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The Impact of a Hybrid Professional Development on Teacher Instructional Strategies: A Study of the Integration of Google Read and Write to Improve Instructional Practices

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THE IMPACT OF A HYBRID PROFESSIONAL DEVELOPMENT ON TEACHER INSTRUCTIONAL STRATEGIES: A STUDY OF THE INTEGRATION OF GOOGLE READ AND WRITE TO IMPROVE INSTRUCTIONAL PRACTICES

by

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ABSTRACT

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ON TEACHER INSTRUCTIONAL STRATEGIES:
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Classrooms today are becoming more diverse and students with disabilities are being included more within the general education setting. Therefore, teachers need to continue to develop their instructional practices to be able to support such a diverse population of students. Assistive technology is one way that teachers are able to meet the needs of their students. The purpose of this study was to identify the influence a hybrid professional development had on urban educators use of assistive technology within their classrooms. The professional development included four sixty-minute face to face sessions where teachers learned the principles of Universal Design for Learning and the functions of Google Read and Write, along with how to incorporate this assistive technology using this framework into their instructional practices. This was then followed by four weeks of online professional development that included targeting ways for teachers to utilize specific tools from Google Read and Write on a weekly basis. Both online and face-to-face components to the professional development granted teachers the opportunity to collaborate with one another while receiving ongoing support. This hybrid professional development process focused on combining assistive technology with the Universal Design for Learning framework which resulted in the majority of teachers being able to fundamentally change their lesson planning and incorporate assistive technology into their literacy instruction.

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Chapter I

Introduction

A review of the literature on professional development and assistive technology has indicated that the vast majority of research has conducted quantitative studies, with the limited qualitative studies investigating teachers' reactions to a given professional development. A greater part of assistive technology studies have focused on the impact a form of technology has on student achievement from a quantitative approach. The purpose of this qualitative study was to explore the influence a hybrid professional development had on the implementation of assistive technology within teachers' literacy instruction. A hybrid professional development refers to the combination of both face-to-face and online instruction and support.

Teacher quality is strongly correlated with student achievement (Darling-Hammond, 2000; Jordan, Mendro, & Weerasinghe, 1997; Nye, Konstantopoulos, & Hedges, 2004; Rice, 2003; Rivkin, Hanushek, & Kain, 2005; Snaders & Rivers, 1996; Wright, Horn & Sanders, 1997; as cited in Masters, De Kramers, O'Dwyer, Dash, & Russell, 2010). Despite current educational policy and calls for reform, there remains a general shortage of highly-qualified teachers (Desimone, Smith, & Frisvold, 2007; Keller, 2006; as cited in Masters at. el., 2010). Improving overall teacher quality requires improving the quality of in-service teachers (Masters at. el., 2010). Professional development has the potential to play an important role in improving teacher quality (Ginsburg, Gray, & Levin, 2004; Kleiman, 2004; as cited in Masters at. el., 2010). There are many ways to improve teachers' instructional practices, however the focus of this study will be on improving teachers' instructional practices through the use of assistive technology using the UDL framework to help support a diverse population of students.

As classrooms continue to become diverse, and students with disabilites are included more in the regular education setting, the professional development that teachers require centers around meeting the unique needs of their students. Assistive technology (AT) can support these unique needs in many areas such as socially, emotionally, and behaviorally; however for the purposes of this study the focus was on supporting the academic needs of students in the area of literacy (Edyburn, 2000). Assistive technology is recognized by many experts in the field as holding great promise for students with disabilities (Ashton, 2006; Blackhurst, 1997; Edyburn, 2000; Marino, Marino, & Shaw, 2006; Patrone & Pettapiece, 2007; as cited in Breackenreed, 2008). Assistive technology is one way to provide students with support to access the general education curriculum by meeting their unique needs (Edyburn, 2000). Currently there is little research evaluating how a hybrid professional development influences teachers' use of assistive technologies within their classrooms. In order to provide effective professional development to teachers on ways to better support academic achievement, especially for students with disabilities, we need to better understand what factors lead to teachers choosing to use or not use assistive technology after being provided a hybrid form of professional development. This led me to my research questions which are: To what extent does a hybrid professional development influence the implementation of an assistive technology for reading and writing, and the classroom application of these resources? What are the driving factors to use or not use assistive technology within literacy instruction?

Problem and Purpose

Students today with disabilities are being included more in general education classrooms then they were in the past prior to the passing of the 2004 revision of pivotal legislation known as the Individuals with Disabilities Act (IDEA) requiring students to be educated in the Least Restrictive Environment (LRE). There has been an ebb and flow of support for inclusion of students with disabilities within general education classrooms overtime. There was considerable support for "mainstreaming" in the 1990s, followed by a plateau or decrease in the sense of urgency to support students with disabilities in the general education classroom, to the push for inclusionary practices currently gaining traction again in recent years (Armstrong, Armstrong, & Spadagou, 2010, as cited in Sharma & Nuttal, 2015). Inclusion is the practice of providing students with disabilities opportunities to learn alongside their non-disabled peers (Sharma & Nuttal, 2015). This requires teachers to make adaptations and changes to instructional practices to support the students as they are in order to maximize the likelihood they can participate in classroom activities at their own ability level (Sharma & Nuttal, 2015). Empirical evidence suggests that inclusive education produces many benefits for students with disabilities as well as the general student population" (Forbes, 2007; Kalambouka, Farrell, Dyson, & Kaplan, 2007; Lindsay, 2007, as cited in Sharma & Nuttal, 2015).

Unfortunately, some teachers are not highly skilled in provided students with supports, which can be due to a number of reasons such as ineffective staff training and school support, which can impede their implementation of inclusion (Sharam & Nuttal, 2015). With students who have disabilities being included more in the general education setting, teachers need to be able to support their diverse needs through quality teaching practices. Assistive technology (AT) is one teaching strategy that educators can use to address students' needs. Assistive technology is

the use of devices and/or services that support individuals with disabilities to complete tasks more efficiently (Edyburn, 2003). Teacher quality that pertains to addressing students' needs is the single most important feature of schools that drives student achievement (Hanushek, 2007; Haskins & Loeb, 2007; Haycock, 2003; Gordon, Kane, & Straiger, 2006; as cited in Dash, Magidin de Kramer, O'Dwyer, Masters, & Russell, 2012). Professional development that focuses on assistive technology is one way to improve teachers' instructional practices, however administrators and district leaders need to be aware of the influence different types of PD have on teacher practices to ensure they are providing the most effective trainings. This is why a need for professional development on assistive technology that meets the diverse needs of students is necessary. Information gained from this study gives researchers, administrators, and policymakers insight into why teachers use or do not use assistive technology to support students after receiving a professional development.

The need for highly skilled teachers has been a focus of educational reform, beginning with the passing of No Child Left Behind (NCLB). Providing teachers with professional development is a way to raise teacher quality (Haskins & Loeb, 2007). Professional development has been adopted as a policy solution to improving the number of highly qualified teachers as well as helping all students to achieve high academic standards (Colbert, Brown, Choi, & Thomas, 2008; as cited in Dash at. el., 2012). Professional development is an important element to improving teacher quality because it helps current teachers gain skills and knowledge that will help them improve their effectiveness in promoting student learning (Haskins & Loeb, 2007).

