers viewed the impact of technology on various student outcomes, much of this study focused on ascertaining the degree to which teachers reported changes in their own pedagogy as a result of 1:1 technology. Target areas for potential change were informed by the Weston and Brooks (2008) framework and included changes to assessment, differentiation, parent engagement, and changes to the ways in which students access knowledge. In the area of assessment, the study specifically sought to determine whether teachers reflected a shift toward the use of formative methods of assessment rather than reliance on traditional testing and summative assessment methods. As with findings relating to student outcomes, survey results indicated a generally neutral/slightly positive score (t values significant at a test level of 3 but not at a test level of 4) on items asking whether technology had changed assessment practices, increased the use of formative assessment, or increased access to methods of formative assessment.

Despite these mildly positive findings in survey results, open-ended survey items and interviews seemed to suggest more inclination toward the use of formative assessment. Four principals strongly suggested that computers had transformed the way they see teachers assessing

student performance while one suggested frustration that she still sees many of the same traditional projects and tests being relied on as primary indicators of learning. Teachers frequently endorsed the notion that technology had changed the way they assessed students via more frequent use of technology-supported informal assessments such as brief google forms and via access to significantly more data from instructional computer programs and even through the technology-supported analysis of computer-based summative assessments which were used in a formative manner. Still two interview participants and one open ended survey response expressed frustration at the limitations of technology-based assessment stating that it was too easy for students to just click an answer or not take a program seriously, rendering any data received from it unreliable. Another teacher shared a similar sentiment, noting that while she had access to tremendous amounts of data reflecting student performance on various reading and math programs, she frequently did not see a correlation between this data and classroom performance. “I have kids that are doing well in these programs but I’m not seeing that reflected in their reading or their work in the class, and then I have other students who I know are capable of doing a lot but when they have the option to just click an answer it’s just click click click, it’s a game to them and the results aren’t valid reflections of what they can do.”

Thus, while some individuals voiced strong opposition to the notion that technology could provide meaningful assessment, an overall weight of 1.1/2 was observed in regards to the area of assessment suggesting a small but definite shift in this area. In light of the mixed results, one should consider the ways in which the limitations of technology in formative assessment highlighted by some teachers are not wholly different from the limitations of many other, more traditional modes of assessment. Whether students are filling in bubbles to create a pattern or randomly clicking, the issues of students not putting forth their full effort or truly

demonstrating their knowledge on assessment tasks (which may occur for a myriad of reasons), does not seem to be a problem limited to technology.

Technology and differentiation. Changes in the area of differentiation of instruction and the shift from large-group instruction to small group and even individual methods of instruction were the most often discussed changes to instructional practices in open-ended survey items and interviews. Issues around the positive role for technology in differentiation were mentioned more than any other code in this category with an overall positive weight of 1.3/2. Still, survey results reflected neutral to mildly positive responses when staff were asked whether technology had changed the way they differentiated, made differentiation easier, or increased their ability to differentiate for different learners with t values significant at the 3 test level but not at the 4 test level.

Principals and district-level administration all mentioned the ability to differentiate instruction as a primary goal for technology implementation and four out of six provided extensive examples of the ways in which they have seen this occur stating that it was the aspect of their school which technology had changed the most. Three principals told me that they had not seen a single whole-group lesson in the last year and that the degree to which teachers were targeting instruction based on student needs had exceeded their expectations while one principal expressed frustration that they did not see as much of this shift away from large-group undifferentiated instruction as she would have liked. Two principals discussed the ways in which this shift toward targeted instruction has changed the type of work teachers spend their time doing, with much less time spent on grading or lecturing and more time spent on finding resources and planning appropriate learning activities.

In regards to this aspect of technology-supported change, teachers and administrators reflected fairly similar sentiments. Respondents to open ended-survey items independently identified differentiation as a key way the 1:1 program has changed or improved their instruction although one suggested that technology is not able to differentiate everything. From teacher interviews, the sense that they were able to reach students at a variety of levels or from different linguistic backgrounds, not only in terms of providing materials but via the ability to spend time in small groups or 1:1 while students worked on engaging and appropriate tasks using a computer was nearly universal. Teachers also endorsed the notion that their workload has shifted and that they spent more time planning various activities and creating online tasks; whereas some saw this as an increase in workload, others saw time spent using technology to create differentiated material as replacing time that used to be spent making copies or grading.

Teachers reporting a shift toward differentiation as a foundation for their instruction represented a variety of teaching positions in regards to grade and whether they were a general classroom teacher, a general educator in a co-teaching classroom, a special educator in a co-teaching classroom, or a special educator in a specialized (self-contained) program, or even specialized positions such as reading specialists and ESL/Bilingual teachers. However, the strongest statements reflecting a shift in this direction came from special education teachers or individuals who had frequent contact with students with disabilities, with these individuals reflecting an average weight of 2/2 in regards to their support for technology in supporting differentiation. For the most part, these individuals suggested that they could never provide the tremendous access to appropriate resources or the opportunities to provide direct instruction from a teacher that they have been able to provide in the last few years without access to 1:1 technology. As one teacher put it, “you would have to be superman or an octopus in order to

provide that level of tailored instruction.” They also noted the ways in which they were able to provide this access without having to segregate students based on learning-levels.

Even amidst this general strong support for the impact of technology on teacher ability to differentiate, provide multiple modes of instruction, and allow for multiple ways of demonstrating learning, contrasting voices were heard. One special educator felt strongly that her struggling students did not show growth from computer-based programming, needed more hands on work and did not feel that technology had afforded her the opportunity to provide this. Another felt that she could not rely on technology as the center of her instruction because her students who struggled with behavior challenges often misused the technology resulting in its removal, rendering her in search of a “plan B” and limited the opportunities for using the devices to differentiate.

It is interesting to note that even those teachers who reflected a positive opinion of a technology-supported instructional paradigm to support differentiation tended to reflect a notion of differentiation which placed an emphasis on difference rather than universality. Using the octopus metaphor provided by the teacher quoted above, differentiation was often described in ways which suggested doing many different things in order to meet many different needs. This reality exists, to some degree, in tension with the principles of UDL or the possibility that technology could promote Inclusive Education via multiple modes of accessing the same materials or experiences. Some of this, I believe, is semantics in that when teachers talk about differentiation they are conditioned to talk about what they are doing differently for student groups, largely because these are the types of activities they have been expected to demonstrate that they are undertaking in order to support all learners. Although the concept of differentiation

via universal design may have been at work, teachers were unlikely to cite this as an example of differentiation.

Another code which was used to describe explicit connections between technology and Inclusive Education via differentiation was termed “norm of differentiation”. In contrast to the types of differentiation described above, this code was used when teachers did address the notion that their classroom was a place in which difference was universal versus a notion that differentiation occurs in order to do something for those who are deficient. Although this code was applied fewer times (15 overall) it had a mean weight of 1.7/2 reflecting strong inclination toward Inclusive Education and a positive perception of technology. Overall, teachers in SSD reflected support for the relationship between technology and differentiation, although the degree to which their concept of differentiation was centered on remediation or an Inclination toward Inclusive Education varied based on personal factors discussed later in these findings.

Technology and parent engagement. Without doubt, parent engagement reflected the least amount of change as a result of technology among the four areas measured. On measures assessing the degree to which teachers felt that technology had positively influenced parents ability to engage with school or had increased their engagement with the students’ academic progress, t-tests did not yield significant results, even at a test level of three, suggesting that mean responses to these items were not significantly greater than three; analysis run with a test value of 2 were significant, however, indicating a neutral/slightly negative response overall. These were the only measures of impact of technology to receive scores below the neutral level. An item assessing whether technology had increased teachers ability to engage with parents was significant at a test value of 3 but not 4 indicating slight positive/neutral results.

These findings were supported by qualitative sources. Parent engagement was not commonly mentioned in open-ended survey questions, but it was a significant topic of discussion in both principal and teacher interviews. Overall, the notion of technology supporting parent engagement received a weight of .3/2, and parent engagement with student academics as a result of technology weighted overall at .16/2. These low levels of support were not shared by administrators. Although two principals discussed the persistent challenge of getting parents involved- a term which they used to refer to attendance at school events or response to school communications- they also highlighted the ways in which teachers were using apps and social media to share with parents what was taking place in the classroom. While many teachers also discussed such applications, and several appreciated the ease with which it supported parent communication, discussion around the degree to which teachers felt that parents were connected with their child's education painted a more complex picture. It appeared that while these apps made communication easier, more frequent, and more collaborative between teachers and parents who were generally well-connected with the school, it did little to engage parents who may have been less connected. Indeed, two teachers suggested ease of communication had made it somewhat more difficult to form deeper relationships with parents or relieved parents of some responsibility as they no longer had to physically come to the school or speak on the phone.

In regards to the ways in which bringing home a laptop impacted parent engagement, no teachers endorsed the idea that parents were able to see or understand more in terms of their students' progress as a result of the 1:1 program. In fact, the reverse was true with several suggesting that parents knew less about the work their students were doing and were spending less time working with their students because they didn't have to (the computer was doing it for them) or they had not been given sufficient support in terms of using the technology to

effectively utilize teacher websites and other resources. One principal suggested that taking home the laptops replaced the need for parents to fully understand homework. This individual explained, “We used to have that problem, ‘I don’t speak English so I can’t help them.’ Now, they can’t say that anymore. They have everything they need right there,” seeming to suggest that the technology could act as a parental substitute. One teacher pushed back against this notion, noting that “I think parents used to be at the table with the kids during the work. Now they’re seeing them on the iPad but they’re not doing it together. That’s a loss.” One administrator and a majority of teachers suggested that parents who were not adept at using the district website or social media were less informed than they had been in the past because schools were no longer sending home paper reminders or paper homework and parents were used to “checking the backpack.” While they cited some efforts at meeting with parents to help them to know where to look for information etc. the loss of paper communication between home and school appeared to generally have a chilling effect on parent involvement for less-connected families.

Another area of discussion exploring the relationship between parent engagement and technology centered on the notion of home access to computers and internet. Principals pointed out that this was the first year in which all students were charged a \$60 technology fee (with reduced fees for additional siblings) at registration. In the past, families who wanted their student to take their device home were expected to attend a session discussion the laptops, sign a waiver, and purchase insurance at a rate of \$80/student (with reduced fees for additional siblings). Some principals saw this shift as a positive move toward family engagement in that everyone would be on a level playing field in terms of the ability to bring their computers home. But probing in this area provided a more nuanced picture. In the first year of implementation,

waivers of the insurance fee were provided to homeless families and other special cases while payment plans were set up for families who could not make the full payment but could do so in time. The following years, these plans were less frequent and the waivers were eliminated.

When asked if they had families for whom the tech fee was a burden, no administrators cited this as a major barrier for families, although all acknowledged that some families simply never paid and others continued to require payment plans. Most stated that 85-95% of their students brought their computers home daily. While this reflects a large percentage of the population, it was difficult to get a clear picture in terms of the degree to which the remaining 5-15% were at a disadvantage from their peers. Similar issues around wireless internet connectivity at home were noted with teachers varying widely in the degree to which they felt a lack of internet connectivity outside of school was a challenge for them. While some stated that most students did not have regular access and that this created a significant barrier, others stated that most of their students had access and that those that did not were able to download materials before leaving.

In terms of both the tech fee and home internet access, the means for knowing whether it posed a challenge or a barrier for families appeared to be the number of parents who had come to them indicating that it was a concern. Thus, while there was an initial push to get all students registered to take their devices home, it appeared to be largely the responsibility of the parent for approaching the school if they were unable to do so. Similarly, no standard measure of whether students had home internet was used and, again, it was generally only a concern when a parent came to a teacher or administrator voicing it as a concern. For those that did not have access, they were often referred to go to the library or McDonalds to use the Wi-Fi, despite the fact that use of the devices in a public place was actually in violation of the use agreement signed by parents. Still, all schools offered after-hours programming which would allow students to access

the internet with supervision both before and after school. While it is possible that access (whether due to money for the tech fee, money for home internet, or the ability to obtain internet elsewhere) is not a significant issue (as most administrators and teachers suggested), it is also possible that they were unaware of the ways in which families had responded to the technology mandates without expressing concerns to their teachers or administrators. In any case, the reality remains that ensuring universal access via concentrated efforts at financial support or facilitating internet access did not come across as a priority based on the data collected for this study.

This is especially interesting in light of the articulated purpose of the 1:1 program as facilitating access to learning opportunities outside of school because, as one administrator put it, “8-3 isn’t enough for our kids, they are two years behind in reading, they need more.” This discrepancy between the goal of access outside of school and a lack of attention devoted to ensuring that families could support that access was highlighted by several teachers. Many noted that they felt that parents just did not have sufficient experience with the devices provided by the schools to either 1) monitor their student’s use or 2) use resources such as teacher websites or educational programs. These individuals described the time they spend updating their website in hopes of making their classroom more transparent only to discover in conversations with parents that they did not know how to even access them. While these comments generally reflected the sentiment that either the school or parents needed to do more to improve this connection, one teacher expressed a more critical view of the way in which the district had failed to engage (or had actively disengaged) many parents with the implementation of 1:1 technology, describing the whole initiative as a sort of “Americanization program...They just want to be able to say, look what we did, we gave all these computers to little brown kids and look how nice it all looks

now.” Because the relationship between technology and parent engagement is central to understanding Inclusive Education in SSD, this issue will be further discussed in the section exploring Inclusive Education. Overall, the general lack of connection between parents/families and the 1:1 program represents one of the most significant findings of this study and one that will be fully explored in the discussion of findings.

Technology and access to knowledge. The final aspect of a technology-supported paradigm shift explored by this study relates to the methods, people, and places through which students are able to access knowledge. Whereas the prevailing paradigm in education today continues to place the teacher in the role of holder and dispenser of knowledge with students receiving instruction from them in the classroom only, technology is suggested to have the potential to disrupt this phenomenon by allowing students to access knowledge on devices in the classroom and outside of it, shifting the role of the teacher to that of a facilitator. Unlike the areas discussed previously, survey measures in this domain reflected significant results on single sample t-tests using a test value of 4, indicating what could be interpreted as significant support for the notions that technology had increased students abilities to access and engage with academic material outside of the direct instruction of a teacher, and that it had increased opportunities for students to demonstrate knowledge in new ways; a final item in this domain assessing the use of technology to access and engage with academic material outside of school yielded significant scores using a test value of three but not with a test value of four indicating generally neutral/slightly positive results (mean >3 but <4).

Despite the fact that statistical measures indicated generally stronger support for change in this domain than others, it was not as frequently or strongly voiced in qualitative measures as a key impact of the 1:1 program. Without doubt, support for changes to the role of teacher away

from a keeper/giver of knowledge and toward that of facilitator were often reflected in teacher experiences, although not as often or as powerfully, as sentiments around differentiation and increased opportunity for small group/individualized instruction. This may have been the result of the ways in which teachers conceptualized the changes and may also be due to what could be construed as overlap between the domains of differentiation and access to knowledge. It is not difficult to see the ways in which a shift toward a fully differentiated classroom built on small group and individual teacher-student interactions in the midst of independent or collaborative work using technology seems to demonstrate the ability of students to gain and demonstrate knowledge outside of the direct instruction of a teacher.

Still, several teachers also described approaches to “flipping” their classroom which students were often accessing new information independently (whether at home or school) via their device and then collaborating with a teacher to further understand or gain practice in a given area. While two teachers described using such an approach, several others presented it as an ideal or something they feel like they should try but had not yet done so due to uncertainty about whether it would work for their students. In the words of one teacher, “We haven’t really tried that flipped classroom stuff. I just don’t know if they would actually do it but I guess it’s something we should look in to.”

Interestingly, outside of the positive survey findings in this domain, the body of qualitative data describing changes in the way students were accessing knowledge was relatively limited compared to other domains. When it did occur, discussions around the changing role of the teacher often reflected more attention to efforts at differentiation and targeted small-group or individual instruction. Although teachers may not have highlighted it directly, the ability to approach instruction this way while ensuring the learning of all students requires that some in the

classroom were accessing information, practicing skills, or demonstrating their learning outside of the direct instruction of a teacher; in this sense, access to knowledge outside of the teacher was often implied but less frequently discussed. Still, given the district's emphasis from the beginning of the program on the ability for students to bring devices home and to extend the learning day, this was almost never mentioned by staff as a change resulting from the program.

Personal and Organization Factors Impacting Perceived Impact of Technology

The ways in which personal factors and organizational factors (approaches to implementation) impacted staff responses to technology represented another critical component of inquiry in this study. On this front, one of the most salient findings was the disconnect between the ways in which administrators and staff members described approaches to implementation and their results. Often, approaches which were described with enthusiasm by administrators were explained somewhat negatively by staff members. Data in this area was nearly entirely qualitative in nature based upon interviews and field notes with the exception of using demographic survey data to describe personal factors relating to PIT. The table below reflects the counts of codes applied to describe personal or organizational factors relating to PIT; these data are explored more fully in the following sections.

Table 8: Counts of Codes Describing Personal/Organizational Factors Impacting PIT

Code	Count
Admin Dictating use of Tech	13
outsider pressure	3
Choice to Participate	11
Implement by highlighting success	3
Risk Taking	2
Collaboration	12
District culture of in-house experts	13
Mindset	15
Fixed Mindset	5
Flexible mindset	10
Purpose/Messaging	3
purpose of tech= differentiation	1
purpose of tech= engagement	1
purpose of tech= learning outside of school	1
purpose= 21st century learners	4
Staff Reactions	34
Initial Fearfulness	14
Staff turnover due to success	1
Staff turnover due to unwillingness to change	2
adopting tech to appease admin	2
lack of expert guidance	5
multiple competing initiatives	2
teacher fear of losing control	1
tech at expense of other needs	11
training only focused on tech	2
turnover due to workload	1
turnover adversely affecting initiatives	1

Personal factors impacting perceived impact of technology. In terms of strict demographic measurement, the most significant factor in determining staff responses to technology appeared to be background as a special educator or current work with students with disabilities with years of experience (both in the district and in education) also demonstrating

significant effects on PIT. Interview and open-ended survey responses help to interpret these findings with strong evidence from these sources that, in terms of teaching position, special educators or others deeply involved in teaching students with significantly differing abilities generally reflected a more positive perception of 1:1 technology than teachers in other positions. A similar conclusion with regards to years of experience, however, is not apparent from the data collected. Contrary to what might be assumed, several of the most experienced interview participants reflected strongly positive perceptions of technology, reporting significant changes to their instruction across multiple domains while some of the least experienced interview participants demonstrated the most resistance to change in the face of technology. Still, several administrators described the ways in which some of their more experienced staff had struggled with the transition to a new approach and had chosen to leave or were choosing to leave in the near future as a result.