In this qualitative study, teachers received a hybrid professional development on an assistive technology called Google Read and Write. Pre and post interviews, observations, surveys, and artifacts were conducted and analyzed. The assistive technology offered various forms of

supports for students in the area of literacy. The hybrid professional development provided included four sixty-minute face-to-face sessions of PD that provided an overview of Universal Design for Learning and instruction on how to use and incorporate Google Read and Write into lesson plans and instruction. This was followed by further instruction and support on ways to implement the AT into their teaching to support students in their classrooms with four weeks of collaborative online support. Teachers utilized this opportunity to have discussions, pose questions, and provided feedback to one another as they explored and implemented Google Read and Write in their classrooms. During this time teachers were given specific guidance and support on how to incorporate Google Read and Write into their instructional practices.

Significance

This study offers insight into the influence a hybrid professional development has as an instructional strategy that can help support a diverse population of students. What can be learned from this study offers awareness into potential ways to effectively assist teachers in applying the support of assistive technology into their classrooms within the area of literacy. With schools currently being required to implement inclusion due to legislation of the Every Student Succeeds Act (2015), having a better understanding of effective ways to train teachers through professional development on teaching methods that support students' unique needs is critical. This research created an opportunity to give teachers an additional instructional approach to use within the area of literacy to meet the needs of students with disabilities in their classroom. Hirsh (2001) has consistently found that hybrid professional development of teachers is the best way to affect their quality of teaching. Similarly, Birman et al. (2000) has shown professional development activities play a key role in teacher preparation and improvement. Previous research on hybrid professional development has focused on the teachers' opinions of the PD. This study is significant because it went beyond the opinions teachers' had towards their PD experience and examined the

teachers' experience and what changes occurred with teachers' instructional practices using assistive technology within the area of literacy. Policymakers, researchers, and educators specifically benefit from the results of this research as they are more informed on effective professional development on utilizing AT within the context of UDL. This study took place within an urban school district in a high-poverty area which is also significant because there has been an increase in the funding of professional development in high-poverty schools due to an apparent need and priority (Mouza, M. A., Guskey, T. R., & Aberli, J. R., 2009).

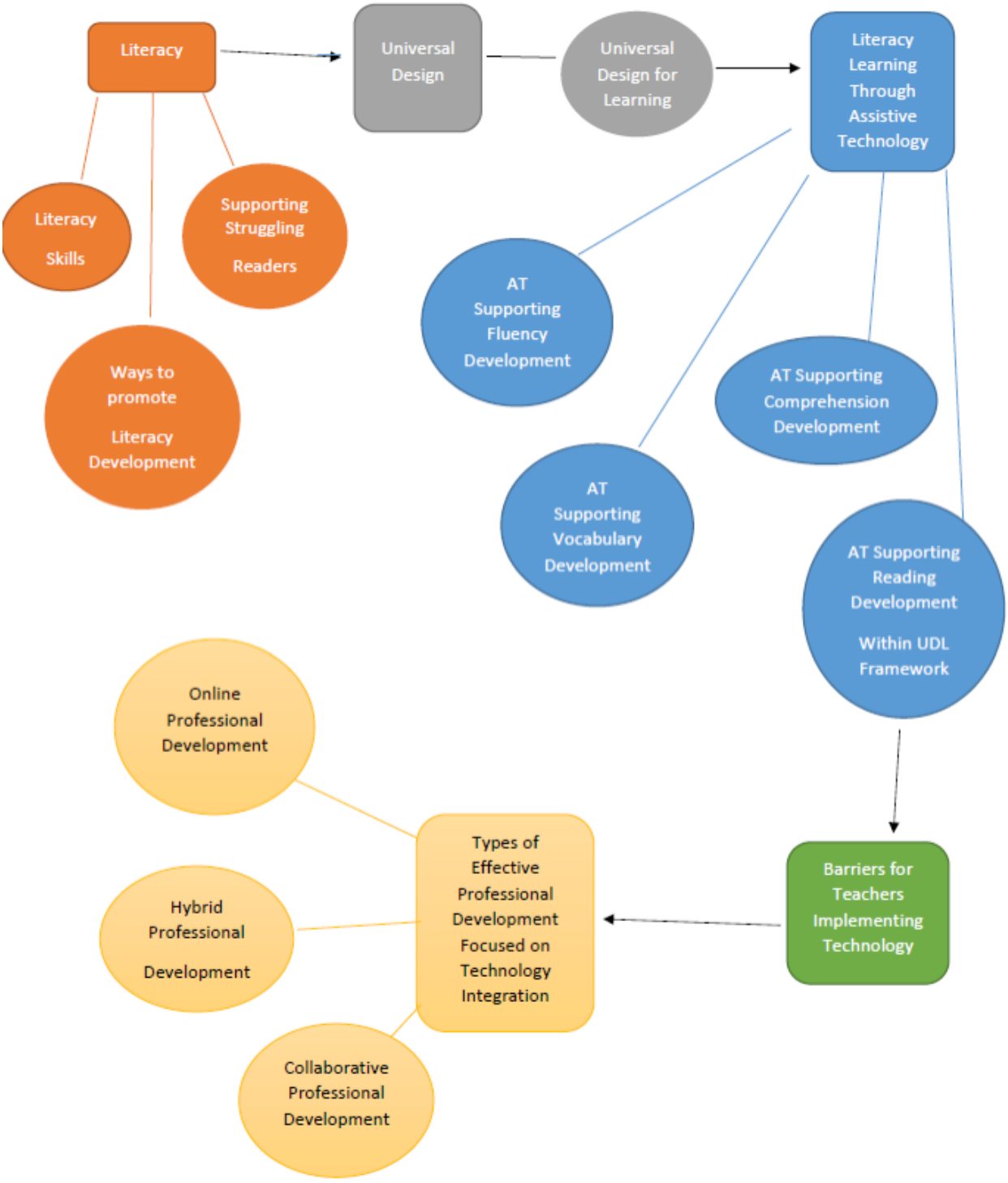
Chapter II

Literature Review

The purpose of this study was to explore the influence a hybrid professional development had on teachers choosing to implement or not implement a form of assistive technology used within the framework of Universal Design for Learning to support the literacy skills of a diverse population of students within the general education setting. Students with special needs are being included more in the general education setting, so it has become imperative that teachers are equipped with the skills and instructional strategies to support the needs of their diverse learners. Unfortunately, classrooms today lack qualified teachers, which is why professional development is needed to improve teacher quality (Desimone, Smith, & Frisvold, 2007; Keller, 2006; as cited in Masters at. el., 2010).