What are we to make of the apparent contradiction between the notion that many experienced staff were leaving or had left while those surveyed or interviewed often expressed positive views of technology and a technology-influenced shift in pedagogy? Why would staff who have more regular interactions with struggling students be more inclined toward a positive perception of the 1:1 program? Interview transcriptions with these individuals suggested that staff approached their pedagogy with distinct differences appearing between individuals who appeared to demonstrate what might be termed a fixed mindset versus those who reflected a growth-oriented mindset (Dweck, 2008). Indeed, it was these differences (which might also incline individuals to choose to work with struggling students or stay in challenging teaching positions for long periods of time) which appeared to account for the largest share of teachers' responses to technology.

Although these terms are used in the literature to describe the ways in which individuals understand their capabilities and respond to challenges, they are well suited to explain what appeared to be a thought pattern common among teachers who were the most resistant to technology-supported changes to their classroom environment. Interview participants who expressed a fixed conception of 1) how they should teach, 2) what they should teach, and 3) what children should do in school, tended to reflect wholesale opposition to the notion that technology could or should fundamentally change their classroom. Administrator interviews exposed a similar pattern with principals citing a willingness to take risks and openness to ceding control of some aspects of instruction as key factors to allowing 1:1 technology to have its intended effect; beyond this, they noted that many staff who were largely unwilling to do these things had chosen to retire or leave the district. More frequently than discrete demographic factors, staff mindset regarding expectations of what and how students should learn seemed to determine response to the 1:1 program. Individuals with favorable overall opinions, favorable views of the program's impact on student outcomes, and those demonstrating the biggest perceived shift in their own practice reflected a much more flexible concept of what and how students should learn whereas teachers with a fixed concept in this area tended to see technology as distracting from or complicating an expected set of developmental tasks, curricular areas, or teaching practices. Indeed, acceptance of the notion that some of the expectations and approaches that may have been considered essential in the past may be in need of reconsideration, appeared to be fundamental to movement toward a technology-supported paradigm shift. This makes sense as the model proposed by Weston and Brooks seems to illustrate discrete areas that will accompany the acceptance of a more flexible expectation for what and how students should learn.

Within discussions which served to outline teacher mindsets in regard to what and how students should learn, several specific areas of concern emerged. Both teachers and principals suggested that technology is somewhat limited in its usefulness for literacy although they varied in the degree to which this appeared to influence their overall response to technology. While some pointed to the limitations in literacy as evidence of the futility of the technology, others simply stated that they tend to use other approaches to teach literacy while continuing to demonstrate support for the technology overall. Although general sentiment reflected the limitations of technology in literacy, technology was seen as a huge benefit to student literacy by one bilingual teacher as it allowed their students to access books in their native language that would not be available in the city or classroom library. Despite some degree of concern expressed by most about the appropriate role of technology in literacy, it appeared that the interpretation of technology's usefulness in literacy often corresponded with individuals' mindsets.

Perhaps the most commonly heard sentiment relating to the issue of what and how students should learn came from early grades teachers suggesting that 1) The amount of screen time expected was not developmentally appropriate and 2) The expectation that technology be used across curricular areas limited time for important developmental tasks such as drawing, cutting, and interactive play which adversely affected student development in these areas. While it might be easy to dismiss this sentiment as reflective of a fixed mindset, data suggests that the reality is somewhat more complicated than that. Even some of the most reflective teachers demonstrating a high-degree of technology-supported changes in their pedagogical approach voiced this concern (albeit less strongly than others reflecting a more fixed mindset). Indeed, the question of the degree to which five or more hours a day of computer time for five and six

years olds is appropriate and the degree to which this may replace other critical tasks is valid. Although it did not preclude all teachers from adapting new practices, those that did often reflected a sense of concern at the unknown consequences of this shift.

The potential impact of teacher mindset on their response to technology represented a novel finding that emerged from interview data. It was expected that existing attitudes toward technology might play a role in teacher perceptions of the 1:1 program; however, interview data suggested that the effect noted was not limited to attitudes toward technology. Overall acceptance or dismissal of the notion that there is a fixed vision for what a classroom should look like, how teachers should teach, and what/how students should learn was a strong predictor not only of perceived impact of technology, but also of inclination toward Inclusive Education (discussed later). Unfortunately, there were not survey measures targeted specifically at these areas. Thus, while open-ended survey responses and patterns from both staff and administrator interviews support this finding, staff-wide data reflecting the relationship between these fixed notions and response to technology is not available.

Organizational factors impacting perceived impact of technology. While the focus of this study centered on teacher perceptions of the 1:1 laptop program, several co-occurring district initiatives appeared to influence teacher responses to technology. Perhaps the most significant was a district-wide shift toward center-based reading and math instruction, which required the use of a small-group model of instruction. This is significant given the number of individuals on survey and interview measures who reflected movement toward this type of instruction. Thus, it cannot be assumed that technology was the sole factor driving a shift in this direction. Another initiative, a district-wide push to move toward standards-based grading, was mentioned by two administrators as potentially supporting the use of technology for collection of data and

formative assessments. Thus, we cannot say that technology was the only driver of any observed shifts toward small-group, differentiated instruction or toward the use of formative assessment. However, given the ways in which teachers described the critical role technology had played in allowing students to meaningfully engage with material while they worked with a small group or the ways in which they were able to collect and analyze more data than could have been done previously, technology-initiatives and the shift toward small-group instruction and formative assessment appeared to be mutually supportive.

Issues around technical support and training were expected to be critical organizational factors influencing teacher perception of the 1:1 program, although the data did not reflect these as a priority. Although t-tests run on survey results yielded general neutral/mildly positive opinions around the adequacy of the district's technical support and training/developments (test values significant at the 3 test level but not the 4 level), issues around technical difficulties or a lack of training in regard to technology were only mentioned on one occasion in an interview and on two open-ended survey items. When they were, they did not reflect complaints overall regarding the district's approach to tech-support, but rather discussed their hesitancy to rely on technology because if something did go wrong they would need to have a backup. It is noted that individuals who did share these concerns reflected a more negative overall perception of the technology, and while we cannot say that this influenced their tendency to highlight the challenges of tech support, the generally low number of respondents citing difficulties with support for their devices suggests that this was not a major organizational flaw. Indeed, the lack of frequent mentions of technical difficulties appeared to suggest that the district's approach to tech support was a positive factor in regards to its impact on teacher responses.

Another area, training and professional development, reflected a more complex picture. While survey sentiments were not negative and staff did not indicate in survey or interview responses that they did not have access to appropriate training or development opportunities with regards to technology, two individuals in interviews highlighted the degree to which all development opportunities had become tech-focused at the expense of opportunities to gain coaching on the implementation of new standards or curricular expectations. Whereas one administrator asserted that “No one can say that they aren’t supported in terms of technology,” referring to the immense number of workshops offered throughout the year and over the summer, teachers did, in fact, reflect feeling not supported in terms of other areas for growth, noting that tech-focused development taught the use of new programs or app but didn’t give them opportunities to understand and plan with new literacy or math curriculum.

This notion of technology at the expense of other needs was echoed on multiple occasions and was used to refer to needs for staff training/support in addition to discussing the needs many students were experiencing in terms of social or financial difficulties facing their families. The sense that computers could not fix the many “problems” facing students and families in the communities was voiced on two occasions, both times accompanied by frustration at the amount of money spent on technology in light of the complex needs of the community. Issues around the cost of technology were also raised in light of discussion around the poor condition of many school buildings and the low-pay (compared to state averages and the surrounding area) for teachers in the district.

This idea also appeared in the statements of teachers who felt undermined by the district’s recognition of staff for their outstanding use of technology but not necessarily for other types of outstanding work. One teacher reported receiving no positive feedback for doing “very

high level work with students” outside of technology while receiving lavish praise for what she considered “very low level tasks” using a computer. Another noted the ways in which district-wide staff meetings were used to only recognize accomplishments relating to technology. Administrator interviews indicated that this was not an accident, and that one of their key approaches to implementing the 1:1 program was to initially allow people to choose to participate and then to highlight the positive things that were happening in these classrooms in order to breed a sense of desire (and even jealousy) for the technology and to promote teachers to push themselves in their use of the computers. While the approach appears to have had its intended effect initially, the lack of attention to other areas contributed to the sense that many shared of feeling unsupported with regards to anything unrelated to technology.

The sense that some administrators had adopted an inflexible mandate of tech for everyone/tech for everything was apparent in several staff interviews and on some-open ended survey responses. Interestingly, staff who expressed a feeling of being bound by the fixed expectation that they had to use technology for all their instruction- whether by being denied access to paper or by being given explicit expectations regarding the amount of time students should be on the computer, tended (as a group) to reflect more negative responses to technology and less shift in their pedagogy than others. In this sense, the degree to which administrators allowed teachers autonomy with regards to how and when to use technology appeared to influence teacher willingness to explore the potential of technology without feeling bogged down by what they considered ineffective uses. It must be said, that even staff with a higher degree of autonomy were expected to use computers throughout the day as a central component of instruction via positive peer pressure and the limiting of paper resources.

One final issue that occurred in several administrative interviews which likely impacted the ways in which teachers responded to technology (although it was mentioned only twice by teachers) was the issue of staff turnover due to technology. On the first day of the site visit, the district superintendent described his frustration with the fact that he is unable to pay his teachers enough to stem the tide of high turnover (25% annual) which had been occurring in the district. Administrators, made more explicit connections between technology and turnover, indicating that they had lost many highly valued staff members due to the success of the program (these staff were recruited by other districts) and that they had also had several staff members who were generally unwilling to adapt to the new environment choose to leave. Although technology use had not been incorporated into teacher evaluation formally, teachers described feeling a sense of obligation to use technology in order to be considered effective and the ways in which administrators described tech-related turnover appeared to lend evidence for this belief.

The Teacher-Administrator Divide. The high rate of turnover described here seemed to coincide with a larger finding around the disconnect between administration and teachers with regards to the perception of technology. Administrators interviewed for this study were wholly supportive of the 1:1 program; with none voicing any concerns about this being the firmly-established direction the district was going in. While none expressed any concerns about 1:1 generally, one principal frequently emphasized the limitations of technology in literacy instruction and described the ways in which they had worked to address this. When asked directly how they would describe staff reactions to the 1:1 program most described an initially mixed reaction that had now settled into widespread acceptance and excitement. However, closer examination of their statements reflected an awareness of the variability in teacher responses and a somewhat dismissive approach to addressing their concerns. One administrator

suggested that “I don’t think my teachers would be able to go back to not having the laptops. They complain at times but I don’t think they even understand the richness of resources that are available to them every day.” While this sentiment seemed to reflect an awareness of teacher concerns, it also represented a fairly paternalistic response, suggesting that teacher concerns were not a significant factor in administrative decision making. Other administrators focused on the ways in which they conveyed the message that, “if you’re not comfortable, there are other places to teach,” to teachers who struggled to adapt to the new way of teaching and accepted high turnover as a sign of success.

Of course, accepting the resignation of teachers who you do not feel are doing what is necessary to ensure student success may also be considered a sign of strong leadership with a clear mission. However, these statements reflect a significant disconnect between teachers and administrators in the ways they understood the relationship between technology and student outcomes. While teachers did occasionally describe frustration with changes in the workload due to technology, the vast majority of concerns were ostensibly concerned with what teacher’s perceived as an adverse effect of technology for student achievement. As described earlier, this was pronounced in the primary grades although staff in other areas shared these sentiments. As one fourth-grade teacher explained, “We parade people through these buildings every week and everyone is so impressed with what we’re doing with the technology. They still can’t read. There in fourth grade and they can’t read. Technology hasn’t fixed that. It might not be so impressive if they knew that.” Indeed, when teachers felt as though their students were performing better than in the past as was the case with a special ed teacher who suggested that, “I could never give my kids these tools in the past. They are progressing so much faster,”

technology was often praised as the source of this change. Technology was also readily scapegoated by teachers who saw student performance stagnate or worsen over time.

Thus, while teacher statements reflected an intimate connected between their perceptions of their students' academic achievement and their perceptions of the 1:1 program, administrators tended to assess the value of the 1:1 program in terms of the changes it brought to the school environment as a whole and pedagogical approaches of their teachers. Whereas teachers provided or sought evidence that computers had impacted academic achievement, administrators asserted evidence that computers had helped to create a cultural shift. The disconnect between interpretations of the 1:1 program are reflective of divides within the research in the field and their implications will be explored in the discussion section.

Perceived impact of technology: Summary. The case of SSD is a strong illustration of the way in which reliance on quantitative measures like means can mislead. When the aggregate variable of Perceived Impact of Technology was analyzed, t-tests with a test value of 3 yielded significant results although a value of 4 did not; recall that on the survey a response of 3 indicated neutral sentiment toward technology, a 4 indicated positive sentiment and a response of 5 indicated strongly positive sentiment. Similarly, the majority of survey items used to assess the degree to which staff supported the 1:1 initiative, felt it had improved outcomes for their students, or reported changes in their approaches due to technology resulted in scores with a mean that was only slightly above three- a score which, statistically, reflected an essentially neutral to slightly positive response. And yet, information gained from open-ended survey items and interviews provide a more nuanced picture. In this case, neutrality did not necessarily mean a lack of sentiment or a lack of change, but rather a complex way of making sense of what has been a wholesale change in the pedagogical approach advocated (and expected) by their

employer. This is not a place in which opinions or practices have been unaffected by technology, but they have done so in varied ways.

When individual survey responses or interviews were reviewed, they did not tend to reflect wholly positive or wholly negative sentiments with the exception of several individuals whose comments on open ended terms often reflected a fairly fixed idea of what and how students should learn (a notion which generally excluded technology). Outside of this group, staff demonstrated a range of responses on different items that likely varied with their own experiences and the nuances of their position or school environment in ways that this study could not measure. And yet, despite this variation, teachers reported using their devices for at least 65% (on average) of their instruction. One principal suggested that teachers might not be fully cognizant of the degree to which things have changed as a result of 1:1 technology and the statements of two teachers may support this sentiment. While neither of these individuals represented wholesale support for the 1:1 program, they mused that they and their peers often wonder what they did with their students before they had access to the resources they have now.

Did teachers in schools with a high degree of technology integration demonstrate a paradigm shift away from traditional models of education characterized by the use of summative assessment, large-group/undifferentiated instruction, low parent-engagement, and access to knowledge in the classroom alone? The answer is both yes and no. In regards to a fundamental shift in the way teachers characterized their own of their school's approach to and outcomes with family engagement, the answer on all measures is no. In regards to a shift toward formative assessment, the answer is a tentative yes, given mildly positive survey results and a majority of open-ended responses highlighting the ways in which technology has allowed for the collection and use of multiple sources of data when compared with only two interview respondents

suggesting that technology has not impacted their approach to assessment. As to whether technology has supported a shift toward differentiated, small group/individual instruction and/or the ability of students to access knowledge outside of direct instruction, the answer is a stronger yes given both positive survey findings and the extensive discussion in open-ended items around the ways in which technology has allowed for differentiation, small group instruction, meaningful independent work, and access to a world of resources. Still, the degree to which learning outside of the school day was not reported on any measures as a key outcome of the program does limit the degree to which changes in these areas have been truly transformative in the way the Weston and Brooks (2008) model describes.

It would be inaccurate to conclude that there has not been a shift toward a new educational paradigm as a result of technology in SSD; however the magnitude of this shift should be characterized as small when measured across all staff. It is fair to say that a shift is evident although at this time, it is somewhat reined in by many factors which will be discussed later. In regards to Although this study sought to assess the relationship between technology and Inclusive Education in this setting, it did not anticipate the degree to which issues around the school-family-community relationship and the factors which account for that (race, language, class etc.) would factor into the impact of technology in this setting. While the discussion section will fully explore this relationship, the following section seeks to discuss the administrator and staff inclinations toward Inclusive Education alone before analyzing these findings in tandem with findings relating to technology specifically.

Assessing Staff Inclination toward Inclusive Education

Earlier, I discussed the difficulty in defining Inclusive Education in such a way that it is both clear and measurable. It seems that it is a concept for which we are more readily able to

explain or recognize what it is not, than what it is. This study utilized a three-dimensional model for defining Inclusive Education (Waitoller & Artiles, 2013) which drew on a three-dimensional concept of social justice suggested by the work of Fraser (2007). While this provides a fairly comprehensive way to characterize the concept, it is not without its challenges. Perhaps the greatest challenge for this study was the task of measuring teacher inclination toward Inclusive Education broadly- across domains of inclusion and across multiple aspects of student/family identity- while using language that was specific enough to be understood by staff and measured by the researcher. Indeed, asking teachers to simply explain the way they understood notions of normalcy and diversity did not seem likely to promote open dialogue in interviews, although asking questions about how teachers or schools responded to particular groups felt limiting. Further complicating the matter was the constant reality that for most teachers, Inclusive Education referred to the mainstreaming of students with disabilities. While the study sought to look beyond this definition, it also recognized that in this setting, there was a strong possibility that this notion of inclusion might represent a well-understood way to explore attitudes which might be reflective of a larger inclination toward or away from Inclusive Education.

Given the complexity of measuring Inclusive Education, the study employed a multi-faceted approach using concrete questions regarding attitudes toward mainstreaming (as one potential proxy for inclusion) in addition to attitudes toward various aspects of student/family identity and its relationship with education on survey measures and as initial interview questions. Because of the familiarity of teachers in discussing the notion of inclusion in reference to students with disabilities, the survey assessment relied more heavily on items soliciting opinions in this area than in other areas. In interviews, responses to items discussing a school or teacher's response to various aspects of student/family identity were elaborated on via the use of probing

questions to seek broader insight into staff's overall understanding of normalcy/diversity and their subsequent inclinations toward Inclusive Education.

It is important to note that the three domains addressed in this study maintain a dynamic relationship with one another; while they serve to support one another they can also exist in tension with one another. However, it is supposed that evidence of efforts in these three areas are necessary in order to truly work toward an inclusive vision of educational justice. Thus, while I will examine the three separately for the sake of analysis, it is important to keep in mind the ways in which movement in one domain may support or (at times) undermine one another.

The tables below reflect T-Test results for survey items relating to Inclusive Education. While these findings are discussed in more detail in the following sections, it is important to note that overall Inclination toward Inclusive Education was not significantly positive, nor was the Potential for Technology in Inclusive Education nor the category of Outcomes for Technology in Inclusive Education. The data below indicate that while teachers voices theoretical support for statements reflecting principles of Inclusive Education and felt that their schools were working toward principles of Inclusive Education, they did not necessary prioritize these principles in their own practices (based on self-report) and they did see a relationship (theoretical or actual) between these principals and the 1:1 program.