In this literature review I begin by looking at the key definitions related to assistive technology as a component of Universal Design for Learning followed by the theoretical frameworks of Socio-cultural Theory and Constructivism that undergrid this study. Then an examination into literacy skills and ways to promote literacy development will be provided. This will be followed by a look into Universal Design and Universal Design for Learning, followed by assistive technology and supports for literacy development. What has already been done in the field of professional development will then be reviewed. This information will then be proceeded by an examination of what recent approaches have yielded success with implementing technology. The organization of these bodies of research that are reviewed is depicted in Figure 1: Connection of Key Concepts.

Figure 1: Connection of Key Concepts



Search Procedures

Computer searches of the Academic Search Complete, Education Research Complete, and PsychINFO databases from 1990 to 2018 were conducted to review relevant work that had been peer-reviewed. In addition to using these databases, references from the studies that were identified as focusing on my topic were also examined. Descriptors for the computer search included "assistive technology," "assistive technology + udl," "assistive technology for students with mild disabilities," "implementing assistive technology," "assistive technology for writing," "providing and assessing teacher professional development," "measuring impact of professional development," "teacher professional development on AT," "effects of AT in writing," "writing performance of students with disabilities," "online professional development," "AT and UDL to support literacy" "literacy development AND special education." Primary sources were also considered, which included the Individuals with Disabilities Act (IDEA) and The National Institute for Professional Practices. I also looked at references of articles to identify more research to review. Articles that were excluded from my review were ones that focused on English Language Learners, were not peer-reviewed, unpublished doctoral dissertations, and studies that focused on a content area outside of literacy.

Key Terms

The key terms that are discussed in this study include: *inclusion, disability, assistive technology, Universal Design for Learning, hybrid professional development*, and *literacy*. Students with disabilities have the right and deserve to be included with their non-disabled peers as much as possible and as deemed appropriate for the student. This belief is operationalized through a practice known as *inclusion* which can be defined as education that aims to ensure that learners with diverse needs and preferences (such as learners with disabilities) can have equal opportunities in accessing learning resources, services and experiences in general education (Florian & Linklater, 2010).

Students who have unique needs may be labeled as having a specific disability. The Individuals with Disabilities Act (IDEA) defines a *disability* as a child having an intellectual disability, hearing impairment (including deafness), speech or language impairment, visual impairment (including blindness), serious emotional disturbance (referred to in this part as "emotional disturbance"), orthopedic impairment, autism, traumatic brain injury, another health impairment, specific learning disability, deaf-blindness, or multiple disabilities, and who by reason thereof, needs special education and related services (2007).

One instructional strategy that supports an inclusive learning environment for students with disabilities is *assistive technology*; which can be defined as "devices and services that enhance the performance of individuals with a disability by enabling them to complete tasks more effectively, efficiently, and independently than otherwise possible" (Edyburn, 2003).

Implementing assistive technology for all students within a classroom would create a learning environment that supports Universal Design for Learning (UDL). As previously stated, UDL is a "concept or philosophy for designing and delivering products and services that are usable by people with the widest possible range of functional capabilities, which include products

and services that are directly accessible (without requiring assistive technologies) and products and services that are made usable with assistive technologies (Mittler, 2007, p. 17). Universal Design for Learning is a subset from Universal Design which is "the design of products and environments to be usable by all people, to the greatest extend possible, without the need for adaption or specialized design" (Mace, 1997, as cited in Bowe, 2000).

There are a variety of ways to deliver professional development to teachers, with a hybrid professional development being the model used for this study. *Hybrid professional development* is when both face-to-face and online exchanges take place (Caudle, 2013).

Literacy instruction is the targeted content area used for this study which refers to "listening, speaking, and interacting, as well as reading, writing, and spelling" (Kurth & Toews, 2019, p. 135).

Sociocultural Theory and Constructivism as the Theoretical Frameworks

This research looked at improving teachers' instructional strategies by providing a hybrid professional development on the use of assistive technology within the UDL framework. Sociocultural theory (SCT) and Constructivism are the theoretical frameworks grounding this research. Sociocultural theory describes learning and development as being embedded within social events and occurring as a learner interacts with other people, objects, and events in a collaborative environment (Vygotsky, 1978). Vygotsky's (1998) sociocultural theories of development are also based on the understanding that knowledge occurs in social interactions between a more and a less knowledgable individual (as cited in Shabani, 2016). This perspective of learning guided the professional development design of this study by providing participants with a collaborative environment that promoted opportunities for social interactions both face-to-face and using an online forum with a trained professional on the use and implementation of the assistive

technology. These social interactions took place throughout the study between both instructor and teacher as well as peer-to-peer.

Vygotsky's work also states that learning is founded in purposeful activity and it develops historically as changes at the sociocultural level impact psychological organization (Scribner, 1990, as cited in Packer & Goicoechea, 2000). This includes the themes that a person is forever changing and are social products and social participants, the transformation of a person occurs in a social context, and the relationship between people and social context that leads to transformation is sustained through practical activities. These themes also guided the design of this study by the professional development including opportunities for the participants to collaborate with one another while learning practical ways to incorporate the assistive technology into their classrooms through their lesson planning and instructional practices. The practical application of the professional development included modeling and providing suggestions and ideas of ways they can incorporate the assistive technology of Google Read and Write into their lesson planning and instruction.

This research looked to understand the participants' point of view of how a hybrid professional development on assistive technology influenced their instructional practices. The design of this study was qualitative using a phenomenological approach, which was grounded in SCT by focusing on the social and collaborative experience that the participants had that led to their understanding of the assistive technology and the driving factors to use or not use it within their classrooms. Phenomenology is the study of people's conscious experience of their life and social action (Merriam & Tisdell, 2016). This type of research is based on the assumption that there is an essence or essences to shared experiences and these essences are the core meanings that are mutually understood through the common experience (Merriam & Tisdell, 2016). These

experiences of different people are then bracketed, analyzed, and compared to identify the essence of the phenomenon; therefore in relation to this study that pertains to the experiences the participants had from the hybrid professional development (Merriam & Tisdell, 2016).

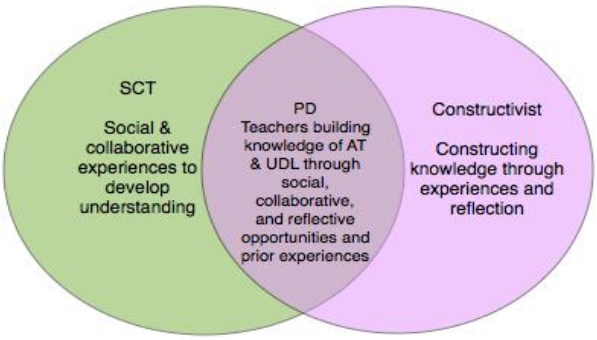
The analytical process of this study was also based on Sociocultural Theory because the focus was placed on the collaborative experience that participants had. The data, which included observations, interviews, and artifacts, was analyzed for themes found regarding the participants' collaborative experiences. When analyzing the interviews, I looked at the data from a SCT perspective by focusing on the importance participants placed on their engagement with their peers throughout the professional development. The observations conducted were analyzed from a SCT lens by looking at whether or not students were engaged with the assistive technology in a collaborative way, such as how they are grouped (individually, partnered, or small groups).