Table 9: One Sample T-Test Results for Survey Items Relating to Inclusive Education (*indicates significance at 95%)

Item	N	Mean	SD	SEM	t(3)/ t(4)
important for students w/disabilities and families to have voice	102	4.6078	.61591	.06098	*26.365/ *9.967
school is working toward providing voice	102	3.7157	1.07517	.10646	*6.723/-2.671
I am working toward providing voice	100	3.8400	.92899	.09290	*9.024/-1.722
students and families from all backgrounds have an important voice	105	3.9048	.99541	.09714	*9.314/-.980
students and families have a voice in academic life of school	105	3.7905	1.09803	.10716	*7.377/-1.955
individual works hard to provide quality learning for students of all backgrounds	105	4.6667	.54889	.05357	*31.114/ *12.446
individual works hard to ensure that low-income students have access to quality opportunities	104	4.5962	.59966	.05880	*27.145/*10.138
Inclination Toward Inclusive Education	86	106.9419	12.26027	1.32206	*19.622/- .800
School Inclination Toward Inclusive Education	99	28.3838	4.94399	.49689	*20.898/*8.823
Potential for Technology in Inclusive Education	94	17.1596	4.39771	.45359	*4.761/-6.262
Outcomes for Technology in Inclusive Education	93	35.5269	7.82636	.81156	*6.810/-5.512

Table 10: Counts and Weights for Codes Relating to Inclusive Education with Mean >1 or <-1.

Code	Count	Min	Max	Mean	Median
Inclusive approach to Discipline/ student relationships	6	1	2	1.5	1.5
parental fear/intimidation	4	-2	0	-1.5	-1.5
environment designed to meet student needs	13	-1	2	1.4	2
high expectations b/c of inclusion	5	2	2	2	2
mutual responsibility for all students	12	-2	2	1.3	2
positive opinion of co-teaching	15	-1	2	1.5	2
social benefits of inclusion	1	2	2	2	2
intersecting identities	1	2	2	2	2

These findings in addition to discussion other sentiments uncovered via the coding process will be explored as they relate to each dimension of Inclusive Education in the following sections. It is important to note that given the relatively limited number of codes reflecting strong inclination toward or away from Inclusive Education, much of this analysis took place by probing not only interviews which expressed strong inclination, but those that did not. Indeed, what might be described as a generally neutral sentiment toward Inclusive Education as a principal on the part of many participants or the feeling from participants that district policies did not reflect an inclination toward Inclusive Education itself represented a significant finding in this area. It is also important to note that the findings explored in this section seek to assess inclination toward Inclusive Education broadly and not only as it relates to technology. Additional findings of data which reflected an explicit connection between Inclusive Education and technology are shared in the discussion section.

Redistribution. Several survey items sought to assess individual teacher and school efforts at redistributing access to meaningful educational activities for several student and family groups which have historically experienced social exclusion. These survey items assessed the degree to which individuals reported working to ensure meaningful learning opportunities for students of different cultural, socio-economic, linguistic backgrounds and academic levels, even if that meant providing different or more resources to different students. One-sample t-tests run for these variables yielded significant results at a test level of 4, indicating significant support for these values- at least theoretically.

Open-ended survey and interview responses appeared to support a strong positive inclination toward Inclusive Education within the realm of redistribution with many staff reflecting an understanding and willing acceptance of the notion that they might have to change

their approach or even “give more” in terms of support or instruction to some students and that this was acceptable. Indeed, one teacher embodied this notion with the mantra that “fair doesn’t mean equal” which appeared to represent the prevailing paradigm.

In regards to redistribution in order to respond to the needs of racial, socioeconomic, or linguistic diversity in students, teachers were almost unanimously supportive on survey measures. However, in interviews most individuals struggled to talk about the role that race or class played in their classroom or school. In discussions of promoting access for students with disabilities or students who struggled in school, teachers had what appeared to be a more clearly formulated system of beliefs. To this end, the vast majority endorsed a co-teaching approach for the majority of students with such needs, describing how it has benefitted students (even those without such needs) both socially and academically. Indeed, in regards to physical or language disabilities and learning disabilities, the idea that pedagogical approaches or the classroom environment might have to change in response to the needs of some students was rarely questioned.

However, in regards to students with significant behavioral disabilities (overall) and students with significant learning or cognitive impairments (at the middle school level), the notion that they should be in mainstreamed classes or that it was the teachers job to adapt to the needs was not endorsed. Those individuals who had generally demonstrated what was previously described as a fixed mindset in terms of their expectation for students and for their practice tended to disagree with the notion that schools were responsible for changing their environment or approach in order to support students who demonstrated significant behavioral or academic challenges. These individuals often expressed frustration that no one “did anything”

about kids that acted out or significantly struggled academically, by which they implied that these students were not identified as having disabilities and/or placed in another classroom.

It is important to note that support for specialized placement for students with disabilities was not always interpreted as a disinclination toward redistribution. Indeed, many teachers voiced a sense of wanting to do everything they could to support a spectrum of student needs and strengths in their classrooms but felt that their limitations were limiting student potential and, in response, voiced the question as to whether their students could be better-served in more specialized classrooms. This sentiment appeared to differ greatly from the idea that “no one does anything,” especially given that Inclusive Education values not only access but achievement. In general, expressions of a desire for more staff in order to fully meet the needs of all their students or questioning a mandate of “inclusion for all” were coded as a desire for a spectrum of supports which is not inherently at odds with the goal of promoting access and engagement for struggling students.

The idea that on the whole, staff appeared to support the notion of redistribution broadly without being able to articulate the ways in which several aspects of student identity (such as race and class) played a role in their pedagogy is likely reflective of the district’s approach to redistribution generally. Indeed, in many ways the entire 1:1 program with its insistence on the ability of students to bring devices home is reflective of an effort to redistribute resources within the school community. The district’s decision five years ago to employ a co-teaching model for special education, effectively eliminating resource and some self-contained special education programs, is another example of a top-down initiative which could be considered redistributive. While both have received generally positive support from the community, the decision to implement both without engaging in deep exploration around issues of normalcy, diversity, and

identity with staff first appears to have limited the degree to which such a program reflects deep change. Rather, they reflected a sort of Robin Hood approach to inclusion in which new opportunities are afforded to those which may not have had access previously without a shared understanding of why exclusion had been occurring and without dialogue with those who had been excluded. The specific ways in which technology served to promote or inhibit meaningful efforts at redistribution are further discussed in the Section entitled Technology and Inclusive Education

Recognition. The lack of a vocabulary to use in the discussion of student and family identity among staff in SSD reflected a generally diminished importance of recognizing and valuing student differences. Certainly, a strong push toward the assessment, acceptance and support of diversity in terms of academic levels or learning styles was readily apparent. Teachers fully accepted the notion that they needed to know what “level” their students were at and that it was their job to reach them at that level rather than to force them to learn at a particular pace or with a particular method. While these activities should not be discounted, such deep interaction with student diversity was largely limited to academic skills or inclinations.

Whereas teachers could talk at length about recognizing student academic needs, they generally had difficulty responding to questions about the importance of recognizing and valuing differences around race or ethnicity. When asked about how their school or their classroom recognized or responded to student racial diversity, respondents in the first three interviews explained that their school “wasn’t very diverse.” In future interviews, this was clarified and the term racial/ethnic background was used. Many teachers described an environment in which prejudice was not a problem and in which students did not necessarily ascribe significant value to their own racial identity. Within this discussion several individuals found themselves

questioning whether they were doing “enough”, sharing that this was something that they had not thought about extensively. Others eagerly pointed to heritage projects that students completed as evidence of their recognition of diversity but struggled to discuss larger issues around racial/ethnic identity such as the role that the discrepancy between staff racial/ethnic makeup and community demographics played (if any) in the school environment. On this point, teachers of bilingual students differed from others, as they were quick to discuss this discrepancy and the dynamic it served to create in some schools. Another (white) teacher independently identified the loss of a core of Latino/a staff members over the years as a loss for many of his students. Whereas it was clear that these three individuals (all of whom had expressed special personal interests in social justice) readily recognized not only race, but class and language as key aspects of student identity and acknowledged their role in education, the remaining responses suggested that this was not a common occurrence or a district priority.

A similar response pattern was observed in interview items exploring the role of socioeconomic background. One major limitation with regards to the survey measures aimed at assessing recognition in these areas was the initial omission of survey items asking the degree to which teachers thought it was important to recognize and value the experiences of students with different linguistic and socioeconomic backgrounds. It is unclear why these items did not appear in the web-based version of the survey which was initially administered. Although the fact that they were not appearing was recognized and remedied within a week, the majority of respondents had already completed the survey leaving results for those who did complete the item invalid. Despite the absence of survey data in this area, interviews spoke volumes about the ways in which recognition of these aspects was limited for most teachers. While teachers and administrators strongly agreed that socioeconomic status strongly impacted their students,

discussion around the ways in which this occurred were largely limited to physical resources. One teacher's largely representative response was, "I mean our social worker keeps clothes and coats and things like that. We help pay for field trips if they can't afford it and we always adopt some families at Christmas for gifts and stuff." This individual, like others, struggled to elaborate any ideas about the role of class outside of discrepancies in physical resources needed for school. In many ways, teachers recognizing differences was limited to activities designed at redistributing opportunity as a result of those differences rather than understanding and valuing difference.

Discussion around the recognition dimension in terms of linguistic diversity was somewhat more nuanced although it reflected inclinations both toward and away from inclusion. Because most staff work with students for whom English is a second language, awareness of the role this status has on education both in terms of academic needs and in terms of working with families was high. The district has provided targeted training in supporting English Language Learners in the classroom in addition to investing significant resources to receive training in engaging Spanish-speaking parents and families. This knowledge was apparent in staff's ability to describe specific ways in which ESL status impacts students- not just in terms of needs but in terms of the tremendous benefits of bilingualism. Three teachers independently described not only what they have done to support ELL students in their classroom but also voiced enthusiasm for the tremendous skills these students have in terms of eventually mastering two languages. Indeed, this support for bilingualism was being supported by district policy overall as two elementary schools were moving toward the implementation of dual-language programs starting with kindergarten classrooms in the 2015-2016 school year. Administrators who described their openness to adopting such a model independently supported the notion that this was a more

inclusive response to recognizing linguistic diversity, highlighting the desire to shift from extinguishing to maintaining proficiency in students' native language.

And yet, the shift toward recognizing and fully valuing bilingual students had not occurred in all staff. Two individuals expressed their own sense of fear and concerns at a movement toward dual-language programming, largely as a result of concerns about their job security. One individual described her experience of a staff meeting in which a video of a Mandarin-English dual language classroom was used as an example of the model that would be used; to their dismay other staff members were heard scoffing. "I couldn't believe it," this individual remarked, "I mean they were actually laughing and saying 'ching chong', it was really upsetting." While recognizing that much of this came from fear about job security, this teacher was clearly upset by the response and by the inability of her coworkers to see beyond these concerns and be open to a new approach.

One interesting anecdote about the shift toward valuing bilingualism emerged during the course of this study. For several years, the district had utilized a phone blast system to call all district families and provide information about important events. These calls had always begun with the phrase "Este mensaje se repetirá en Español" (this message will be repeated in Spanish), followed by the information first in English and then in Spanish. During the period of data collection, however, calls that went out began with "this message will be repeated in English" with subsequent information stated first in Spanish and then in English. Two teachers mentioned this change while we discussed issues around engagement of Spanish-speaking families. When they were asked what they thought this indicated, neither articulated a strong opinion but both suggested that they wondered if it would be upsetting to English-only families. After two Spanish-first calls, messages reverted to their English-first format.

Apart from what appeared to be strides toward the recognition and valuing of native language status, the lack of a deep sense of recognition of the value of all aspects of student and family identity reflected presents one potential explanation for the limitations of the districts approaches to redistribution. The ways in which both administrator and teacher interviews reflected a lack of experience in exploring the ways in which multiple aspects of student diversity impact students suggested that a lack of a strong understanding in this area has limited the ability of staff to recognize or respond to student needs that arise from this diversity. Areas of identity such as race and socioeconomic background reflected a general absence of a full conception of the interaction between these factors and education with the exception of staff who were specially trained or had professed personal interests in these areas. Some areas which had been targeted for growth via the implementation of policies and programming reflected a more nuanced and purposeful approach to recognition. Whether as a result of co-teaching or the expectation of the use of differentiated instruction with the introduction of 1:1 laptops, support for the recognition and valuing of student differences in regards to academic levels, learning styles and the like was strong. Similarly, staff were fairly adept at describing the ways in which ESL status impacted their students in terms of classroom modifications, and several staff independently voiced a highly strength-based perspective of bilingualism in their students. Still, two participants and anecdotes from others suggested that such recognition of the value of bilingualism was not universal.

Before moving on to discussion of the third domain of Inclusive Education, it is important to acknowledge another limitation of the discussion around recognition. I discussed earlier the challenge of allowing participants to express their sentiments around Inclusive Education broadly, while using terms that were concrete enough to be used in survey measures

and to promote conversation using terms with which teachers were familiar. As such, the decision was made to discretely explore various aspects of student and family identity. This decision is, in itself, limiting as identity is not governed by a neatly prescribed by a set of characteristics. In addition to this messy reality, my own limitations in terms of recognition are illustrated by the complete omission of any survey or interview questions relating to gender as a feature of identity. While this is certainly not the only omission, it is significant. Interestingly, one participant served to highlight this limitation by independently talking about school-wide approaches to inclusivity in this area including the purchase of more gender/sexuality inclusive book sets for classrooms and the founding of a district-wide gender support team to work toward responding with inclusivity to students and families reflecting non gender or hetero-normative identities.

Representation. The complexity of implementing programs to reflect a value of linguistic diversity in SSD arose as a prominent issue when assessing the representation domain. A core element of assessing representing centered on the degree to which students and families, especially those belonging to historically excluded groups, were given a voice in advancing claims (Waitoller & Artiles, 2013) of exclusion and in voicing potential solutions. In this domain, as in the domain of recognition, inclination toward Inclusive Education was generally low. Although representation should not be interpreted exclusively to indicate family voice in SSD, given the younger age of the majority of students, it certainly represents a strong component. Data did not yield any examples of specific initiatives aimed at promoting student voice although several discussions around increased student engagement and dialogue at one middle school site visit did explore the ways in which technology has been used to this end. This will be discussed in the section exploring technology and Inclusive Education.

In regards to the issue of family voice and family representation, several survey items assess the degree to which teachers felt that students and families had an important voice in the school community, and the degree to which empowering these groups to have a voice represented an important goal for individuals or schools. On these items, only one which asserted the importance of giving voice to students with disabilities and their families yielded significant t-test results at the test level of 4. Other items assessing representation were significant at the test level of 3 but not 4 indicating general neutral/slightly positive results.

Overall interview analysis did not reflect any individuals who felt that parents had significant voice or power in either the academic or social life of the school. It is important to note that the study intentionally allowed staff to interpret the notion of family voice and engagement on their own terms. Most tended to rely on attendance at school events or frequent communication with teachers as primary indicators of family voice, reflecting the notion that families themselves were responsible for their own representation. Many expressed frustration that there were particular parent groups who were “involved” no matter what, while others were simply difficult to engage: “I mean, the parents who were always involved, they’re probably more connected now but there’s always those people who just aren’t involved.” This difficulty did not, according to most teachers, necessarily break down along racial or linguistic lines but tended to have a stronger relationship to family socio-economic status; parents who had significant time commitment to work as well as those who were not employed (or were underemployed) but had demonstrated financial challenges tended to be underrepresented according to teachers.

A different understanding of representation and its relationship specifically to racial/ethnic and linguistic diversity was voiced by a few participants. One administrator

described a decision to dissolve the PTA because this type of hierarchical organization was a “very white, middle class” approach to parent involvement; this individual instead had implemented more varied and parent-initiated avenues to involvement which appeared to have resulted in broader family representation in the school. Similarly, bilingual staff who were interviewed both enthused that the parents of their students were highly involved and great educational partners although these same parents often struggled to connect with larger school initiatives. Another teacher asserted that his motto was “partnering with parents for the educational success of all children” although he did not always see this value reflected across other staff in the school.

One individual described a sense in which Spanish-speaking parents (even those who also spoke English) were fearful of bringing issues to the attention of administration, although they would frequently come to her with valid concerns. This person described what might be described as a paternalistic relationship between her school and Spanish-speaking families with the notion that it was the school’s job to Americanize students as a core sentiment. Interestingly, when asked about family engagement for Spanish speaking families another staff member in the same school who had a decidedly less critical stance described the hosting of events such as a college night, “I think it was a good thing to give them that exposure because a lot of my students, especially the girls, just aren’t brought up to value education so this opened the door for them a little bit.” Certainly, the decision to host a college night is not inherently an exclusionary practice. However, the discourse around meaningful engagement for Spanish speaking and Latino families in this particular example suggested a fairly strong disinclination to representation of all families on their own terms.

Despite support on survey findings for the importance of student and family voice, teacher reflection on their own practice in both surveys and interviews revealed a general lack of understanding as to what it means to build representation and a subsequent lack of activities which would support this domain. Indeed, the finding in surveys and interviews that suggested a negative relationship between 1:1 technology and parent engagement represents one of the most significant findings of this study and one major area for both further research and future action for those who are strong advocates of educational technology.

Pathways to Sensemaking in the Relationship between Technology and Inclusive Education

The findings shared until this point have attempted to segregate responses to technology and responses to Inclusive Education. The following section seeks to illuminate the ways in which teachers themselves made sense of the relationship between these two areas. Table 11 represents interview coding data in which participants made explicit connections between technology and issues related to Inclusive Education. Some key findings emerge from this data. The first is that among all codes in which an explicit connection between technology and Inclusive Education was made a wide range of responses was exhibited (weights ranging from -2 to 2) and a generally neutral mean (1.6) was achieved; this suggests large variability among interview respondents' sensemaking in regards to 1:1 and Inclusive Education. A brief look at the other codes and sub-codes further illustrates this variability. The area of technology and differentiation had a positive mean (1.3) but again had scores spanning the entire range whereas the area of technology and family engagement had a negative mean (-.7) but also had scores spanning the entire possible range. While we could make discrete conclusions about each area measured, it appears that the variability within codes (not between codes) is truly the story here. Indeed, while some trends emerged- more negative sentiment regarding technology and parent

engagement vs. more positive sentiment for the value of technology in differentiation- making conclusions about interview respondents as a whole obscures valuable information about alternate ways teachers made sense of these policies. In general, teachers interviewed reflected one of three patterns of sensemaking around the relationship between technology and Inclusive Education. Each of these patterns are described below.

Table 11: Counts/Weights for Codes Describing Connections between Technology and Inclusive Education

Code	Count	Min	Max	Mean	Median
Tech Impact on Inclusive Ed	131	-2	2	0.6	1
Technology and Ability/ Differentiation	66	-2	2	1.3	2
Tech to build pride/audience engagement	8	2	2	2	2
Technology for Intervention	4	-2	0	-1.3	-1
Technology for Students with Disabilities- Academic Impact	17	-2	2	0.5	1
facilitating useful sped documentation	1	2	2	2	2
learning outside of school	4	1	2	1.8	2
norm of differentiation/ minimizing differences	15	0	2	1.7	2
tech as unifier/ common experiences	6	1	2	1.2	1
tech highlighting differences	1	-2	0	-2	-2
social benefits of tech for swd	4	1	2	1.5	1.5
support gened interaction with swd	5	0	2	1	1
tech facilitating access	20	2	2	2	2
Technology and Family Engagement	23	-2	2	-0.7	-1
Issues with Home Connectivity preventing access	19	-2	1	-0.6	-1
Technology and Socioeconomic Inclusion	14	-1	1	-0.5	-1
Tech Fee Issues preventing access	5	-2	0	-0.4	
cost to repair issue for low-income families	4	-1	2	0.5	0.5
parents not familiar with tech/ less involved due to tech	19	-2	0	-0.9	-1
tech as imperialism	3	-2	0	-1.7	-2
tech for transparency	3	2	2	2	2
Technology and Linguistic Inclusion	11	-2	2	0.9	1
tech supporting student-teacher relationships	8	1	2	1.6	2

Positive Perception of Technology, Positive Inclination toward Inclusive Education.