A constructivist approach was also applied to the analysis of the data collected in this study. Constructivism is a theory that believes that people construct their own understanding and knowledge of the world, through experiencing things and reflecting on those experiences (Abbott & Ryan, 1999). The study's design of having teachers work collaboratively with one another also takes on a constructivist approach because this design fosters a type of learning community created among the participants. Teachers were provided opportunities to reflect on their current teaching strategies and discuss how they can build on those approaches by applying content on the use of assistive technology from the PD into their classrooms which applies constructivism. This took place in both face-to-face and online forums. The data collection process also reflected this process through the interviews and surveys, by prompting teachers to reflect on their previous knowledge and experiences, drawing again on the constructivist approach. As the researcher

I am aware that I hold constructivist values, so therefore when analyzing the data, this theory was also present.

The theoretical framework of constructivism was also present throughout the data analysis process because I looked at how the participants' views and understandings of assistive technology and UDL adapted and changed in any way due to their participation in the hybrid PD. Due to all of the participants having taught before, they came into the study with some degree of background knowledge regarding professional developments and supporting students in the area of literacy. Therefore when analyzing the data collected there was particular attention put on how, if at all, the participants knowledge and practices using assistive technology within the UDL framework adapted and changed. The relationship between Sociocultural theory and constructivism is present within this study. This is evident by SCT focusing on the social and collaborative experiences that the participants had, and through those experiences their knowledge and understanding of the information presented throughout the PD was constructed. In addition, those understandings the participants developed are built upon their previous knowledge that they reflected on throughout the PD and data collection process which reflects constructivism. This complementary relationship is depicted in Figure 2: The Correlation of Theoretical Frameworks.

Figure 2: The Correlation of Theoretical Frameworks



Literacy Skills

The definition of literacy has evolved over time, from describing literacy as the ability to both read and write a short simple statement on his or her everyday life in the 1950's, to defining literacy as a person's ability to engage in all the activities in which literacy is required for effective functioning in their community in the 1970's, to today's definition of literacy as the ability to identify, understand, interpret, create, communicate, and compute using printed and written materials within a variety of contexts (UNESCO, 2005 as cited in Ahmed, 2011). Literacy in the twenty-first century is a concept of "multiple literacies" that are related to technological, health, information, media, visual, scientific and other contexts due to the changing dynamics of life (Ahmed, 2011).

Steel, Scerif, Cornish, and Karmiloff-Smith (2013) along with Whitehurst and Lonigan (2001) found that based on a diverse body of research evidence, it now seems clear that learning to read is affected by the foundation skills and multiple cognitive skills, such as phonological awareness and processing (the ability to hear and manipulate the smallest units of sound), receptive vocabulary, print awareness, and oral language are precursors to reading (Goswami & Bryant, 1990; Rack, Hulme & Snowling, 1993; Carroll & Snowling, 2004; and Fowler, 1991). To become successful readers children need to (a) become aware of the phonemic elements to words (phonemic awareness), (b) learn to decode words they have not seen before in print by using knowledge about relationships between letters and sounds (phonics), and (c) learn to recognize large numbers of words by sight so they can read fluently (Goldstein, 2011). In addition to these skills, children need language skills to allow them to retrieve the meaning of vocabulary and think actively while reading to construct meaning (Goldstein, 2011).

There are distinct stages of development across the continuum of learning to read, with each stage having specific reading behaviors that can be identified (National Institute for Profes-

sional Practice, 2018). Researchers have used various labels and terms to identify the stages of reading development, but the literature indicates there are five stages of learning to read (Chall, 1983; Dorn & Soffos, 2001; Fountas & Pinnell, 1996; Snow, Burns & Griffin, 1998, as cited in National Institute for Professional Practice, 2018). These stages of reading development include: awareness and exploration of reading (typically pre-K), emergent reading (typically pre-K to early Kindergarten), early reading stage (typically Kindergarten to early grade 1), and fluent reading stage (typically grade 3 and higher) (National Institute for Professional Practice, 2018).

Whitehurst and Lonigan (1998) outlined two broad classes of early literacy skills that provide a foundation for learning to read: code-based and meaning-focused skills (as cited in Goldstein, 2011). A more closer look into these areas for emergent and conventional literacy are derived from individuals' ability to utilize information from two interdependent domains of information: outside, meaning contextual, semantic and language units, and inside, meaning sound units (words) and print units (graphemes) (Whitehurst and Lonigan, 1998, as cited in Goldstein, 2011). Children need to learn two concepts that are fundamental for later development of reading: alphabet knowledge and phonological awareness (PA) (Goldstein, 2011). Children must learn the alphabetic principle which is the awareness that letters or graphemes correspond to speech sounds or phonemes (Goldstein, 2011). This provides children with the foundation for reading. In regards to phonological awareness, children must learn that words are made up of sounds units that can be isolated and manipulated (Goldstein, 2011). This is evident when children recognize words that rhyme, words that begin with the same sound, that words are changed into new words when we remove or add a sound, and that words can be segmented into individual sounds (Goldstein, 2011).

To help children make sense of written material they need to develop their meaning-focused skills that include vocabulary, grammar, and world knowledge (Goldstein, 2011). These

skills are critical for becoming a fluent reader and comprehending what is read. Decoding, fluency, and comprehension skills are all reliant on these skills (Goldstein, 2011). Decoding is the ability to recognize written words by using rules of letter-sound correspondence (Brinchmann, Hjetland, & Lyster, 2015). Literacy comprehension is understood as the process by which information, sentences and discourse are interpreted (Gough & Tunmer, 1986, as cited in Brinchmann at. el., 2015).

Once an adolescent possess word reading skills sufficient to allow for accurate, efficient, and rapid recognition or decoding of numerous abstract and morphologically complex terms that occur they are able to comprehend a passage independently (Nippold, 2017). This knowledge of words builds the student's lexical development (Nippold, 2017). Once the student is able to read the words accurately in a passage, they much know the meaning of the those words to be able to discern meaning from the text (Nippold, 2017). Morphological analysis of words drawn from expository texts can improve the reading comprehension levels of adolescents (Vaughn, 2015, as cite din Nippold, 2017). In addition to lexical development, syntactic development plays a key role in reading comprehension (Poulsen & Gravgaard, 2016, as cited in Nippold, 2017). Syntax is a system of rules governing the ways in which words can be combined into phrases, clauses, and sentences to express meaning (Kamhi & Catts, 2012, as cited in Nippold, 2017). Syntax is related to comprehension skills by realizing how each clause in a passage contributes unique information (Nippold, 2017).