About ¼ of respondents were very positive about technology and also able to talk at length about school and individual efforts toward Inclusive Education; these individuals generally saw a positive relationship between the two. Interestingly, these were not all individuals who had been predisposed to accepting the technology. One individual described their initial skepticism, stating that “I used to have the computers out on tables while we read from books just so that they could see that I was playing the game.” And yet, this individual went on to describe their strong support for the program at present. Interestingly 3 of the individuals in this general category were special educators while another one was a general educator who was co-teaching (meaning they had special education students in their classroom); only one teacher in this category had limited exposure to students with disabilities. These individuals were also noted to reflect a flexible mindset in regards to what and how students should learn. And, while it is impossible to determine whether this mindset was a result of their positions, whether it led them to choose those positions, or whether it had come about in another way, it appeared to influence the way they perceived both technology and Inclusive Education. For this group, the belief that student achievement had increased as a result of technology appeared to largely inform their sensemaking around technology and largely accounted for their belief in a positive relationship between the two. This may not be surprising given that their frame of reference for “success” was likely more oriented toward the removal of barriers (due to their work with students with disabilities) than may have been true of other teachers.

Negative Perception of Technology, Negative Inclination toward Inclusive Education. Alternately, about ¼ of respondents were generally negative about the impact of technology; these individuals also tended to express more sentiments that would suggest a low

inclination toward Inclusive Education. For example, these individuals might question whether “those students” (referring to students with behavioral disabilities) should be in general classrooms, or they reflected a strong deficit-orientation to student racial and socio-economic background (i.e. discussing cultural norms or low-income issues exclusively as barriers to academic success). Four of these individuals were general educators while one was a general educator in a co-taught classroom. These individuals often did not voice a directional relationship between technology and Inclusive Education because Inclusive Education was not a value for them. This group tended to associate what they saw as a lack of growth in achievement with flaws in the 1:1 program and district decisions to ignore larger deficits in the community. As one teacher explained, “It’s just hard to justify all this money for computers when we have some many kids with so many other problems.” This group tended to reflect a largely fixed mindset in terms of their expectations of what and how students should learn and behave in school which appeared to mediate their acceptance of both technology and principles of Inclusive Education.

Mixed Perception of Technology, Mixed Inclination toward Inclusive Education.

The remaining approximately ½ of individuals interviewed reflected mixed perceptions of the impact of technology as well as mixed inclination toward Inclusive Education. They would identify strongly positive and strongly negative aspects of the 1:1 program; for most, the positive aspects related to supporting the logistics of differentiated instruction and grading whereas the negative aspects related to adverse effects on social/developmental skills and parent engagement. They also demonstrated evidence that they supported principles of Inclusive Education although they also questioned at times whether these principles were always practically achievable. For example, these teachers would make statements like, “I think co-teaching is great, but it can’t

work for all kids.” Instead of placing the responsibility for ensuring a supportive environment on schools, they tended to see Inclusion as something that was nice to do rather than essential and saw it as only impacting kids who were different (rather than understanding the diversity of all students). The limits of their inclination toward Inclusive Education actually correlated somewhat with their critiques of the 1:1 program. Whereas they tended to see exceptions to inclusion for behavior problems, they also saw technology as negatively impacting social skills. Whereas they supported the idea that teachers should respond to a wide range of academic strengths and needs within the classroom, they saw technology as positively supporting their ability to do so. These correlations also reflected areas in which they held fixed or flexible mindsets. Whereas they held inflexible conceptions of how students should behave, they held more flexible notions of what and how students should learn; again, these mindsets appeared to mediate their response to technology and efforts at Inclusive Education.

Pathways to Sensemaking: Conclusions. Table 12 highlights key elements of these three different sensemaking pathways observed.

Table 12: Pathways to Sensemaking in the Relationship between Technology and Inclusive Education

	Perception of Technology	Inclination toward Inclusive Education	Relationship between Technology and Inclusive Education	Mindset	Student Populations
Pathway 1	Positive	Positive	Positive	Flexible	Largely special education
Pathway 2	Negative	Negative	Not Applicable	Fixed	Largely general education
Pathway 3	Mixed	Moderate	Variable (both positive and negative)	Variable depending on subject	Largely general education with some special education

In observing these distinct patterns to sensemaking around the relationship between technology and Inclusive Education two major conclusions emerge:

- 1) The metric for “student success” matters and varies based on student population.

Teacher perceptions of whether technology was supporting or hindering student success influenced the way they perceived the technology. For teachers of students with disabilities, the ways in which they defined success centered more on questions of access and opportunity whereas general education teachers focused on traditional measures of academic achievement. Whereas evidence for students accessing new opportunities abounded, evidence for increased academic achievement was limited. This appeared to influence perception of technology.

- 2) Mindset matters. Anywhere teachers demonstrated a flexible mindset (whether overall or in regards to specific areas), teachers were both more positive toward technology and more inclined toward inclusive education; there was also an explicit

positive relationship between the two in these instances. In instances where teachers demonstrated more fixed notions of student achievement, there was limited acceptance of technology and Inclusive Education and either a neutral or positive relationship between them was described.

These key conclusions hold strong implications for policy-makers in the way they define success within their organization and the ways in which they help staff to interpret changes, setbacks, and successes; these implications will be discussed in the following section.

Discussion

Possibility and Reality in Technology and Inclusive Education

Data from this study suggested that a strong inclination toward Inclusive Education which incorporated dimensions of recognition and representation (as opposed to only redistribution) was not pervasive among staff at SSD and that the relationship between this inclination and technology varied according to personal factors. More than anything, findings suggested that absent focused attention to these dimensions, the possibility that technology could support the growth of a broadly inclusive paradigm shift was limited. I begin this section with an anecdote that highlights the tension between providing technology *to* students in an effort to address exclusion in contrast to an approach which (centered on recognition and representation) seeks to empower students and families via technology.

Beginning with the whispers of attendees at site visits hosted by the district, questions of the relationship between technology and race and class were embedded within the question of whether technology had managed to penetrate entrenched mindsets/practices or if it represented what might be imagined as a new coat of paint. For many visitors, the contrast between these classrooms and others in bordering districts were striking. Questions about the racial/ethnic, linguistic, and socio-economic makeup of the population stirred among tour groups while many noted (somewhat incorrectly) that students in this district were better-off financially than most neighboring communities. Administrators in interviews and panel discussions at the district-hosted conference used the phrase, “if we can do it here, anybody can do it” on three different occasions after highlighting the district’s predominantly Latino, predominantly low-income population. On one level, this statement was factually true. SSD was not only a low-income district in regards to its student population, but also in terms of its own finances with per pupil

spending lower than state averages and lower than bordering districts. If they could find the money to put devices in the hands of all their students, certainly anybody could do so.

And yet, this statement conjures up a sense of the way in which the administration, as an entity, characterized the community it was tasked with serving. Coming from an individual who was not from the community, whose background was not reflected of many in the community and did not have strong personal ties there, using the term “we” to discuss the apparent difficulty of ushering in a new approach to education in a poor, largely minority school district seemed to reveal what might be understood as a deficit-oriented understanding of the community. While acknowledging the fact that all individual administrators may not have personally reflected such a view, the ways in which the notion that “we can do it anywhere” may have trickled down to mediate interactions between administrators, staff, students and families was significant.

In general, this study was careful to avoid discourse or syntactical analysis; interpreting data as it was stated without specific attention to the implications of word choice, voice, or other such factors. In light of the ways in which technology implementation demonstrated a fairly clear lack of engagement with parents, and in light of the ways in which domains of recognition and representation were often overlooked despite administrations frequent emphasis of the challenges of the demographic makeup of the community, a less literal interpretation of this statement seems appropriate.

This anecdote is presented not to provide negative personal characterization of district staff. Rather it serves to highlight the ways in which the very decision to implement a 1:1 program was inevitably impacted by issues of race, class, language and other elements of identity. Moreover, “if we can do it, anybody can do it” embodies the potential for technology to be a transformative resource in the lives of children and families- many of whom grapple with

multiple sources of social exclusion regularly while, foreshadowing the reality that seeking to address these sources of exclusion would prove to yield little meaningful change without recognizing, valuing and giving voice to the community itself.

Redistribution, Technology and a Sense of Purpose

This is not to suggest that a negative relationship between technology and Inclusive Education was observed. Correlational analysis indicated a significantly positive relationship between Inclination toward Inclusive Education (ITIE), and both School Inclination toward Inclusive Education (SITIE) and the Perceived Impact of Technology (PIT) among survey respondents (Appendix C). While this does not reflect that a pedagogical shift as a result of technology causes a similar shift in inclination toward Inclusive Education, the two concepts were related. Survey results also indicated significant correlations between PIT and Potential for Technology in Inclusive Education (PTIE) and Outcomes for Technology in Inclusive Education (OTIE), indicating that teachers with a more positive perception of the impact of technology were more likely to support statements asserting a potential or observed positive relationship between technology and Inclusive Education. This is especially interesting because t-tests suggested that overall scores for PTIE and OTIE-which asked respondents to rate the degree to which they saw technology potentially or currently supporting various aspects of Inclusive Education or alleviating frequent concerns with Inclusive Education- were only significant at the test level of three and not at a test level of four. Thus, while a correlation between the two concepts was detectable within teacher sentiments as reflected on the survey, teachers tended to respond to the question of whether they saw a relationship between the two with a neutral or only slightly positive response (<3 but >4). These variables were most likely correlated due to the fact that individuals who exhibited a more growth-oriented or flexible

mindset were more open to both the changes technology could offer and toward attitudes and practices reflecting a more inclusive approach to education. It might be said that, to a large degree, core beliefs about what and how students should learn were among the most significant factors influencing both response to technology and inclination toward Inclusive Education.

When we consider this finding in light of the concern voiced by many that the “nuts and bolts” of technology had become the dominant focus of district administration (especially in terms of teacher development), it is not difficult to understand why overall, teacher perceptions of technology or staff inclination toward Inclusive Education were not significantly positive and had not changed significantly as a result of the 1:1 program. Despite administrator statements which identified redistribution-in terms of redistributing access to learning material via technology, the extension of the learning day, and the assurance that all students in the district would have access to 21st century learning materials- as a central goal of the 1:1 program, a sense of the purpose of technology initiatives in the district was largely absent from staff data. Interview respondents who were asked whether they had a sense of the goals of the 1:1 program struggled to articulate a clear purpose, with more critical individuals suggesting that it was just something the administration did to “look good” and more supportive individuals musing that it was probably to help kids be more engaged.

This lack of purpose combined with the common sentiment that students and schools had other big “needs” (largely implied to be related to the demographic makeup of the student population) made the 1:1 program somewhat problematic for many individuals, even serving to inculcate a deficit-driven perception of the community and a reluctance to change as a result of technology. Certainly, the degree to which policy and its messaging is able to change mindsets in these areas is up for debate. It is possible that clear messaging around the goal of technology

to support inclusion or discussion/training around the development of a more flexible concept of what and how students should learn would do little to change findings. However, it is clear here that the infusion of devices without establishing a clear understanding of their purpose or articulation of the ways in which they could help to solve the many “problems” teachers observed to adversely impact their students created a cognitive dissonance among many staff members, which limited their inclination toward technology-supported instructional changes negating the full potential for these changes to promote a more inclusive educational environment.

Noting the degree to which lack of a sense of purpose appears to have limited the potential for technology to influence teachers’ inclination toward Inclusive Education, the study found strong support for the ways in which technology supported the redistribution of access in this setting. Survey and qualitative measures demonstrated that teachers believed that students were able to engage with material outside of their direct instruction, thus removing the potential ways in which reliance on the teacher to provide knowledge and skills could limit access for many students. Especially in the area of allowing for differentiation of materials and allowing for students to demonstrate knowledge in new/varied ways, interviews and open ended surveys were highly supportive of the notion that technology had provided previously inaccessible means to both of these ends. All but one of even the most technology-reluctant teachers reflected a notion that their classroom had shifted (to varying degrees) from a “one to all” to an setting in which students could direct their own learning, work 1:1 with a teachers or in small groups with or without teacher support more readily. Despite the lack of test scores as evidence that this type of access has resulted in academic growth, teachers tended to attribute positive outcomes to this

approach, even when they expressed concerns for the overall impact of technology on academic growth.

The significance of technology-supported differentiation was the most striking in regards to its apparent impact on facilitating the inclusion of struggling students, with many teachers describing the ways in which they could provide appropriate resources to all students without having to segregate students based on needs. This not only enabled students with various academic needs and strengths to learn and demonstrate their learning within a non-segregated context, but it appeared to facilitate what might be considered a “norm of differentiation” in the district as a whole. Administrators and teachers alike reflected a new normal in which everyone was expected to be working on something different depending on their needs, interests, or pace. As such, technology-supported instructional practices had appeared to shift the very notion of differentiation from something that was done to address deficits and toward a universal expectation. In the sense that technology had served to create classrooms that more fully reflected the principles of Universal Design for Learning, the 1:1 program appears to have had a significant impact on redistribution to meaningful learning activities for most students, with perhaps the strongest impact on students who previously had struggled.

One final issue relating to the potential for technology-supported redistribution must be explored and that is whether access to devices, absent of any changes on the part of school staff, in themselves had any power to promote Inclusive Education in this setting. The possibility that they might is not novel with much anecdotal evidence supporting the ways in which individuals (especially children) can be empowered by the capabilities technology provides with little to no instruction or support on how to do so (OLPC, 2015). It was not within the domain of this study to assess the degree to which students had experienced increased access to learning opportunities

and engagement with the world had occurred as a result of access to devices. However, the frequency with which teachers described student and family misuse of technology- generally in terms of accessing material beyond that which had been assigned- and the common sentiment that students had more technology expertise than teachers, suggested that this could be occurring although it was doing so outside of school-sanctioned activities. As such, another study exploring the unintended use of technology and its implications would make an excellent complement to this study.

The Centrality of Recognition and Representation in Efforts toward Inclusive Education

Of course, messaging was not the sole factor influencing staff responses. The reality that 1:1 implementation had occurred with a primary focus on redistribution, often at the expense of promoting recognition/value for student diversity among staff or representation among students and families, limited the potential for technology in redistributing access to meaningful learning opportunities- both in and outside of the classroom. In terms of recognition, it was observed that both administration and staff had a strong sense of who their students were in demographic terms. They were Latino. They were poor. English was their second language. These factors did not go unmentioned. What was often lacking was a coherent attempt to give value to the experiences of students as a result of these factors. For many respondents, being poor meant that schools needed to give things like computers or coats, being Latino meant that schools might have to do more to teach what might be considered “academic values”. Interestingly, for most, the recognition of linguistic diversity and diversity in terms of academic skills reflected a more strength-based understanding. Although significant fear about the movement toward dual-language education was voiced (largely due to concerns about job security), staff did not describe English Language Learners in deficit-oriented terms. While acknowledging classroom

or curricular modifications needed to support them, most staff reflected a highly positive view of bilingualism. Similar sentiments generally occurred in regards to students with disabilities or students who struggled academically, with discussion tending to reflect the need to meet students where they were or adapt to their needs while often recognizing the ways in which these students contributed to the classroom overall. An exception, however, was found for students with significant behavioral needs or cognitive disabilities who were generally described in terms which were less strengths-based.

What role did technology play in this tendency toward recognition of diversity without fundamentally valuing diverse experiences? The answer to this question does not lie in the specific practices or experiences of staff, but in the implicit meanings of statements like “if we can do it here, anybody can do it.” As mentioned earlier, one highly critical individual described the entire 1:1 initiative as an “Americanization program”, describing district administration as colonizers who could pat themselves on the back and enjoy the attention of others for giving fancy devices to poor, brown, Spanish-speaking students. Data does not fully corroborate her account, with several administrators (and, perhaps not surprisingly, staff in their schools) reflecting a much more strengths-based conception of the Latino community and of bilingualism and with these individuals using technology to create more flexible classrooms and schools in order to meet students and families on their own terms. Without fully endorsing her characterization, her words helped to provide a framework for the limitations of technology-supported efforts toward inclusion in SSD. Without exploring and seeking to celebrate who students were (beyond academic levels or language status), it was impossible for administrators and staff to understand the ways in which these factors would interact with technology both in and out of the classroom. Perhaps, in this community, the use of computers by families in the

evening to browse the internet should be encouraged? Would parents be better able to find work, inform themselves politically, or even master computer skills necessary to engage in the way that schools wanted if they were able to do so? Perhaps strong intra-family community ties could be leveraged to increase home internet access? Many possibilities emerge regarding the ways in which a better understanding, not only of community demographics, but of strengths and needs and of the ways in which valuing those strengths could support district initiatives. Findings from this study suggest that in order to fully leverage the potential of technology, a different approach to recognizing and valuing diversity was needed.

The domain of representation demonstrated similar untapped potential in regards to technology and Inclusive Education. This is not surprising given the ways in which recognizing and valuing diversity is a necessary part of any work toward empowering marginalized groups. In the school setting, school-family relationships (often described by school staff as parent engagement) are among the most ostensible measures of representation although the degree to which students themselves have voice in their schools should not be wholly ignored.

Accounts from school staff in this study suggested that parent engagement was largely unaffected, or even negatively impacted, by technology despite the suggestion by three administrators that social media had significantly increased and improved communication with parents. This discrepancy is likely due to differing views of what it meant to have a strong family-school relationship. Administrators demonstrated a higher willingness to accept the notion that parents did not need to work with students on homework given the capabilities of the computers they brought home and tended to cite the number of parents who followed the school on Twitter as evidence of engagement. Teachers, on the other hand, often lamented the loss of direct parent interaction with academic material via sitting and working with students (especially

in the lower grades) and noted that parents often got “off the hook” by being able to read an email rather than having to talk to a teacher in person or on the phone.

Beyond differing definitions of engagement, there was evidence to suggest that the ways in which technology had replaced other modes of engagement and communication had served to exclude family groups who already tended to experience isolation from the school community. Teachers frequently suggested that the decision to stop sending home paper notices regarding school events and the fact that homework was often on the computer had a significant adverse impact on many parents as they either lacked the access or mastery to utilize online tools for communication which had replaced paper. Absent significant efforts toward ensuring the access and mastery necessary for parents to use these new tools, parent groups were left without the means to engage with their students’ schools. Given that many of these families also experienced language barriers which also complicated phone and face-to-face communication, it seemed that many of these families were wholly unrepresented in the school community, not just in spite of, but because of the technology.

Here, it is important to distinguish between study data in which administrators and staff described the potential of technology and data which reflected the reality of what had occurred. In regards to family representation, technology held great potential. Whereas administrators and one teacher raved about apps and the ways in which teachers classrooms had become transparent with the posting not only of grades but of the entire curriculum via teacher websites, most reflected that while the computer could provide for families to be highly connected to the school community (both socially and academically) families were largely not using the tools in this way. Furthermore, those families that were doing so were families who had always been highly connected with technology; as such, technology presented a new tool to support the engagement

of those with existing standing in the school rather than a tool to provide such standing to families which had been previously excluded. This failure to harness the potential of technology in promoting representation is closely related to the weaknesses in recognition of cultural and class issues impacting the school community in this setting. Recall the description by one administrator of the decision to abolish the PTA because that approach was simply incongruent with the values and modes of engagement in the community. Similar willingness to consider the ways in which the expected use of technology by families-whether by requirements to access information electronically or by limitations on the types of activities for which computers could be used- interacted with issues of race and class could have served to support progress in this domain; such critical reflection on the interaction between technology and representation was not evident in this study.

Another anecdote yields one final perspective through which to view the interaction of technology and representation in this setting. During the course of data collection, the researcher was tasked to work registration sessions for returning students (in an employment capacity). Here, parents were required to come in on one of two days to complete registration forms online, make payments for registration and tech fees, and show four documents to verify residency within district boundaries. Each of these components was required to be completed in full before a student would be guaranteed a spot. A number of considerations around inclusivity were raised by the process: the expectation to come in at designated times (when waits could exceed three hours), the fee requirements, the ways in which fee waivers were publicly handled; these concerns aside, the relationship between students, families, and technology was striking. While a large majority (90% or more) of families had completed registration forms online at home successfully, for those that needed to do it at school, the limitations of their ability to rely on

technology as a primary medium for playing a role in their child's education was striking. These families reflected minimal experience with skills such as typing or moving the cursor and yet were expected to create registration accounts (which required the existence of an email address- which most of them did not have), and login to these accounts to register their children. Most parents anticipated the challenges this would pose, relying on their students to complete the process for them. For these families, the ways in which an educational process that is wholly reliant on technology could disempower them is striking. Although teachers expected that parents would monitor technology use (and voiced strong disapproval of the fact that many parents were not doing so) such an expectation for these families was truly unreasonable. If these families also experienced language barriers, they were reliant on their children to communicate their concerns to the school and were forced to fully rely on their children to truthfully relay information about events, homework, and the like. Again, failure of recognition and representation served not only to limit the potential of technology but to use technology to further marginalize underrepresented families in these situations.

Of course, family engagement is not the sole measure of representation. This section concludes with a brief discussion of the ways in which technology worked to support student representation. On this note, the potential of technology was much more fully realized. The status of students as experts or teachers where computers were concerned went beyond their ability to support parents in the registration process. Almost half of the staff interviews independently described the ways in which students had become experts, helping one another and helping teachers with tech-support issues. Beyond this, teachers who reflect an openness to a shifting role for the teacher (from that of instructor to that of facilitator) expressed great joy and enthusiasm for the ways in which technology had enabled their students to surpass their

expectations. Several teachers happily shared anecdotes of students finding new information on a topic or discovering new ways to complete tasks completely independently which they could then share with peers, elevating the learning process for the entire class. This tended to occur more often in the upper grades where devices were more often used for research and projects as opposed to practice of discrete skills. Reflecting a similar mechanism in which technology supported student voice and full engagement via their expertise, two special educators suggested that their students, who often struggled with social interaction, were actually more able to interact socially with peers via computer-based activities. In these realms, struggling students were often experts, a fact that gave them increased social standing and the ability to engage in reciprocal relationships with peers whom they were unlikely to engage in more traditional ways.

While it is impossible to know the full scale of increased student representation in academic and social activities as a result of the access afforded by technology, site visits affirmed that this was occurring on some scale. Students presented complex projects which they had undertaken on their own after exceeding the knowledge of their teacher in a particular area. Administrators described the sense that these places were “their schools,” supporting the idea that they should have a voice in what and how they learned, and suggesting that the high degree of student engagement that technology had brought meant that students were equipped and excited to take on this role. In apparent support for this idea, students appeared excited and empowered. These observations, of course, should be tempered with the findings indicating low recognition and valuing of student diversity in order to guard against the possibility that technology was empowering students to engage in particular modes of learning or discourse that were largely not reflective of their own experiences. And yet, this did not appear to be what was happening. As opposed to a sense in which students had managed to confirm to an expected

norm as a result of technology, it appeared that (where it was happening) students were truly being given the flexibility to explore and engage with the larger world on their own terms and to bring what they obtained from these interactions to their classrooms.

Pathways to Sensemaking

In light of these findings, we return to discuss the ways in which the variability of responses in regards to technology and Inclusive Education illuminated findings of critical importance to policy-makers and school-leaders. The discovery of three general pathways to making sense of the relationship between technology and Inclusive Education demonstrated that the ways in which teachers define success for their students largely impacts their interpretation of policies aimed at promoting that success; it also highlighted again the relationship between teacher mindset and both their perception of technology and their inclination toward Inclusive Education. Interestingly, whereas findings suggested a general disconnect between administrators and teachers regarding the impact of technology, this disconnect was not apparent among individual demonstrating Pathway 1 (Positive perception of technology and inclination toward Inclusive Education). Indeed, whereas many teachers were skeptical of administrations unquestioning support for the program based on their own concerns about stunted academic achievement, this was not true among individuals in Pathway 1. This observation suggests that these patterns of sensemaking may also reflect varying levels of acceptance of administrative messaging around technology. While it is fair to question whether administration's focus on student processes rather than outcomes, the varying sensemaking pathways observed in staff seem to reflect a teaching population in which personal mindset and inclination Toward Inclusive Education seemed to predict acceptance of or resistance to administrative messaging around technology. Knowing this, a focus on building inclination toward Inclusive Education

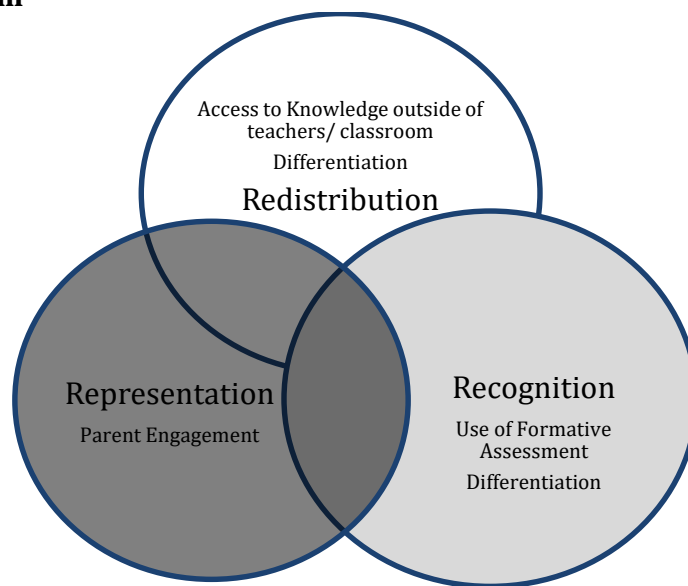
via the cultivation of a flexible mindset within the organization could potentially alter teacher perceptions of technology and possibly present new opportunities for technology to positively impact inclusive practices in this setting.

Theory and Practice: Testing the Model for Technology and Inclusive Education

In order to analyze the relationship between findings around the Perceived Impact of Technology and Inclination toward Inclusive Education in SSD, it is necessary to return to the model advanced earlier in order to demonstrate the potential alignment between a technology-supported paradigm shift and Inclusive Education. With this model in mind, did data support the notion that a technology-support paradigm shift was related to inclination toward Inclusive Education? Findings here, were mixed. The areas of Access to Knowledge and Differentiation reflected the most significant shift as a result of technology. Perhaps not surprisingly, when these activities were examined specifically in terms of the ways in which they promoted the redistribution of access to meaningful learning opportunities, a positive relationship could be established with reasonable certainty. Although at least mildly positive support for the role of technology in the area of Formative Assessment and stronger support for its role in Differentiation, these activities did not play a significant role in promoting efforts to recognize and value student diversity. Finally, whereas Parent Engagement was found to have a negative correlation to technology based on teacher reports, it is not surprising that technology was not found to be positively related to inclusion via representation (at least where family/community representation was concerned). The shading here is used to reflect the degree to which significant findings were observed in each domain with lighter areas representing more significant findings. Whereas there appeared to be support for the notion that technology had enabled redistribution via access to knowledge outside of teachers/classrooms and increased

differentiation, there was only limited evidence to support the advancement of recognition via the use of formative assessment; where differentiation was observed it tended to focus on redistribution versus recognition. Finally, there was no evidence that representation had increased due to growth in parent engagement.

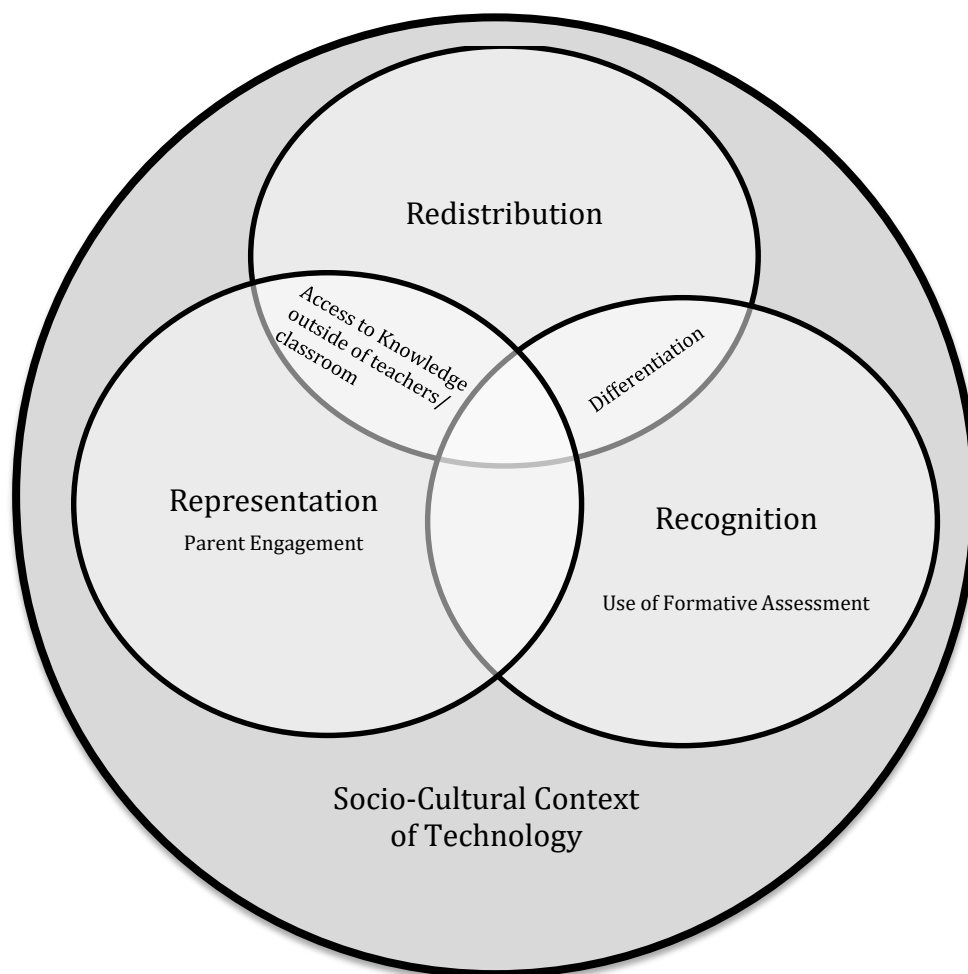
Figure D: Observed Relationship between Inclusive Education and Technology-Supported Paradigm



In light of findings, some changes to the theoretical model advanced earlier are necessary. This study suggested that the domains of recognition and representation were intricately related, especially where school—family relationships were concerned. In general, representation was largely impossible as a result of a lack of recognition of the ways in which issues of culture and class interacted with technology outside of the classroom. While the original model proposing potential changes to the educational milieu as a result of technology focused on in-classroom effects, a study of the interaction between technology and Inclusive Education could not help but be intimately concerned with the role technology also played outside of the classroom- both in terms of its use at home and in terms of its larger meaning in the community. The area of Access to Knowledge was added into the representation domain as a result of findings which suggested

that the ability of students to access and demonstrated knowledge in new ways afforded them new opportunities at representation in the classroom and in their schools overall. Finally, all three of the domains are enclosed within a circle which represents the Socio-Cultural Implications of Technology. As such, the degree to which these technology-supported changes to instruction serve to promote inclusion in this domain is largely determined by the way in which policy-makers and implementers understand them as socially-situated. The degree to which this position is understood, discussed, and (when needed) addressed, these activities are more likely to promote inclusion via recognition and representation. To the extent that this positionality is ignored, technology is likely to have a neutral or adverse impact in these domains.

Figure E: Revised Model for the Relationship between Inclusive Education and Technology-Supported Paradigm Shifts

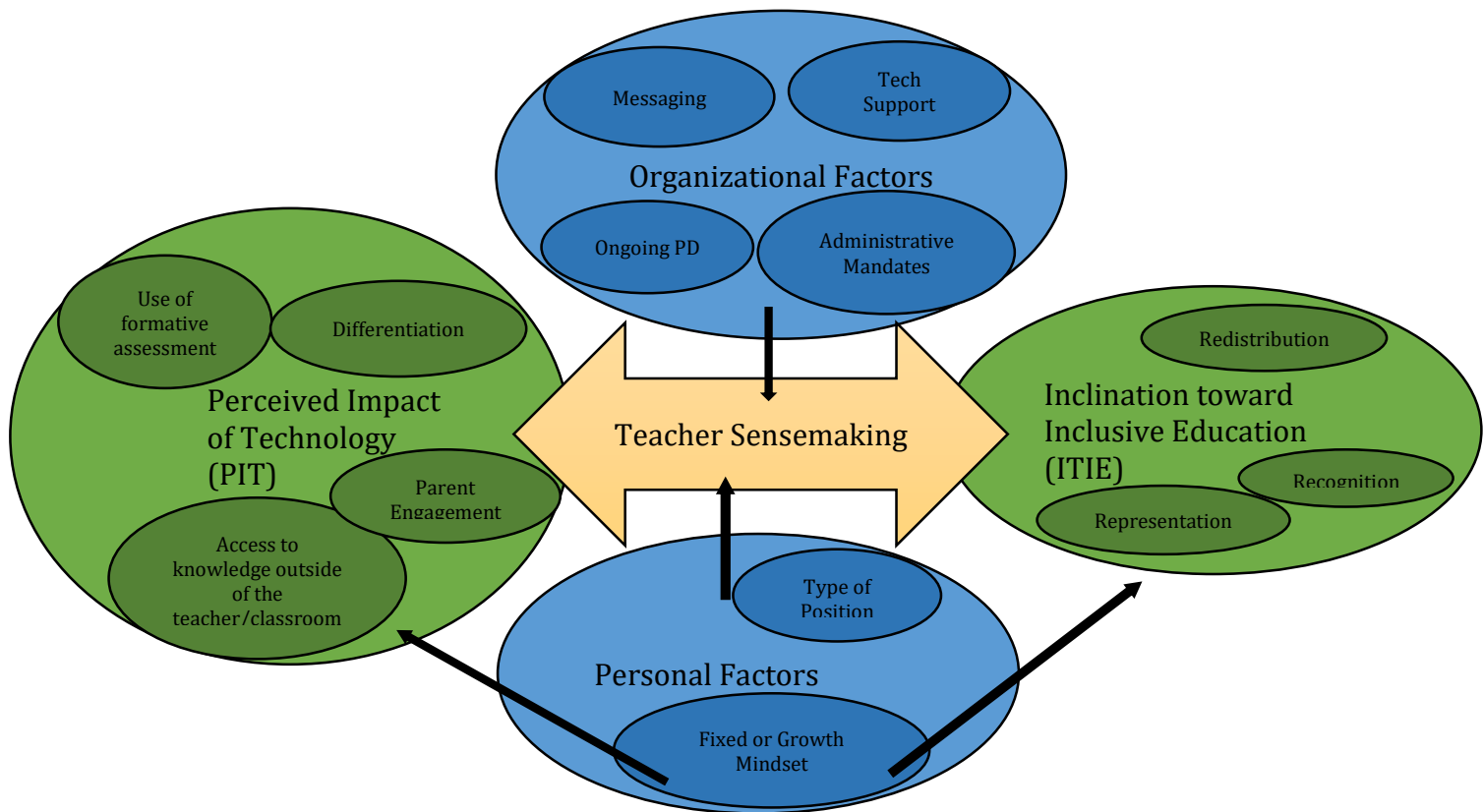


While study findings significantly modified the model describing the alignment between domains of Inclusive Education and technology-supported changes in pedagogy, the model reflecting the ways in which teacher sensemaking was related to the perceived impact of technology and inclination toward Inclusive Education was found to be a fairly accurate reflection of the relationship between these variables. Some minor changes, however, are required to this model. Whereas it was anticipated that teacher demographic factors such as experience or racial background might play a significant role in sensemaking, strong evidence of this was not found. Rather, teacher mindsets around what and how students should learn was the personal factor which most strongly predicted sensemaking around both technology and Inclusive Education. In regards to organizational factors, messaging, training/professional development and tech-support all played a role with messaging appearing to play the largest role. However, administrative mandates (or lack thereof) in their approach to implementation, specifically, the degree to which teachers were afforded flexibility in how and when to use technology, appeared to play an equally large role with teachers in schools reflecting a more administrator-dictated approach to technology use tending to reflect less positive perceptions of technology.

A final change to this model comes in the way in which the shading was done. Whereas originally, colors were chosen to reflect the potential that a positive perception of the impact of technology could mediate sensemaking in order to produce a positive inclination toward Inclusive Education, the data did not support such a directional effect. Rather, data suggested that to the degree in which response to technology and Inclusive Education were related, they were mutually supportive and occurred simultaneously among individuals reflecting a flexible or largely growth-oriented mindset. Thus, technology was not found to be a lever to promote a

shift in sensemaking toward Inclusive Education, but in individuals with a growth-mindset technology provided concrete ways to support inclusive principles, resulting in what might be viewed as a multiplicative impact on both.

Figure F: Revised Model for the Relationship between Technology, Sensemaking and Inclusive Education



Given findings around the inhibiting impact of overlooking the socio-cultural context of technology and the role this played in promoting inclusion via recognition and representation, I would suggest that these findings could be different had more efforts toward recognition and representation had been evident in SSD. This is to say that in order for technology to be a driver of and not just an instrument of inclusion more than redistribution was necessary. Perhaps efforts to more fully explore the ways in which low-income families or families with low social-

capital continued to be excluded in spite of (and in some cases, because of) technology could have prompted changes in this direction. Perhaps, staff discussions aimed at developing strengths-based understandings of their students' unique identities could have supported these efforts. While it is possible to identify any number of discrete activities which might serve to situate 1:1 implementation within the socio-cultural context, it was evident that the general lack of connection between these domains relegated technology to the status of resource rather than that of catalyst where Inclusive Education was concerned.