Ways to Promote Literacy Development

Assisting students in becoming more actively engaged during literacy instruction is a critical first step to improving their literacy outcomes in all developmental levels (Kamil, 2008, as cited in Garwood, Ciullo, and Brunsting, 2017). Providing students with choices during instruction can promote intrinsic motivation to engage in literacy activities (Guthrie & Klauda, 2014, as

cited in Garwood at. el., 2017). Choice on its own does not bring about the increases in students' literacy skills; however, because students are motivated by having a choice, they become more engaged in instruction-which then results in more opportunities to respond and receive feedback (Daly, Garbacz, Olson, Persampieri, & Ni, 2006, as cited in Garwood at. el., 2017). When implementing choice in the classroom, teachers need to decide what choices align with intended students outcomes, create and review the menu of choices as lessons are planned, explain the menu options to students, and solicit student feedback to be sure the options are motivating (Kern & State, 2009).

Early word play with songs and rhymes sets the stage for teaching phonological awareness skills (Goldstein, 2011). As children mature, the vocabulary gets more sophisticated, and the word play begins to focus on the phonemic level as well as on the alphabet and corresponding sounds (Goldstein, 2011). Word study is an approach to developing children's understanding of alphabetic, pattern, and meaning layers of English orthography to help increase students literacy skills (Hufnagel, Hungler, & Lundstrom, 2009). The primary goal of word study is to support students' development of orthography- knowledge that students can apply as they are reading and writing (Hugnagel at. el., 2009). Through this instructional approach teachers use a variety of hands-on activities to explore layers of information; such as the alphabet by studying the relationship between letters and sounds (Hugnagel at. el., 2009). Through this work students learn to match single letters and pairs of letters to specific sounds and in doing so create words and recognize patterns (i.e CVC) (Hugnagel atl. el., 2009). Word study also teaches students how to use their word knowledge strategically to support their spelling attempts during writing activities and to help them decode unfamiliar words while reading (Bear & Templeton, 1998).

Explicit vocabulary instruction is particularly important for children with disabilities to build their literacy skills (Goldstein, 2011). Instruction in vocabulary has been found to improve

reading comprehension outcomes, especially for students with reading difficulties (Elleman, Lindo, Morphy, & Compton, 2009, as cited in Kuder, 2017). Bryant D., Goodwin, Bryant B., and Higgins (2003) reviewed the literature on vocabulary instruction with students who have learning disabilities and found that vocabulary instruction such as computer-assisted instruction, fluency-building vocabulary practice activities, mnemonic strategy instruction, and conceptual enhancement instruction (i.e semantic feature analysis and semantic mapping) could improve the learning of word meanings as well as reading comprehension, especially when students were interactively engaged through the use of methods such as mnemonics, semantic feature analysis, and semantic mapping. Mnemonic instructional methods use a technique such as rhyme or a picture to help the individual recall information (Kuder, 2017). Morphemic analysis instruction supports students with semantics by helping students learn the meaning of the root word. This allows students to break the word pinto morphemic parts (prefix, suffix, root) and attach meaning to each word part. Students are then able to make a prediction about the meaning of the word based on the meaning of the parts (Kuder, 2017).

Repeated reading has been identified as an effective and promising practice to improve the literacy skills of adolescents (Escarpio & Barbetta, 2016). This instructional strategy involves a teacher reading a passage to a student and then the student reading the passage several times until mastery (Garwood at. el., 2017). The goal in repeated reading is to increase students' decoding and word identification to the point where it becomes automatic (Escarpio & Barbetta, 2016). A meta-analysis on the effects of repeated reading on fluency for students with reading disabilities, including those with and at risk for Emotional Behavioral Disability (EBD), reported positive effects for elementary and secondary students (J. Lee & Yoon, 2017). To increase the benefits of repeated reading, teachers should first read the passage aloud while the student listens

and then have the student read the passage least four times (J. Lee & Yoon, 2017). Students can also work collaborative with their peers using this strategy.

Structured peer tutoring is also a strategy that supports students literacy development. The use of peer tutoring is also a way to promote literacy development for urban minority school children in particular because it accounts and compensates for family and sociocultural risk factors and prevents students' early academic failure (Greenwood & Delquardi, 1995, as cited in Kourea, Cartledge, & Musti-Rao, 2007). Through the use of peer tutoring, students are provided with ample opportunities for active engagement and practice; as a result increasing students on-task behavior, they receive individualized instruction and immediate error correction with positive feedback, and they improve their academic and social skills (Arreaga-Mayer, 1998; A.D. Miller, Barbetta, & Heron, 1994, as cited in Kourea at. el. 2007). Simmons (1994), and Kamps (1994) found that students increase their fluency and comprehension after participating in peer tutoring (as cited in Kourea at. el., 2007). Providing students with the opportunity to work collaboratively with their peers during literacy allows students to respond to a text and provides students sustained text exposure (Ciullo, Ortiz, Al Otaiba, & Lane, 2016; Wexler, Reed, Pyle, Mitchell, & Barton, 2013). During structured peer tutoring, teachers divide the class into two groups based on reading abilities and then create heterogeneous pairs (Garwood at. el., 2017). After the teacher has modeled appropriate tutor behavior, students then take turns reading and providing feedback to each other using a text chosen by the teacher at the lower-achieving reader's level (Garwood at. el., 2017). Teachers can also provide students with prompts to promote engagement with their peer, for example "are there any confusing parts about this story that you think we should read again?" (Garwood at. el., 2017).

The use of self-assessment in writing instruction presents meaningful ways to promote student writing achievement through reflection and meta-cognition during the writing process

(Nielsen, 2012). Self-assessment in writing is evident in teaching methods that prompt writers to think about, evaluate and/or respond to their own writing (Nielson, 2012). Self-assessments is usually practiced to help students recognize specific attributes of good writing and to lead them to revise their own work with these qualities in mind (Nielson, 2012). Through this process the writer both improves the finished written product and rebuilds their skills in revising to apply for later use. This strategy expands on Graham and Harris's (1993) meta-analysis model of Self-Regulated Strategy Development (SRSD) and has recently been found to by instructors as a way to encourage meta-cognition (Andrade & Valtcheva, 2009; Campillo, 2006; Garham, Harris & Hebert, 2011) and growth in writing among beginning writers who may have trouble reviewing their own work to make improvements (Bloom, 1997; Graziano-King, 2007; McCarthy, Meier & Rinderer, 1985; Nicol & Macfarlane-Dick, 2006, as cited in Nielsen, 2012). The use of a self-assessment method is also beneficial for students because it encourages them to follow a process in writing rather than composing an essay in one step, as often occurs when students write their drafts at the last minute and with little to no revisions (Andrade & Boulay, 2003; Harris, Graham, Mason & Friedlander, 2008, as cited in Nielsen, 2012). Positive communication between teachers and students is also facilitated by the use of self-assessment which helps students to understand feedback from their teacher more and enables the expression of student voice by providing a sense of purpose and meaning, as well as motivation for the writer (Diltz, 2006; Yancey, 1998, as cited in Nielsen, 2012).