These results were, in large part, predicted by the literature. Warschauer (2004) asserted that bridging the digital divide was not merely about providing access to technology. It was about mastery of the skills needed to use this technology in ways that would promote social inclusion. It makes sense, then, that parent engagement would be largely unaffected by the provision of a device in a population where many parents had no previous familiarity with these devices and no ongoing support regarding how to use them to engage with their child's education. This study illuminates why access is not sufficient for bridging the digital divide. It is not just about making sure that people know how to use technology (although this is part of it), but it is also about the ways in which technology is used to promote or undermine other activities which recognize, value, and give representation to diverse (and previously excluded) groups. Giving students from these groups access to computers within a context that does not counter the narrative that their demographic makeup is something to be overcome fails to harness the potential of access. As this study demonstrated, in situations where student voice was truly valued, access facilitated remarkably individualized yet meaningful engagement with previously-unexplored opportunities for learning. And yet, in situations where student learning was highly circumscribed by teacher expectations, access did little to change learning opportunities. Indeed,

the digital divide is not simply a question of who has technology, but rather who is able to use technology to improve their opportunities, a reality that is highly determined by teacher efforts at recognition and representation for children in schools.

Although not exploring technology specifically, North (2006) eloquently described the tension between redistribution and recognition which serves to explain the overall ways in which technology and Inclusive Education were related in SSD.

The relationship between redistribution and recognition, then, is complicated. On the one hand, a focus on recognition can distract from the ongoing exploitation of workers and the marginalization and powerlessness of impoverished people. On the other hand, an emphasis on redistribution does not necessarily challenge the underlying social structures and "doxa" [Bourdieu, 1984/2002] that sustain and perpetuate unequal power relations (North, 2006).

Despite the intention to use technology to redistribute access to meaningful learning opportunities to students who struggled, students who did not have computer access at home, and students who needed more engagement with academic material than the school day could afford, the ways in which this redistribution resulted in a wholesale shift toward Inclusive Education in the district were limited. While technology proved to be a useful tool in service of those already inclined toward a model of education which recognized and valued student differences and a means for students to independently access new ways to engage with the world and further their learning independently, technology itself did little to shift the way teachers made sense of student and community identity. In fact, a stark contrast between what they saw as a highly expensive intervention which fully ignored more fundamental needs of students and the community disinclined many teachers toward voicing support for the 1:1 program. The need to grapple with the socio-cultural context of technology in this community on an individual level for teachers and as a district is a key finding of this study. And yet, the finding that perceived

impact of technology and inclination toward Inclusive Education were correlated, demonstrating a mutually supportive relationship in individuals is significant. Knowing this, it is possible that efforts to better understand the socio-cultural context of technology in this community and address resulting issues could serve as disruptive forces to the fixed mindsets of many staff which appeared to limit both their response to technology and their inclination toward Inclusive Education.

Limitations

While the use of teacher sensemaking as a metric for the interaction between technology and Inclusive Education in SSD provided a new lens through which to understand the impact of technology on the learning environment, this decision also limited findings in several ways. Perhaps the most significant limitation comes from uncertainty around the degree to which teacher sentiments and experiences are accurate reflections of what is actually happening on the ground in this setting. This study asserted that without change in teacher paradigms, it was highly unlikely that significant changes (either in the use of technology or in inclusive approaches to education) could occur. While the literature supports the centrality of teacher beliefs and actions as key determinants of the school environment, particularly in response to efforts at school change (Payne, 2008), there remains a limited possibility that change in either of these areas could have occurred without a co-occurring change in teachers. This, in conjunction with the fact that the thoughts and experiences of individuals cannot be said to definitively represent reality requires that findings from this study be interpreted with the knowledge that any picture taken away is a *reflection* of reality which may be missing key details or nuances.

Another major limitation of this study came from the types and volumes of data used to draw conclusions. A mixed methods approach allowed the use of quantitative measures to

broadly describe responses in SSD while the use of qualitative measures further delineated these findings within an explanatory context. This approach allowed for broad conclusions to be drawn, though it potentially limited the power of each individual data source in providing more strongly supported and specific conclusions. More resources devoted to the recruitment of additional survey participants could have yielded more statistically reliable results and enabled the use of further statistical testing. On the other hand, devoting survey resources to the collection and analysis of additional interviews could have garnered additional voices from schools or teacher positions which were not represented in the interview group as a whole. The decision to seek broad data was suitable for the research aims of this study although more targeted approaches could have served to provide more reliable data in specific areas.

A final list of limitations of this study come from issues which were unrelated to study design but which might be considered novice errors. The omission of a gender question on the survey did not significantly limit findings but did reflect one measure for which sample demographics should have been available but were not. Similarly, omission on survey and interviews of any exploration into diversity as it relates to gender identity and sexuality reflected my own “blind spots”. While these were not major areas of focus for the study, the existence of such oversights is acknowledged with the awareness that other such omissions may have occurred. The initial omission of survey items assessing recognition/representation dimensions in issues of socio-economic and linguistic diversity reflected a technical error but one which did limit survey data in this area. The relative strength of findings that support an apparent distinction between inclination toward redistribution and inclination toward recognition/representation, the ways in which the survey tended to explore Inclusive Education as one entity limited its explanatory potential in this area. Instead of exploring discrete areas of

student identity and teacher approaches to inclusion in regards to these factors, a more appropriate approach would have been to include statements assessing sentiments and activities within the domains of redistribution, recognition, and representation respectively.

Conclusion

The world is flattening, but it is far from flat. Significant barriers continue to exclude non-dominant student groups from full and meaningful participation in education. As we continue to move into the digital age, the ability of these groups to access, create, and communicate using digital tools is of critical importance to their full inclusion in society, and schools are the front lines through which some communities have access to this technology. Beyond access, we know that the way in which technology is used matters. If technology serves to further stratify, alienate, or subordinate student groups, we cannot expect altered outcomes. Yet, there remains the possibility that technology can promote Inclusive Education and, thereby, social inclusion. If we understand whether and how this can occur, we may learn much about how to harness the power of the digital revolution to further even the playing field for those who still await repayment on the nation's education debt.

In order to do this, we must go to the places where this work is being done. The story of Southern School District represents one chance for the research community to gain insight into the ways in which technology is being used in schools and with students that are traditionally viewed as existing on the margins to assess if these policies have an impact on that very marginality. Despite efforts toward using a massive 1:1 laptop initiative to transform teaching and learning in order to extend learning opportunities for students in this community, a net movement toward Inclusive Education was not found. Without doubt, the classroom environment and some elements of instruction had been dramatically changed in ways that reflected shifts toward a new, technology-supported paradigm for education in this place. And, for individual staff who strongly supported these changes, technology strongly supported their ability to put more inclusive practices in place and to develop a stronger ethos of inclusion in

their classrooms. Yet, for individuals who held a fairly circumscribed notion of what and how students should learn, pervasive technology did little to shift their thinking in terms of Inclusive Education; to the degree that they changed instructional approaches, they did so on more concrete levels (using computers frequently but not necessarily in novel ways) and they did so out of a sense of obligation.

Thus, while response to technology and Inclusive Education were related, it was not the case that one initiated the other; rather both grew and served to support one another in what might be considered the fertile soil of growth-oriented mindsets. Given the major role that teacher mindsets played in their responses to both this study holds significant implications for those who are seeking to employ technology initiatives as a potential solution to what they see as a need for redistribution to 21st century learning opportunities in their community. First, it is critical to acknowledge that computers are more than devices; this study demonstrated the many ways in which the existence of computers held multiple and complex meanings. The ways in which technology is socially-situated, what it means to give poor students and families computers and what subsequent decisions around how and why they are used hold strong implications for how these tools will be understood and used. These issues need to be understood and explored in the way policy is messaged. Second, the given the highly social context of technology, implementation cannot occur without ongoing discussion, training, and support around that social context. Specifically, the desire to use technology to promote opportunity yields limited results without simultaneous efforts to promote recognition and representation. If computers are chosen as a tool to address exclusion, then focused attention on understanding why and how exclusion occurred and a willingness to listen and act on the voices

of the excluded, is central to determining the degree to which computers will serve their intended purpose.

Returning to the early work of Fraser (1995) which presented a two-fold notion of social justice comprised of both economic and cultural justice, it we are able to understand why SSD's efforts at promoting social justice via technology did not result in an inclination toward Inclusive Education among staff. Whereas the provision of computer technology- which allowed for increased access to knowledge and differentiation- represented steps (limited as they were) toward a vision of economic justice via a redistributive solution. The absence of focused attention to the socio-cultural context of these computers, however, allowed sources of cultural injustice (or exclusion) to remain unexamined, limiting the degree to which recognition-oriented solutions could take hold.

Amid these lessons learned, the story of SSD should not be deemed one of failure. Given what should be considered, their success, and implementing 1:1 technology in a way that has transformed several aspects of the educational paradigm, the limitations identified in this study reflect what should be considered as critical next steps. For school leaders and policy makers who are addressing the digital divide as a critical element of promoting inclusion in their own populations, the story of SSD suggests that simultaneous attention to the academic (nuts and bolts) and social context for technology in their setting could serve to multiply the impact of their investment in technology. Although this study is limited in its generalizability, it does hold implications for schools like those in SSD, which are seeking to address issues of equity as they move their students into the digital age, as well as researchers and policy makers seeking to understand the relationship between inclusion and technology as we strive to increase meaningful educational opportunities for all students in the flattening world.

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Appendices

Appendix A: Means and Values for One-Sample T-Test at Test Levels of 3/4 (*Indicates significance at that test level)

	Item	N	Mean	SD	SEM	t(3)/ t(4)		Df
Items Measuring Perceived Impact of Technology	Positive Opinion at Introduction	103	3.6117	1.16	.11397	*5.367/-3.407		102
	Initially Prepared to Implement	101	2.7723	1.02841	.10233	-2.225/-11.998		100
	Adequate ongoing training	105	3.4857	1.07519	.10493	*4.629/-4.901		104
	Adequate tech support/infrastructure	104	3.4135	1.12008	.10983	*3.764/-5.340		103
	Current positive opinion	105	3.667	1.05308	.10277	*6.487/-3.243		104
	Positive impact on academic growth	105	3.5619	1.00884	.09845	*5.707/-4.450		104
	Positive impact on engagement	103	3.8738	.88206	.08691	*10.054/-1.452		102
	Positive impact on critical thinking	103	3.2524	1.08210	.10662	*2.367/-7.011		102
	Positive impact on collaboration	104	3.2788	1.10125	.10799	*2.582/-6.678		103
	Positive impact on parent engagement	105	3.1048	1.10003	.10735	.976/-8.339		104
	Increased parent engagement with education	105	2.8095	1.06604	.10404	-1.831/ -11.443		104
	Increased teacher engagement with parents	104	3.2212	1.14023	.11181	*1.978/-6.966		103
	Changed differentiation for struggling students	103	3.8544	.97425	.09600	*8.900/-1.517		102
	Made differentiation easier	102	3.8922	.97399	.09644	*9.251/-1.118		101
	Made differentiation more effective	103	3.7767	1.02834	.10133	*7.665/-2.204		102
	Changed how student access knowledge	103	4.1262	.95671	.09427	*11.947/*1.339		102
	Use of laptops outside of classroom	100	3.86	.97463	.09746	*8.842/-1.436		99
	Access knowledge outside of instruction	102	4.1765	.73675	.07295	*16.127/*2.419		101
	Demonstrate knowledge in new ways	105	4.1429	.87077	.08498	*13.449/*1.681		104
	Changed assessment	103	3.7864	.95641	.09424	*8.345/-2.267		102
	Improved formative assessment	101	3.5545	1.08144	.10761	*5.135/-4.140		100
	Increased access to formative assessment	101	3.6238	1.09409	.10887	*5.730/-3.456		100
Aggregated Variables	Perceived Impact of Technology	86	78.6047	15.21940	1.64115	*7.680/-5.725		85
	Inclination Toward Inclusive Education	86	106.9419	12.26027	1.32206	*19.622/- .800		85
	School Inclination Toward Inclusive Education	99	28.3838	4.94399	.49689	*20.898/*8.823		85
	Potential for Technology in Inclusive Education	94	17.1596	4.39771	.45359	*4.761/-6.262		93
	Outcomes for Technology in Inclusive Education	93	35.5269	7.82636	.81156	*6.810/-5.512		92

	Item	N	Mean	SD	SEM	t(3)/ t(4)		
Items Measuring Inclination toward Inclusive Education	important for std w/disabilities and families to have voice	102	4.6078	.61591	.06098	*26.365/ *9.967		101
	school is working toward providing voice	102	3.7157	1.07517	.10646	*6.723/-2.671		101
	I am working toward providing voice	100	3.8400	.92899	.09290	*9.024/-1.722		99
	students and families from all backgrounds have an important voice	105	3.9048	.99541	.09714	*9.314/-.980		104
	students and families have a voice in academic life of school	105	3.7905	1.09803	.10716	*7.377/-1.955		104
	individual works hard to provide quality learning for students of all backgrounds	105	4.6667	.54889	.05357	*31.114/ *12.446		104
	individual works hard to ensure that low-income students have access to quality opp	104	4.5962	.59966	.05880	*27.145/*10.138		103
	individual works hard to ensure that all ell have access to quality learning opp	101	4.5446	.62490	.06218	*24.840*8.758		100

Appendix B: ANOVA- Differences in Means on Aggregated Variables by Home School

		Sum of Squares	df	Mean Square	F	Sig.
Perceived Impact of Technology	Between Groups	2253.378	8	281.672	1.269	.272
	Within Groups	16871.446	76	221.993		
	Total	19124.824	84			
Teacher Efficacy	Between Groups	12.245	8	1.531	.647	.736
	Within Groups	224.592	95	2.364		
	Total	236.837	103			
Inclination Toward Inclusive Education	Between Groups	491.880	8	61.485	.435	.897
	Within Groups	10750.520	76	141.454		
	Total	11242.400	84			
Potential for Technology in Inclusive Education	Between Groups	181.089	8	22.636	1.257	.277
	Within Groups	1513.190	84	18.014		
	Total	1694.280	92			
Outcomes for Technology in Inclusive Education	Between Groups	657.260	8	82.158	1.461	.184
	Within Groups	4667.392	83	56.234		
	Total	5324.652	91			
School Inclination toward Inclusive Education	Between Groups	147.773	8	18.472	.745	.652
	Within Groups	2206.472	89	24.792		
	Total	2354.245	97			

Appendix C: Correlations between Aggregated Variables (*indicates significant at the .05 level, ** indicates significant at the .01 level)

		Perceived Impact of Technology (PIT)	Teacher Efficacy (TE)	Inclination Toward Inclusive Education (ITIE)	Potential for Technology in Inclusive Education (PTIE)	Outcomes for Technology in Inclusive Education (OTIE)	School Inclination toward Inclusive Education (SITIE)
PIT	Pearson's Coefficient	1	.129	.415**	.726**	.824**	.440**
	Sig. (2-tailed)		.238	.000	.000	.000	.000
	N	86	86	72	78	76	81
TE	Pearson's Coefficient	.129	1	.339**	.178	.109	-.027
	Sig. (2-tailed)	.238		.001	.087	.297	.788
	N	86	105	86	94	93	98
ITIE	Pearson's Coefficient	.415**	.339**	1	.546**	.575**	.461**
	Sig. (2-tailed)	.000	.001		.000	.000	.000
	N	72	86	86	83	81	83
PTIE	Pearson's Coefficient	.726**	.178	.546**	1	.893**	.468**
	Sig. (2-tailed)	.000	.087	.000		.000	.000
	N	78	94	83	94	89	92
OTIE	Pearson's Coefficient	.824**	.109	.575**	.893**	1	.626**
	Sig. (2-tailed)	.000	.297	.000	.000		.000
	N	76	93	81	89	93	91
SITIE	Pearson's Coefficient	.440**	-.027	.461**	.468**	.626**	1
	Sig. (2-tailed)	.000	.788	.000	.000	.000	
	N	81	98	83	92	91	99

Appendix D: Survey Protocol

Technology and Inclusive Education Staff Survey

The following questionnaire is part of a doctoral research study being conducted by Stacy Gherardi through the University of Illinois at Chicago. The purpose of the study is to better understand the relationship between 1:1 laptop programs and inclusive education in school settings. You are being asked to participate because you currently work in a setting with 1:1 technology.

Although this survey is being sent to your district email, your participation is requested as part of an independent research project and not as part of your employment with District 100. Neither your decision whether or not to participate nor your responses will be shared with your employer.

We expect this survey to take 10 to 15 minutes to complete. Survey questions will ask you to share personal and demographic information as well as your thoughts and feelings about the 1:1 laptop program, your students, your school, and your approach to teaching. It is not anticipated that these questions would cause any distress or discomfort.

While you may not receive any direct benefit for participating, we hope that this study will contribute to academic knowledge of the way technology policies interact with other policies and approaches to education in school settings. At the end of the survey you will have the option to submit your name to be entered into a drawing for a \$25 Amazon.com gift card. You may complete the survey without entering your name if you choose.

Researchers will not be able to link your survey responses to you by name. Researchers will know if you have participated if you choose to submit your name for entry into the drawing for the \$25 Amazon.com gift card but your name will not be linked to your responses. While the survey does not require your name and does not record your email address, your demographic information (gender, race, current assignment etc) will be linked to your responses on the rest of the survey. Confidentiality of this information will be maintained to the degree permitted by the technology used. Your participation in this online survey involves risks similar to a person's everyday use of the Internet.

We plan to publish the results of this study, but will not include any names or demographic information that would allow you to be identified personally. Results will be available to the public as a published dissertation through the University of Illinois at Chicago. A summary of trends in the data will also be made available to District [REDACTED] administration upon request.

Participating in this study is completely voluntary. Even if you decide to participate now, you may change your mind and stop at any time. You may choose to not answer an individual question or you may skip any section of the survey. Simply click "Next" at the bottom of the survey page to move to the next section.

If you have questions about this research study, you can contact Stacy Gherardi at [REDACTED]edtechstudy@gmail.com.

1. **By completing this survey, I indicate that I have been informed of the purpose and scope of the study. I give my consent for my responses to be collected and utilized in the manner described above.**

Mark only one oval.

- ☐ I agree to participate and give my informed consent
- ☐ I do not wish to participate *Stop filling out this form.*

Demographic Information

2. How long have you worked in District [REDACTED]?

Please count how many full years you have been in the district- do not include the current year

Mark only one oval.

- ☐ 0-2 years *After the last question in this section, stop filling out this form.*
- ☐ 2-5 years
- ☐ 5-10 years
- ☐ 10-15 years
- ☐ 15 years or more

3. What is the nature of your current position?

Mark only one oval.

- ☐ General Education/ Classroom Teacher
- ☐ Special Education Teacher
- ☐ Specials Teacher
- ☐ Reading Specialist
- ☐ ESL/ Bilingual Teacher
- ☐ Other:

4. How long have you been working in your current position? (i.e. as a teacher, as a reading specialist etc)

Mark only one oval.

- ☐ 0-2 years
- ☐ 2-5 years
- ☐ 5-10 years
- ☐ 10-15 years
- ☐ 15 or more years
- ☐ Other:

5. What grade are the students you work with?

check all that apply

Check all that apply.

- ☐ preschool
- ☐ k-1
- ☐ 2-3
- ☐ 4-5
- ☐ 6-8
- ☐ Other:

6. What school do you currently work in?

check all that apply
Check all that apply.

☐

☐

☐

☐

☐

☐

☐

☐

☐

☐ Other: _____

7. How long have you been working at your current school?

Mark only one oval.

☐ 0-2 years

☐ 2-5 years

☐ 5-10 years

☐ 10-15 years

☐ 15 or more years

8. Which of the following specific endorsements do you currently hold?

Check all that apply
Check all that apply.

☐ ESL

☐ Special Education

☐ Elementary

☐ Middle School

☐ Other: _____

9. Which of the following student groups do you work with on a daily basis?

Check all that apply

Check all that apply.

- ☐ Students with Disabilities
- ☐ English Language Learners
- ☐ Low-income students
- ☐ Students receiving academic RTI services
- ☐ Students receiving PBIS interventions
- ☐ Students with a different racial/ethnic background than my own
- ☐ Other: _____

10. Including prior work experience, how many total years of experience do you have in your position or a similar position?

For teachers, please indicate total years of teaching experience

Mark only one oval.

- ☐ 0-2 years
- ☐ 2-5 years
- ☐ 5-10 years
- ☐ 10-15 years
- ☐ 15 years or more

11. What is the highest level of education you have completed?*Mark only one oval.*

- ☐ Bachelors Degree
- ☐ Bachelors plus some additional courses
- ☐ Masters Degree
- ☐ Doctoral Degree

12. What language(s) do you speak?

Check all that apply

Check all that apply.

- ☐ English
- ☐ Spanish- fluent
- ☐ Spanish- conversational
- ☐ Spanish- basic
- ☐ Other: _____

13. How would you describe your ethnic background?

Check all that apply
Check all that apply.

- ☐ White/ Caucasian
- ☐ Black/ African American
- ☐ Hispanic/ Latino
- ☐ Asian
- ☐ Native American
- ☐ Other: _____

14. _____

Student Technology Use

For the following items, please provide estimates based on your experiences with your students and technology at home and school. Choose N/A if your position does not allow you to answer the question (i.e. you do not have assigned students or have access to technology for instruction)

15. What percentage of your students have regular access to a computer at home (not provided by the school)

Mark only one oval.

- ☐ 0-50
- ☐ 50-60
- ☐ 60-70
- ☐ 70-80
- ☐ 80-90
- ☐ 90-100
- ☐ NA

16. What percentage of your students have regular access to internet at home?*Mark only one oval.*

- ☐ 0-50
- ☐ 50-60
- ☐ 60-70
- ☐ 70-80
- ☐ 80-90
- ☐ 90-100
- ☐ N/A

17. What percentage of your students take their devices home regularly?*Mark only one oval.*

- ☐ 0-50
- ☐ 50-60
- ☐ 60-70
- ☐ 70-80
- ☐ 80-90
- ☐ 90-100
- ☐ N/A

18. What percentage of your instruction utilizes individual student devices?*Mark only one oval.*

- ☐ 0-50
- ☐ 50-60
- ☐ 60-70
- ☐ 70-80
- ☐ 80-90
- ☐ 90-100
- ☐ N/A

1:1 Technology in [REDACTED]

This section of the survey is intended to provide information about your experience with the 1:1 program as it has been implemented in District 100. For each item, indicate the degree to which you agree or disagree with the statement. A score of 5 indicates a statement with which you STRONGLY AGREE while a score of 1 indicates a statements with which you STRONGLY DISAGREE. If you are unable to answer a question because of the nature of your position or your time in the district, you may skip it.

- Mark only one oval.

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

- Mark only one oval.

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

- Mark only one oval.

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

- Mark only one oval.

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

- Mark only one oval.

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

- Mark only one oval.

1 2 3 4 5

Strongly Disagree ☐ ☐ ☐ ☐ ☐ Strongly Agree

31. **The 1:1 program has changed the way I differentiate instruction for students with disabilities and struggling learners**

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

32. **The 1:1 program has made my classroom differentiation easier**

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

33. **The 1:1 program has made my classroom differentiation more effective**

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

34. **The 1:1 program has changed the way students access and interact with material**

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

35. **My students use their laptops to engage with material outside of the classroom**

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

36. **The 1:1 program has allowed students to access knowledge and engage with material outside of my direct instruction**

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

37. The 1:1 program has allowed students to demonstrate knowledge in new ways

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

38. The 1:1 program has changed the way I assess student performance

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

39. The 1:1 program has improved the ways in which I use formative assessment to drive instruction

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

40. The 1:1 program has allowed me more access to formative assessments of my students

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

41. Please summarize your experience with the 1:1 program. Has it changed your classroom? Your instruction? Your students? Your relationships? If so, how? What are the biggest benefits the program has brought? What are the biggest concerns you have about the program?

Please share any insights, thoughts, or stories you may have that capture your feelings about the 1:1 program overall

Teacher Opinion Survey

This section of the survey is intended to provide information about your beliefs about students, your school, and your instruction. For each item, indicate the degree to which you agree or disagree with the statement. A score of 5 indicates a statement with which you STRONGLY AGREE while a score of 1 indicates a statements with which you STRONGLY DISAGREE.

42. **When it comes right down to it, a teacher really can't do much because most of a student's motivation and performance depends on his or her home environment.**

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

43. **If I really try hard, I can get through to even the most difficult students**

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

44. **Students of all backgrounds should have access to quality learning opportunities, even if it requires different approaches to for different students.**

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

45. **My school works hard to make sure that students of all backgrounds have access to quality learning opportunities, even if it requires different approaches for different students.**

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

46. **I work hard to make sure that students of all backgrounds have access to quality learning opportunities, even if it requires different approaches for different students.**

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

47. **1:1 technology plays a positive role in helping ensure quality learning opportunities for students of all backgrounds.**

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

54. I work hard to ensure that students from low-income backgrounds have access to quality educational experiences, even if it means providing additional services to these students.

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

55. 1:1 technology plays a positive role in ensuring that students from low-income backgrounds have access to quality educational experiences.

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

56. It is important for schools to ensure that students who speak languages other than English have access to quality educational experiences, even if it means providing additional services to these students.

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

57. My school works hard to ensure that students who speak languages other than English have access to quality educational experiences, even if it means providing additional services to these students.

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

58. I work hard to ensure that students who speak languages other than English have access to quality educational experiences, even if it means providing additional services to these students.

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

59. **1:1 technology plays a positive role in ensuring that students who speak languages other than English have access to quality educational experiences.**

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

60. **Students and families from all backgrounds have an important voice in the social life of my school.**

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

61. **Students and families from all backgrounds have a voice in the academic life of my school.**

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

62. **1:1 technology has helped to give a voice to students and families in my school.**

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

63. **Students who are inattentive should be in regular classes.**

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

64. **Students who exhibit significant beahvioral difficulties should be in regular classes.**

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

65. **Students who require communicative technologies (e.g. Braille/sign language/ assistive technology) should be in regular classes.**

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

66. **Students with significant physical disabilities should be in regular classes**

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

67. **Students with cognitive or intellectual disabilities should be in regular classes**

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

68. **Students who are 1 or more years behind academically should be in regular classes**

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

69. **Students who are 2 or more years behind academically should be in regular classes**

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

70. **Students who need an individualized academic program should be in regular classes.**

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

71. **Students with disabilities are generally accepted by the rest of the class**
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

72. **1:1 technology could help to support students with disabilities to be accepted by the rest of the class**
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

73. **1:1 technology is helping to support students with disabilities to be accepted by the rest of the class**
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

74. **It is difficult for teachers to give appropriate attention to all students in an inclusive classroom**
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

75. **1:1 technology could help teachers to give appropriate attention to all students in an inclusive classroom**
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

76. **1:1 technology is helping teachers to give appropriate attention to all students in an inclusive classroom**
Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

77. **Teachers' workloads increase or would increase when students with disabilities are included**

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

78. **1:1 technology could help teachers to manage increased workloads in an inclusive classroom**

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

79. **1:1 technology is helping teachers to manage increased workloads in an inclusive classroom**

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

80. **Teachers' stress levels increase or would increase when students with disabilities are included**

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

81. **1:1 technology could help to reduce teacher stress levels when students with disabilities are included**

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

82. **1:1 technology is helping to reduce teacher stress levels when students with disabilities are included**

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

89. I feel that it is important for students with disabilities and difficulties and their families to have a strong voice in the school and in their education

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

90. Our school is working toward providing students with disabilities and their families a strong voice in the school and in their education

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

91. I am personally working toward providing students with disabilities and their families a strong voice in the school and in their education

Mark only one oval.

	1	2	3	4	5	
Strongly Disagree	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Strongly Agree

Thank you for your participation. Your anonymous responses have been of great value to this research. If you would like to be entered in the drawing for the \$25 Amazon.com giftcard, please email edtechstudy@gmail.com with "GIFT CARD" in the subject line. Winner will be notified via email.

Researchers are also seeking teachers and staff from a variety of positions for further participation in the study through in-person interviews. General and special education co-teachers are especially desired. Interviews will take place at a time and location of your choosing and will last approximately 1 hour or less. Individuals who choose to participate in interviews will be provided a \$15 Amazon.com gift card in appreciation of your time. If you would like to be an interview participant, please email edtechstudy@gmail.com with the word INTERVIEW in the subject line. You will be contacted shortly if you are selected as an interview participant.

Appendix E: Interview Informed Consent

University of Illinois at Chicago Research Information and Consent for Participation in Social Behavioral Research Technology and Inclusive Education Study

You are being asked to participate in a research study. Researchers are required to provide a consent form such as this one to tell you about the research, to explain that taking part is voluntary, to describe the risks and benefits of participation, and to help you to make an informed decision. You should feel free to ask the researchers any questions you may have.

Principal Investigator Name and Title: Stacy Gherardi, PhD Candidate
Department and Institution: Educational Policy Studies, University of Illinois at Chicago
Address and Contact Information: stacygherardi@gmail.com, (773) 623-9136

Why am I being asked?

You are being asked to be a subject in a research study about the relationship between 1:1 laptop programs and Inclusive Education. The study involves interviewing staff who have implemented 1:1 technology in order to better understand their experiences with the program and to understand how this program has impacted the ways in which schools and teachers approach diverse students.

You have been asked to participate in the research because you have worked in the District throughout implementation of the 1:1 program and you submitted your name as a potential interview participant.

Your participation in this research is voluntary. Your decision whether or not to participate will not affect your current or future dealings with the District or with the University of Illinois at Chicago. **If you decide to participate, you are free to withdraw at any time without affecting that relationship.**

Approximately 15-20 staff members may be involved in this research as interview participants.

What is the purpose of this research?

The purpose of this research is to better understand their experiences with the program and to understand how this program has impacted the ways in which schools and teachers approach diverse students.

What procedures are involved?

This research involves a one-time interview which is expected to last 60 minutes or less. This interview will take place at a time and place which is mutually agreed upon by the researcher and yourself. It may take place on D100 property or at another agreed upon location. The interview will involve questions and conversation about your experiences

with the 1:1 program as well as your experiences with different student groups and your philosophy of teaching.

What are the potential risks and discomforts?

To the best of our knowledge, the things you will be doing have no more risk of harm than you would experience in everyday life. *One potential* risk of this research is a loss of privacy (revealing to others that you are taking part in this study).

Will I be told about new information that may affect my decision to participate?

During the course of the study, you will be informed of any significant new research information (either good or bad), such as changes in the risks or benefits resulting from participation in the research or new alternatives to participation, that might cause you to change your mind about continuing in the research. If new information is provided to you, your consent to continue participating in this research may be re-obtained.

Are there benefits to taking part in the research?

This study is not designed to benefit you directly. This study is designed to learn more about the relationship between educational technology and Inclusive Education. The study results may be used to help other schools and teachers in the future.

What other options are there?

You have the option to not participate in this study.

What about privacy and confidentiality?

The people who will know that you are a research subject are members of the research team. Otherwise information about you will only be disclosed to others with your written permission, or if necessary to protect your rights or welfare (for example, if you are injured and need emergency care or when the UIC Office for the Protection of Research Subjects monitors the research or consent process) or if required by law.

Study information which identifies you and the consent form signed by you will be looked at and/or copied for checking up on the research by: UIC OPRS.

A possible risk of the research is that your participation in the research or information about you might become known to individuals outside the research team. The researcher will take every effort to ensure that your participation is confidential, although your choice of interview site and time may not guarantee privacy. Even if your participation becomes disclosed, researchers can ensure that your data (information you share during the interviews) will remain confidential and will not be disclosed to anyone. When it is used in the study, it will not be connected with your name or with enough personal information that someone could reasonably discern your identity. If any information you shared is

included directly in the final study, it will be associated with a fictitious identity to ensure your confidentiality or will not be associated with demographic information that could tie the response to you. All notes and other forms of data which are connected with your personal information will remain locked securely until the project is complete and will be destroyed after the final project is submitted. Audio tapes of interviews will be identified only by a number although they will have any personal information that you share. These tapes will be locked securely and destroyed once the final project is submitted. You have the opportunity to request access to these tapes which include your information if you desire.

When the results of the research are published or discussed in conferences, no information will be included that would reveal your identity.

What are the costs for participating in this research?

There are no costs to you for participating in this research.

Will I be reimbursed for any of my expenses or paid for my participation in this research?

You will receive a \$15 Amazon.com gift card for completing the interview. The gift card will be given in person at the completion of the interview session.

Can I withdraw or be removed from the study?

If you decide to participate, you are free to withdraw your consent and discontinue participation at any time. You can contact the researcher via telephone or email to indicate that you no longer wish to participate at: stacygherardi@gmail.com or 773-623-9136.

Who should I contact if I have questions?

Contact the researchers Stacy Gherardi at 773-623-9136 or email address: stacygherardi@gmail.com if you have any questions about this study or your part in it, or if you have questions, concerns or complaints about the research.

What are my rights as a research subject?

If you feel you have not been treated according to the descriptions in this form, or if you have any questions about your rights as a research subject, including questions, concerns, complaints, or to offer input, you may call the Office for the Protection of Research Subjects (OPRS) at 312-996-1711 or 1-866-789-6215 (toll-free) or e-mail OPRS at uicirb@uic.edu.

Remember:

Your participation in this research is voluntary. Your decision whether or not to participate will not affect your current or future relations with the University or with

theDistrict. If you decide to participate, you are free to withdraw at any time without affecting that relationship.

Signature of Subject

I have read (or someone has read to me) the above information. I have been given an opportunity to ask questions and my questions have been answered to my satisfaction. I agree to participate in this research. I will be given a copy of this signed and dated form.

Signature

Date

Printed Name

Signature of Person Obtaining Consent

Date (must be same as subject's)

Printed Name of Person Obtaining Consent

Appendix F: Interview Protocols

Administrator Interview

- Can you tell me a little bit about yourself and your background? Probe to get work history, history in the district/school, personal experiences with technology and students with disabilities.
- Can you tell me about how teachers initially responded to the 1:1 program? Why do you think they had this response? What actions have you had to take in response to this?
- I'm wondering if you have seen any changes to daily instruction as a result of the 1:1 program? (probe to assess types of changes if so) How has it changed the environment in your school? Probe to assess impact on 1) Parent engagement 2) Access to knowledge outside of teacher/classroom 3) Use of formative assessment and 4) Differentiation.
- Positives or challenges? Probe
- *Inclusive Education is an ambitious and far-reaching notion that is, theoretically, concerned with all students. The concept focuses on the transformation of school cultures to (1) increase access (or presence) of all students (not only marginalized or vulnerable groups), (2) enhance the school personnel's and students' acceptance of all students, (3) maximize student participation in various domains of activity, and (4) increase the achievement of all students. (Artiles, Kozleski, Dorn, and Christensen, 2006).*
- I'm wondering if this resonates with you at all...If so..can you talk about the ways in which this is taking place at your school?
- Can you talk a little bit about the ways in which your school and your teachers respond to different student racial/ethnic/ cultural backgrounds? (probe to assess the ways in which ethnic/cultural issues are addressed socially and in curriculum) What role has the 1:1 program played?
- Your school has a relatively large number of low-income students, how does this impact instruction and the school environment? What role has the 1:1 program played?
- Your school has a relatively large number of English Language Learners, how does this impact instruction and the school environment? What role has the 1:1 program played?
- Can you describe the approach to students with disabilities and struggling students in your school? How long has co-teaching been in effect? Do you have a special ed teacher at each grade level or how is that support distributed? Other key initiatives?
- Does the 1:1 technology have a role in the school's philosophy on educating students with disabilities/difficulties? Probe to assess the degree that person indicates a clear relationship between the two. If no clear relationship, end here. If they indicate a relationship, probe for principal to explain in own words how technology has impacted this area.

- At IRV, KOM, HER, FRE: Your school has a more specialized classroom setting for_____. I'm wondering what role technology has played for students and staff in that environment...
- Are there any staff members here that you feel would be KEY for me to speak to regarding technology and/or approaches to educating diverse learners?

Teacher Interview

- Can you tell me a little bit about yourself and your background? Probe to get work history, history in the district/school, personal experiences with technology, personal experiences with students from low-income backgrounds, students of color, English language learners.
- Can you tell me about how you initially responded to the 1:1 program? Why?
- Has the 1:1 program changed your instruction? If so, how? Has it changed the environment in your classroom and the school? Probe to assess impact on 1) Parent engagement 2) Access to knowledge outside of teacher/classroom 3) Use of formative assessment and 4) Differentiation.
- Can you talk a little bit about the ways in which your school and you personally respond to different student backgrounds? (probe to assess the ways in which ethnic/cultural issues are addressed socially and in curriculum)
- Your school has a relatively large number of low-income students, does this impact your instruction and the school environment? If so, how?
- Your school has a relatively large number of English Language Learners, does this impact your instruction and the school environment? If so, how?
- Has the 1:1 program had any influence on the way the school as a whole or you personally respond to student differences in term of culture or language?
- Has the 1:1 program had any specific influence on the way the school and you personally reach and interact with low-income students and families?

- Can you describe your own philosophy around educating students with disabilities and difficulties? How do you feel about co-teaching? How do you feel about the school/district approach to students with disabilities and difficulties generally?
- Has the 1:1 program impacted the way you feel about these things? Has the 1:1 program changed the environment for students with disabilities or difficulties? How?