Universal Design

Universal Design (UD) refers to the design of products and environments to be accessed, understood and used to the greatest extent possible by all people regardless of their age, size, ability or disability, to the greatest extent possible, without the need for adaptations (Ron Mace, 1997, as cited in Bowe, 2000). Society limits and constrains individuals with disabilities through

an environment that creates attitudinal, physical and social barriers (Riedmann, Lamanna, & Nelson, 2003, as cited in Hindes & Mather, 2007). Universal design is about social inclusion while accessibility measures implemented after the basic design of a building or a product represents exclusion (Iwarsson & Stahl, 2003).

Following the passage of the Americans with Disabilities Act (ADA, 1990), UD became popular with architects and designers who worked to make public buildings and city streets accessible for the first time. Three critical insights came from this work that have become to define Universal Design: 1. Most adaptions could be avoided if designers plan for accessibility from the beginning. Therefore, UD proactively builds in features to accommodate a range of human needs and abilities. 2. Modifications to the built environment are beneficial to many people, not just those with disabilities (i.e. automatic doors, curb cuts, entry ramps, universal-height drinking fountains). 3. Disabilities have less to do with individual deficits and more to do with environmental barriers that inhibit people's ability to participate fully in society (Access Project, 2011). Universal Design has become a fundamental condition of good design with the philosophy that if an environment is accessible, usable, convenient and a pleasure to use, everyone benefits (Centre for Excellence in Universal Design, 2014). Universal Design incorporates a two level approach including user-aware design which pushes for mainstream products, services, and environments to include as many people as possible, and customizable design that minimizes the difficulties of adaption to particular users (Centre for Excellence in Universal Design, 2014).

Universal Design is made up of seven principles that include: equitable use, flexibility in use, simple and intuitive, perceptible information, tolerance for error, low physical effort, and size and space for approach and use (Centre for Excellence in Universal Design, 2014). "The purpose of these principals is to articulate the concept of universal design in a comprehensive way, and they are intended to be applied to all environments, products and communications"

(Iwarsson & Stahl, 2003). When applying these principles, universal design requires integration of accessibility and usability features from the onset, removing any stigma and resulting in social inclusion of the broadest diversity of users (Iwarsson & Stahl, 2003).

The first principal, equitable use, refers to the design providing the same means of use to all users, segregating or stigmatizing users is avoided, privacy, security, and safety are equally available for all users, and the design is appealing to all users (Centre for Excellence in Universal Design, 2014). In order to meet the second principle of flexibility in use it has to meet the guidelines of providing choice in methods of use, accommodating both right and left handed people, facilitates the user's accuracy and precision, and provided adaptability to the users' pace (Centre for Excellence in Universal Design, 2014). Simple and Intuitive use occurs when unnecessary complexity is eliminated, there are consistent user expectation and intuition, a wide range of literacy and language skills are accommodated, arrangement of information is consistent, and effective prompting and feedback is provided after task is completed (Centre for Excellence in Universal Design, 2014). The fourth principle, perceptible information, is translated into designs when necessary information is communicated effectively to the user, regardless of ambient conditions or the user's sensory abilities (Bowe, 2000). UD guidelines for this to happen include: providing adequate contrast between essential information and its surroundings, maximize "legibility" of essential information, differentiate elements in ways that can be described, use different modes (pictures, verbals) for redundant presentations, and provide compatibility with a variety of techniques or devices (Centre for Excellence in Universal Design, 2014). Designs that arrange elements to minimize hazards and errors, provide warnings of hazards and errors, provide fail safe features, and discourage unconscious action in tasks that require vigilance follow the fifth principle that deals with tolerance of error. Low physical effort revolves around the user to maintain a neutral body position, use reasonable operating forces, minimize repetitive actions,

and minimize sustained physical effort (Centre for Excellence in Universal Design, 2014). The final principle, size and space for approach and use, provides a clear line of sight to important elements for any seated or standing user, makes the reach to all components comfortable for any seated or standing user, accommodated variations in hand and grip size, and provides adequate space for the use of assistive devices or personal assistance (Centre for Excellence in Universal Design, 2014).

Universal Design for Learning

In recent years the Universal Design (UD) philosophy has found ground in the field of education (Access Project, 2011). Having a disability can affect an individual's access to a level of education that is in accordance with his/her disabilities (Hindes & Mather, 2007). "UD in education helps meet the diverse needs of students by making instruction as flexible as possible" (Fernandes, 2010). Within the educational setting, universal design means the preparation of curricular, materials, and environments so that they may be used, appropriately and with ease, by a wide variety of people (Bowe, 2000). Teachers have adopted UD as a conceptual and philosophical foundation on which to build a model of teaching and learning that is inclusive, equitable, and guides the creation of accessible course materials (Schelly, Davies, & Spooner, 2011). Inclusion of individuals with disabilities in the classroom is believed to promote social experiences, as well as create equal social structures between individuals (Baker & Donelly, 2001, as cited in Hindes & Mather, 2007). Designing for the extremes of the populations is an effective way to meet the needs of all. Once the needs of the extremes of the population are met; the needs of all people are usually met (Burgstahler, 2008, as cited by Fernandes, 2010). The work of the Center for Applied Special Technology (CAST) is grounded in Universal Design for Learning which they view as an approach to planning and developing curricula in ways that promote access, participation, and progress in the general education curriculum for all learners (CAST, 2006 as cited

in McGuire, Scott, & Shaw, 2006). Through this instructional approach, teachers would be structuring their instructional style to meet the needs of students with disabilities, making education accessible to all (Fernandes, 2010). By preparing to meet diverse needs, we will better serve people with no special needs (Bowe, 2000).

If the goal of UD is the removal of barriers from the physical environment, the goal of UDL is the elimination of barriers from the learning environment (Access Project, 2011). As David Rose, one of UDL's founders has stated, "UDL puts the tag 'disabled' where it belongs-on the curriculum, not the learner. The curriculum is disabled when it does not meet the needs of the diverse leaners" (Council or Exceptional Children, 2011). Universal design places responsibility for making adjustments upon the instructors and the school (Bowe, 2000). Educators need to avoid the tendency to blame deficits on students and be prepared to scrutinize the instructional design for potential problems (Rickerson & Deitz, 2003). It is not only best practice for instructors to strive to limit the barriers their students encounter so that they are able to have equal access to their education, but it is also legally mandated. "Section 508 Access Standards for the most recent Rehabilitation Act amendment explains that public telecommunication information needs to be accessible" (Smith, 2002). This is particularly significant for educators as they increasingly exchange information and communicate with their students through the use of technology.

The Council for Exceptional Children (CEC) recognizes that Universal Design for Learning is achieved by means of flexible curricular materials and activities that provide alternatives for students with differing abilities (Bowe, 2000). These alternatives are built into the instructional design and planning, and are not added on after-the-fact (Bowe, 2000). UDL is about providing options which are essential to learning, because no single way of presenting information, no single way of responding to information, and no single way of engaging students will

work across the diversity of students that populate out classrooms (CAST, 2011). This is achieved by means of flexible curricular materials and activities that provide alternatives for students with disabilities (Ouellett, 2004).

The Center for Applied Special Technology (CAST) has developed three principles for UDL that include providing students with multiple means of engagement, representation, and action and expression. When providing students with multiple means of representation the end results is to support students in becoming resourceful and knowledgeable learners. “Providing flexible means of representation addresses potential perceptual or cognitive barriers to learning (CAST, 2004, as cited in Ouellett, 2004). Students are provided options for perception by offering ways of customizing the display of information, alternatives for auditory information, and alternatives for visual information. Students are provided options for language, mathematical expression, symbols, and comprehension.

The second principle, providing multiple means of action and expression, begins with options for physical action. This principal reminds educators that it is not enough for students merely to acquire information; they must also have some way to express what they have learned and some way to apply that information as knowledge (Burgstahler & Cory, 2008). This can be through varying the methods for response and navigation and optimizing access to tools and assistive technologies. This principle also provides learners with options for expression and communication through multiple tools and supports, along with options for executive functions that include supportive planning and managing information. These supports are put into place with the goal being to help support learners in becoming goal-directed learners. “Some methods of expression may create barriers for students due to physical, sensory, emotional, or cognitive differences. These barriers can be addressed by offering students a range of methods of expression including combinations of writing, speaking, and drawing” (Ouellett, 2004).

The third principle, which focuses on providing learners with multiple means of engagement, works on providing options for recruiting interest through individual choice and optimizing relevance. “Students will never use knowledge they don’t care about, nor will they practice or apply skills they do not find valuable” (Burgstahler & Cory, 2008). This principle also provides options for sustaining effort and persistence through feedback and collaboration, in addition to providing options for self-regulation by promoting self-assessment and reflection. “For learning environments to be truly accessible for all, it is important to provide learners with a range of options that consciously promote engagement, interest, and motivation” (Ouellett, 2004). This third principal reminds us that there is an affective component to reaching any goal (Burgstahler & Cory, 2008). The end goal of this final principle is to promote purposeful and motivated learners. Universal Design for Learning fosters solutions that address the limitations of the learning environment rather than the limitations of the student, while making the student less of a problem and more of a part of diversity within the classroom (Burgstahler & Cory, 2008). All of these components to Universal Design for Learning create learning opportunities for students that support their unique needs.

Supporting the Literacy Development of Struggling Readers’

Federal education policy has stated to use “scientifically based, reliable, replicable research” as the basis for instructional recommendations for teachers, schools, and state education agencies (Allington, 2013). The National Reading Panel has noted that there is no single way that has been shown to be the most effective approach to developing the literacy skills of children (Allington, 2013). Therefore, teachers need to know how to teach several literacy approaches effectively because no single approach works for every child, and effective teachers adapt their teaching until they locate the best method for developing the literacy proficiencies for each child (Allington, 2013).

A best practice strategy is to support the literacy development of struggling readers is to use a text that is at their instructional level. Ehri, Dreyer, Flugman, and Gross (2007) found that the reading development of primary-grade struggling readers appeared to have made gains due to reading texts at a high level of accuracy, between 98% and 100% (as cited in Allington, 2013). O'Connor (2002) also found similar results when working with sixth-grade struggling readers who benefitted using reading level-matched texts (as cited in Allington, 2013). Jorgenson, Klein, and Kumar (1977); Gambrell, Wilson, and Gantt (1981); Fisher and Berliner (1985); and Anderson, Everston, and Brophy (1979) all reported that struggling readers were more likely to be engaged when the texts they were reading better matched their reading levels as compared with engagement when texts were at grade level (as cited in Allington, 2013).

One way to develop literacy skills of children is to foster phonemic awareness. Phonemic awareness is the awareness that the speech stream consists of a sequence of sounds- specficially phonemes, the smallest unit of sounds that makes a difference in communication (Yopp & Yopp, 2000). Inventive writing is an approach to develop phonemic awareness while promoting understanding of the alphabetic principle (Adams, 1990, as cited in Allington, 2013). This strategy works because instruction in letter-sound relationship is of little value or utility unless the child is interested in using those letter-sounds relationships to read or write (Adams, 1990, as cited in Allington, 2013). Inventive writing provides focuses attention on the individual phonemes that compose English words (Clarke, 1988; Gough, 1998; Morris, Bloodgood, Lomax. & Perney, 2003; as cited in Allington, 2013). Students who engage in this literary activity learn how to record the smallest units of sound of the spoken language in print (Yopp & Yopp, 2000). Supporting students to engage with inventive writing allows them to notice that running speech is made up of a sequence of small sounds, which helps to prevent the alphabetic symbol system from being arbitrary (Yopp & Yopp, 2000).

Students who struggle with the writing component to literacy often experience difficulty with how to plan a story (McCuthchen, 2006, as cited in Dunn and Finley, 2010). Even if students have a good idea and plan, if they have a lack of knowledge about proper sentence structure and syntax they may experience challenges with creating a fluid and elaborate text (Dunn & Finley, 2010). There are a number of strategies to support students in the planning phase of writing which include Graham and Harris's WWW, W=2, H=2 strategy which lists a series of seven questions to prompt students to think about what they could include in a story (as cited in Dunn & Finley, 2010). Saddler, Moran, Graham, and Harris (2004) developed the strategy Plan, Organize, and Write (POW) and found that students produced more elaborate stories when given explicit instruction in how to plan a story and when focusing on what key elements to include (as cited in Dunn & Finley, 2010). Art materials such a modeling clay, paints, markers, and crayons can also be a way to support students skills in the pre-writing phases by allowing students to note their story ideas visually before facing the possibly laborious task of writing (Dunn & Finley, 2010).

Literacy Learning Through Assistive Technology

Literacy is one area in which well-applied assistive technologies can act as a lifeline to students with disabilities (Hasselbring and Bausch, 2006). Assistive technology can break down barriers that students experience when it comes to literacy by using it as a reading support to access grade-level text as they read, or as a reading instructional strategy that helps to strengthen and improve a student's overall reading skills (Hasselbring and Bausch, 2006). Supportive assistive technology approaches should continually improve students' reading skills by providing the scaffolding necessary to read text at their grade level (Hasselbringa and Bausch, 2006). Although AT devices may be used in remediation, such devices may also provide a compensatory alternative that circumvents deficits while capitalizing on students strengths (D.P. Bryant & B. R. Bry-

ant, 1998; Garner & Campbell, 1987; McGregor & Pachuski, 1996, as cited in Bryant, Bryant, and Raskind, 1998).

AT to support fluency development.