Appendix G: Code Tree

Id	Parent Id	Depth	Title
1	1	0	Tech Impact on Inclusive Ed
2	1	1	Technology and Linguistic Inclusion
3	1	1	Technology and Family Engagement
4	3	2	parents not familiar with tech/ less involved due to tech
5	3	2	Technology and Socioeconomic Inclusion
6	5	3	Tech Fee Issues
7	5	3	cost to repair
8	3	2	Issues with Home Connectivity
9	3	2	tech as imperialism
10	3	2	tech for transparency
11	1	1	Technology and Ability/ Differentiation
12	11	2	Technology for Intervention
13	11	2	Technology for Students with Disabilities- Academic Impact
14	11	2	Tech to build pride via audience
15	11	2	norm of differentiation/ minimizing differences
16	15	3	tech as unifier/ common experiences
17	15	3	tech highlighting differences
18	11	2	learning outside of school
19	11	2	facilitating useful sped documentation
20	11	2	social benefits of tech for swd
21	11	2	tech facilitating access
22	11	2	support gened interaction with swd
24		0	Implementation
25	24	1	Collaboration
26	25	2	District culture of in-house experts
27	26	3	tech promoting teacher leadership
28	24	1	Choice to Participate
29	28	2	Implement by highlighting success
30	28	2	Risk Taking
31	24	1	Mindset
32	31	2	Fixed Mindset
32	31	2	Flexible Mindset
33	24	1	Admin Dictating use of Tech
34	33	2	outsider pressure
35	24	1	Purpose/Messaging
36	35	2	purpose of tech= engagement
37	35	2	purpose of tech= differentiation
38	35	2	purpose of tech= learning outside of school
39	35	2	purpose= 21st century learners
40	35	2	no sense of purpose

Id	Parent Id	Depth	Title
41	24	1	Staff Reactions
42	41	2	Staff turnover due to success
43	41	2	Initial Fearfulness
44	41	2	Staff turnover due to unwillingness to change
45	41	2	teacher fear of losing control
46	41	2	multiple competing initiatives
47	41	2	teacher self-reflection
48	41	2	lack of expert guidance
49	41	2	turnover due to workload
50	49	3	turnover adversely affecting initiatives
51	41	2	tech at expense of other needs
52	51	3	training only focused on tech
53	41	2	adopting tech to appease admin
54		0	Impact of Technology
55	54	1	Differentiation
56	55	2	New ways to demonstrate learning
57	54	1	Parent Engagement
58	57	2	parent connection with student work/ school
59	57	2	Tech to support parent engagement
60	57	2	Parent Sentiment around 1:1
61	54	1	Assessment
62	61	2	More useful data
63	61	2	Shift to formative assessment
64	61	2	Summative Assessment
65	64	3	Projects etc. vs tests
66	61	2	tech not providing meaningful assessment
67	54	1	Changes to Instruction
68	67	2	Less whole group instruction
69	67	2	More Group Work
70	67	2	Technology to support independent work/ teacher work with small groups
71	67	2	Effort to go beyond substitution
72	67	2	Teacher as Facilitator/ Flipped Classroom
73	67	2	tech as resource not approach
74	67	2	shift in teacher workload
75	74	3	teachers expected to monitor tech
76	75	3	teacher creating curriculum
77	76	3	tech complicating activities
78	54	1	increased growth from tech
79	54	1	Increased student engagement
80	79	2	kids as experts
81	54	1	Limits of Technology
82	81	2	Difficulty of Technology in Literacy

Id	Parent Id	Depth	Title
83	81	2	inability to replace teacher
84	81	2	kids needing tech teaching
85	81	2	loss of subject matter
86	81	2	Tech Developmentally Inappropriate for young children
87	81	2	cost concerns
88	81	2	tech support/infrastructure issues
89	52	1	tech to support logistics
90	52	1	Social Implications
91	88	2	Technology as Incentive/Punishment
92	88	2	no concerns about tech and social skills
93	88	2	Technology Impacting Behavior
94	91	3	loss of novelty
95	91	3	student misuse of tech
96	93	3	parents not monitoring tech
97	88	2	Technology Impacting Communication
98		0	Inclusive Education Inclination/Practices
99	98	1	LGBT Inclusion
100	98	1	Socio-Economic Inclusion
101	100	2	Financial/Material support from school
102	98	1	Ability Inclusion
103	102	2	changing views on inclusion depend on personnel
104	102	2	environment designed to meet student needs
105	102	2	high expectations b/c of inclusion
106	102	2	limits of co-teaching
107	102	2	mutual responsibility for all students
108	102	2	parents resistance to co-teaching
109	102	2	positive opinion of co-teaching
110	102	2	social benefits of inclusion
111	102	2	staff needed to support inclusion
112	102	2	teacher relationships in co-teaching
113	98	1	School-Family Relationships
114	113	2	Cultural Inclusion
115	114	3	staff racial makeup
116	113	2	Linguistic Inclusion
117	116	3	staff fear of dual-language
118	113	2	difficult to engage parents
119	113	2	parental fear/intimidation
120	113	2	Working parents
121	98	1	Inclusive approach to Discipline/ student relationships
122	98	1	intersecting identities

Appendix H: Code Counts and Weight Statistics

Code	Count	Min	Max	Mean	Median
Impact of Technology	327	-2	2	0.3	1
Assessment	33	-2	2	1.1	2
More useful data	17	1	2	1.6	2
Shift to formative assessment	14	1	2	1.6	2
Summative Assessment	4	-2	1	-0.5	-0.5
Projects etc. vs tests	2	-2	0	-1.5	-1.5
tech not providing meaningful assessment	7	-2	0	-1.7	-2
Changes to Instruction	82	-2	2	0.6	1
Effort to go beyond substitution	8	-1	2	1	1
Less whole group instruction	3	1	2	1.7	2
More Group Work	8	-2	2	1.1	1.5
Teacher as Facilitator/ Flipped Classroom	11	-2	2	1.2	2
Technology to support independent work/ teacher work with small groups	24		2	1.5	2
shift in teacher workload	25	-2	2	-0.1	
teacher creating curriculum	6	-2	2	0.2	0.5
tech complicating activities	3	-2	2	-0.7	-2
tech as resource not approach	5	-1	0	-0.6	-1
Differentiation	54	-2	2	1.3	2
New ways to demonstrate learning	9	-2	2	1.6	2
Increased student engagement	45	-2	2	1.6	2
kids as experts	8	-1	2	1.5	2
Limits of Technology	57	-2	2	-1.3	-1
Difficulty of Technology in Literacy	16	-2	2	-1.1	-1
Tech Developmentally Inappropriate for young children	20	-2	2	-1.3	-1
inability to replace teacher	10	-2	0	-1.2	-1
kids needing tech teaching	6	-2	0	-1.5	-1.5
loss of subject matter	10	-2	2	-1.6	-2
tech support/infrastructure issues	7	-2	2	-0.9	-2
Parent Engagement	49	-2	2	0.4	1
Parent Sentiment around 1:1	8	-1	1	0.5	1
Tech to support parent engagement	28	-1	2	0.9	1
parent connection with student work/ school	13	-2	2	-0.7	-1
Social Implications	88	-2	2	-0.4	-1
Technology Impacting Behavior	55	-2	2	-0.6	-1
student misuse of tech	28	-2	2	-1	-1
Technology Impacting Communication	31	-2	2	0.1	
increased growth from tech	4	-2	2		
tech to support logistics	18	1	2	1.7	2
	76				

Implementation					
Code	Count	Min	Max	Mean	Median
Admin Dictating use of Tech	13				
outsider pressure	3				
Choice to Participate	11				
Implement by highlighting success	3				
Risk Taking	2				
Collaboration	12				
District culture of in-house experts	13				
Mindset					
Fixed Mindset	5				
Flexible mindset	10				
Purpose/Messaging	3				
purpose of tech= differentiation	1				
purpose of tech= engagement	1				
purpose of tech= learning outside of school	1				
purpose= 21st century learners	4				
Staff Reactions	34	-2	2	-0.1	
Initial Fearfulness	14				
Staff turnover due to success	1				
Staff turnover due to unwillingness to change	2				
adopting tech to appease admin	2				
lack of expert guidance	5				
multiple competing initiatives	2				
teacher fear of losing control	1				
tech at expense of other needs	11				
training only focused on tech	2				
turnover due to workload	1				
turnover adversely affecting initiatives	1				
Inclusive Education Inclination/Practices	186	-2	2	0.3	1
Inclusive approach to Discipline/ student relationships	6	1	2	1.5	1.5
LGBT Inclusion	2	0	2	1	1
School-Family Relationships	54	-2	2	-0.1	
Cultural Inclusion	30	-2	2	-0.1	
staff racial makeup	1	-1	0	-1	-1
Linguistic Inclusion	49	-2	2	0.1	
staff fear of dual-language	1				
Working parents	3				
difficult to engage parents	5	-1	2	0	0
parental fear/intimidation	4	-2	0	-1.5	-1.5
Socio-Economic Inclusion	23	-2	1	0.2	
Financial/Material support from school	8	-1	2	0.9	1
Sped Inclusion	65	-1	2	0.7	1
changing views on inclusion depend on personnel	1	-1	0	-1	-1

Code	Count	Min	Max	Mean	Median
environment designed to meet student needs	13	-1	2	1.4	2
high expectations b/c of inclusion	5	2	2	2	2
limits of co-teaching	3	-1		-0.7	-1
mutual respnsibility for all students	12	-2	2	1.3	2
parents resistance to co-teaching	2	-1		-1	-1
positive opinion of co-teaching	15	-1	2	1.5	2
social benefits of inclusion	1	2	2	2	2
staff needed to support inclusion	5	-1	2	0.6	
teacher relationships in co-teaching	8	-1	2	1.3	2
intersecting identities	1	2	2	2	2
Tech Impact on Inclusive Ed	131	-2	2	0.6	1
Technology and Ability/ Differentiation	66	-2	2	1.3	2
Tech to build pride/audience engagement	8	2	2	2	2
Technology for Intervention	4	-2	0	-1.3	-1
Technology for Students with Disabilities- Academic Impact	17	-2	2	0.5	1
facilitating useful sped documentation	1	2	2	2	2
learning outside of school	4	1	2	1.8	2
norm of differentiation/ minimizing differences	15	0	2	1.7	2
tech as unifier/ common experiences	6	1	2	1.2	1
tech highlighting differences	1	-2	0	-2	-2
social benefits of tech for swd	4	1	2	1.5	1.5
support gened interaction with swd	5	0	2	1	1
tech facilitating access	20	2	2	2	2
Technology and Family Engagement	23	-2	2	-0.7	-1
Issues with Home Connectivity	19	-2	1	-0.6	-1
Technology and Socioeconomic Inclusion	14	-1	1	-0.5	-1
Tech Fee Issues	5	-2	0	-0.4	
cost to repair	4	-1	2	0.5	0.5
parents not familiar with tech/ less involved due to tech	19	-2	0	-0.9	-1
tech as imperialism	3	-2	0	-1.7	-2
tech for transparency	3	2	2	2	2
Technology and Linguistic Inclusion	11	-2	2	0.9	1
tech supporting student-teacher relationships	8	1	2	1.6	2

Appendix I: IRB Approval

UNIVERSITY OF ILLINOIS AT CHICAGO

Office for the Protection of Research Subjects (OPRS)
Office of the Vice Chancellor for Research (MC 672)
203 Administrative Office Building
1737 West Polk Street
Chicago, Illinois 60612-7227

Exemption Granted

February 19, 2015

Stacy Gherardi, MSW
Policy Studies
3556 S. Seeley, 102
Chicago, IL 60609
Phone: (773) 623-9136

RE: Research Protocol # 2015-0103
 “Technology and Inclusive Education”

Sponsors: None

Dear Stacy Gherardi:

Your Claim of Exemption was reviewed on February 19, 2015 and it was determined that your research meets the criteria for exemption. You may now begin your research.

<u>Exemption Period:</u>	February 19, 2015 – February 19, 2018
<u>Performance Site:</u>	UIC
<u>Subject Population:</u>	Adult (18+ years) subjects only
<u>Number of Subjects:</u>	340

The specific exemption categories under 45 CFR 46.101(b) are:

(1) Research conducted in established or commonly accepted educational settings, involving normal educational practices such as (i) research on regular and special education instructional strategies, or (ii) research on the effectiveness of or the comparison among instructional techniques, curricula, or classroom management methods; and

(2) Research involving the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, unless: (i) information obtained is recorded in such a manner that human subjects can be

identified, directly or through identifiers linked to the subjects; and (ii) any disclosure of the human subjects' responses outside the research could reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, or reputation.

Please note the Review History of this submission:

Receipt Date	Submission Type	Review Process	Review Date	Review Action
01/22/2015	Initial Review	Exempt	01/30/2015	Modifications Required
02/12/2015	Response to Modifications	Exempt	02/19/2015	Approved

You are reminded that investigators whose research involving human subjects is determined to be exempt from the federal regulations for the protection of human subjects still have responsibilities for the ethical conduct of the research under state law and UIC policy. Please be aware of the following UIC policies and responsibilities for investigators:

1. Amendments You are responsible for reporting any amendments to your research protocol that may affect the determination of the exemption and may result in your research no longer being eligible for the exemption that has been granted.
2. Record Keeping You are responsible for maintaining a copy all research related records in a secure location in the event future verification is necessary, at a minimum these documents include: the research protocol, the claim of exemption application, all questionnaires, survey instruments, interview questions and/or data collection instruments associated with this research protocol, recruiting or advertising materials, any consent forms or information sheets given to subjects, or any other pertinent documents.
3. Final Report When you have completed work on your research protocol, you should submit a final report to the Office for Protection of Research Subjects (OPRS).
4. Information for Human Subjects UIC Policy requires investigators to provide information about the research protocol to subjects and to obtain their permission prior to their participating in the research. The information about the research protocol should be presented to subjects in writing or orally from a written script. When appropriate, the following information must be provided to all research subjects participating in exempt studies:
 - a. The researchers affiliation; UIC, JBVMAC or other institutions,
 - b. The purpose of the research,
 - c. The extent of the subject's involvement and an explanation of the procedures to be followed,

- d. Whether the information being collected will be used for any purposes other than the proposed research,
- e. A description of the procedures to protect the privacy of subjects and the confidentiality of the research information and data,
- f. Description of any reasonable foreseeable risks,
- g. Description of anticipated benefit,
- h. A statement that participation is voluntary and subjects can refuse to participate or can stop at any time,
- i. A statement that the researcher is available to answer any questions that the subject may have and which includes the name and phone number of the investigator(s).
- j. A statement that the UIC IRB/OPRS or JBVMAC Patient Advocate Office is available if there are questions about subject's rights, which includes the appropriate phone numbers.

Please be sure to:

→ Use your research protocol number (2015-0103) on any documents or correspondence with the IRB concerning your research protocol.

We wish you the best as you conduct your research. If you have any questions or need further help, please contact the OPRS office at (312) 996-1711 or me at (312) 355-2908. Please send any correspondence about this protocol to OPRS at 203 AOB, M/C 672.

Sincerely,

Charles W. Hoehne, B.S., C.I.P.
Assistant Director
Office for the Protection of Research Subjects

cc: Benjamin M. Superfine, Policy Studies, M/C 147
Kimberly Lawless Education, M/C 147

Appendix J: Copyright Permission

January 15, 2016

George Johnson
Information Age Publishing

Dear Mr. Johnson,

I am writing to request permission to incorporate the following material into my PhD dissertation:

- Selected portions of my chapter "Social Divides, Digital Bridges: Exploring the Potential of Technology in Inclusive Education" which has been accepted for publication in:
L. Miller, D. Becker, & K Becker (Eds.) Technology for transformation: The confluence of educational technology and social justice. Information Age Press.
- Excerpts from the chapter will appear in the literature review, conceptual framework, and case description sections of the dissertation.

The material will be distributed as follows:

- Submitted via ProQuest to the University of Illinois' library collection of dissertations. The dissertation will be embargoed for two years upon submission and extension of the embargo will be requested when this option is available (after initial submission).

I have also provided a copy of the dissertation with chapter excerpts appearing in black text as well as the University Publishing Agreement indicating the choice to embargo publication of the dissertation.

Sincerely,

Stacy Gherardi

My signature indicates that I grant the permission requested herein and have the authority to do so.

Signature

Title

Company

VITA

STACY A. GHERARDI

EDUCATION

2010-2014	Ph.D. Candidate, ABD	University of Illinois at Chicago Major: Policy Studies in Urban Education
2008	M.S.W	University of Illinois at Chicago Major: School Social Work
2005	B.S.W.	Valparaiso University Major: Social Work Minor: Urban Studies

PROFESSIONAL EXPERIENCE

2016		Adjunct Faculty, University of Illinois at Chicago <i>Anticipated</i>
2014-2015		Research Assistant, Michael Cohen Group UMIGO/ Ready to Learn Summative Evaluation
2010-Present		District Social Work Department Leader/ School Social Worker Berwyn South District 100
2008-2010		School Social Worker, Oakwood Elementary Lemont-Bromberek CSD 113A
2005-2007		Fourth Grade Teacher/Teach for America Corps Chicago International Charter School
2004-2005		Teaching Assistant, Freshman Seminar Leader Christ College, Valparaiso University

PUBLICATIONS/ PRESENTATIONS

Gherardi, S.A. (October 2015). Digitized and decoupled? Teacher sensemaking around educational technology in a model 1:1 program. Paper presented at the Midwestern Educational Research Association Annual Meeting: Evanston, Illinois.

Gherardi, S. A. (October 2015). *Pervasive technology and paradigm shifts: Teacher perceptions of the impact of educational technology*. Poster presented at the Illinois Educational Research Council Annual Meeting: Lisle, Illinois.

Gherardi, S.A. (Forthcoming). Social divides, digital bridges: Exploring the potential of technology in Inclusive Education in L. Miller, D. Becker, & K Becker (Eds.) *Technology for Transformation: The Confluence of Educational Technology and Social Justice*. Information Age Press

Gherardi, S.A. (November 2014). *Digital bridges and social divides: A case study in technology, sensemaking, and inclusive education*. Paper presented at the Midwest Educational Research Association Annual Conference: Evanston, Illinois.

Gherardi, S.A. (May 2012). *Changing schools, expanding mandates: Educators understanding and practice around non-academic factors in a demographically changing elementary school*. Poster presented at the Council on Contemporary Families Annual Conference: Chicago, Illinois.

PROFESSIONAL LICENSES

State of Illinois: Licensed Clinical Social Worker

Illinois State board of Education: Type 73 School Service Personnel: Social Worker

Illinois State board of Education: Type 03 Initial Elementary Teacher

PROFESSIONAL AFFILIATIONS

National Association of School Social Workers

American Educational Research Association

Midwest Educational Research Association

RESEARCH INTERESTS

Educational Technology, Inclusive Education, Intersections of social and educational policy, Full service and community school models, Social Emotional Learning, Positive Behavior Interventions and Supports

SKILLS

Proficient Spanish speaker, experience with SPSS, Dedoose, and ATLAS TI, proficient with most PC and MAC based applications as well as web-based applications (Google Docs), familiar with Blackboard online learning platform, experience with designing and maintaining web pages