As children's reading skills develop, they are expected to read words both effortlessly and quickly (Mraz, Nicholas, Caldwell, Beisley, Sargent, and Rupley, 2013). Students cannot take time to analyze or decode every word they encounter if the goal is higher level thought processes and enjoyment of reading (Richek, Caldwell, Jennings, & Lerner, 2002, as cited in Mraz et. al. 2013). Fluency affords the reader the ability to focus on understanding the deeper levels of meaning that are embedded in the text (LaBerge & Samuels, 1974, as cited in Mraz et. al., 2013). Additional principles to fluency include the ability to read with appropriate intonation, expression, and phrasing, and engagement with the text to practice and increase their level of fluency (Mraz et. al. 2013). Unfortunately, many struggling readers have difficulty moving to a level of fluency that allows them to easily comprehend what they are reading (Mraz et. al., 2013). Word identification may not be automatic so struggling readers must focus their attention on recognizing and decoding unfamiliar words in the text and consequently have little attention to devote to comprehension (Dowhower, 1989; Nathan & Stanovich, 1991; NRP, 2000; Rasinski, 2004; Rasinski & Padak, 1994; Stanovich, 1993/94; Tyler & Chard, 2000; Unrau, 2004; Zutell & Rasinski, 1994, as cited in Mraz, 2013).

Using picture symbols with printed text is a form of assistive technology that fosters fluency skills with struggling readers. Students with reading problems have difficulty acquiring fluent and accurate word-identification skills (Adams, 1990; Stanovich, 1988, as cited in MacArthur, Ferretti, Okolo, and Cavalier, 2001). Studies have shown that when words are paired with pictures or symbols, students who are struggling readers have greater success learning the words. As students increase their level of sight word identification their fluency increases, allowing the

student to focus on higher level thought processes such as comprehension. This is demonstrated in the work done by Spector 2010; Fossett and Mirenda, 2006; and van Daal and Reitsma 1990, who used this form of assistive technology to enhance the fluency skills of students with disabilities. A theme within these studies consisted of students experiencing an increase in their fluency skills through their work with having visual images paired with high frequency sight words. Students were provided a picture or symbol with a word on flash cards or PowerPoint document. The students were given opportunities to practice and work with this assistive technology and over time were able to recognize the words without the visual support. Then when the students were provided a text that included the words they had been working with, they were able to correctly identify them. This increased the students' knowledge of sight words and word recognition, leading to them being able to read words more effortlessly and automatically. The work that these studies showed demonstrates that by providing students with this form of assistive technology it allowed students to increase their level of sight words which is knowledge students can transfer while reading a text.

Another form of assistive technology that supports fluency are tracking aids. These provide students with visual supports to maintain their place in the text. These can include a bar magnifier or a colored reading strip that students move over or below words as they read. Students who have visual impairments or difficulty attending to a task can result in challenges viewing and focusing on a text which can negatively affect their level of fluency. The majority of students with visual impairments have residual functional vision, and the focus of support for them should be given to visual discrimination, such as color contrasts and color discrimination (Lee and Templeton, 2008). Contrasting aids is another form of assistive technology that can support students' fluency skills by altering the foreground or background of a text to promote visual access. This can include using highlighters, highlighting tape, acetate report covers, or cover over-

lays. Magnification aids, such as hand held or stand magnifiers and video magnifier (CCTV), which allow for controlled enlargement of text. These inexpensive, teacher created materials can be as effective as other medium-to high-tech AT items when addressing students' fluency (Lee and Templeton, 2008). Having a visual support to move along the text while reading is a way for students to focus their attention to increase their fluency. Unfortunately, the current literature on low-tech assistive technology is minimal, and has not yet extensively explored the effects of these visual aids on students' literacy skills.

The use of a digital pen is also a form of assistive technology that supports students' literacy skills in the area of fluency. A digital pen looks very much like a typical ballpoint pen, and also writes the same with real ink on real paper. However, digital pens also digitalize every pen stroke that is made, and then later transfers those pen strokes to digital pages (Patti & Garland, 2015). In studies conducted by Bleson, Hartmann, & Sherman, 2013; and Patti & Garland, 2015, using the 'Smartpen' with students who have specific learning disabilities and found that this form of assistive technology supported students' progress in multiple areas within literacy including fluency and vocabulary. The 'Smartpen' has a tape-assisted reading feature that is utilized to increase a student's ability to read with proper phrasing, intonation, and expression in connected text which supports the development of a student's fluency skills (Patti & Garland, 2015). A teacher can facilitate this by reading a passage that is at the student's instructional level and record it on the 'Smartpen.' Then the student can listen to the recording while following along with the written passage as many times as the student would like. Smartpens can also support the acquisition of vocabulary and vernacular by the pen serving as AT for students to access written study tools such as vocabulary cards, word walls, or labels for objects around the room (Patti & Garland, 2015). To further support student's word study, talking points can be attached

to each vocabulary word and contain audio information, such as correct pronunciation, definition, and use of the word in a sentence (Patti & Garland, 2015).

AT to support vocabulary development.

Vocabulary is an area that students may require scaffolded support due to students needing to learn 2,000 to 3,500 new words annually in content areas (Osborn & Hiebert, 2004, as cited in Clay, Zorfass, Brann, & Kotula, 2009). Areas of difficulty within vocabulary skills may include one or more of the following: a lack of prior knowledge and experience; reliance on a language other than English as the primary language; poor long-term or short-term memory; difficulty in decoding words; or a lack of specific vocabulary skills, such as being able to recognize and use context clues (Barton & Heidema, 2002; Beers & Howell, 2003, as cited in Clay et. al., 2009). A talking dictionary is one form of assistive technology that supports students in these areas. It is a hand-held device that allows the teacher and/or student to create an electronic vocabulary file complete with definitions and verbal pronunciation (Lindsey-Glenn and Gentry, 2008). Teachers can select targeted words for the student to focus on learning to include with the vocabulary list. For students who have difficulty recalling the meaning of words due to poor long-term or short-term memory, they are able to reference this list continuously as needed. When students are reading a text and come across an unfamiliar word, which may be due to a lack of prior knowledge and experience, they can use a talking dictionary to learn the meaning and pronunciation. In addition to the voice feature, talking dictionaries also have thesaurus, definition and game functions which makes this form of assistive technology a flexible tool for any student who needs support for vocabulary development (Lindsey-Glenn & Gentry, 2008). Studies conducted by Lindsey-Glenn and Gentry, 2008, Clay, Zorfass, Brann, and Kotula, 2009 had a common theme that when using the AT support of a talking dictionary, students with special needs learned more vocabulary words and were able to generalize the new vocabulary words in a

variety of contexts and materials. These studies also indicated that the use of a talking dictionary supported readers in building word knowledge, identifying synonyms, and exploring multiple word meanings; all skills that support vocabulary development.

AT to support comprehension development.

Graphic organizers are a form of assistive technology that support students' literacy skills in the area of comprehension. This form of assistive technology allows students to have a visual representation of a text. Students can use this form of assistive technology to take notes while reading which can support their comprehension of a text. Studies conducted by Ponce, Mayer, and Lopez 2013, Barrett-Mynes, Moran, and Tegano, 2010, and Cheon and Hyun Ma, 2014 showed that by providing students with a scaffold support of graphic organizers to complete while they are reading a text increases a students level of comprehension based on a quantitative analysis of test results. By having students use a graphic organizer their reading comprehension skills were enhanced by translating passages into graphic organizers. Another theme within these studies showed that the support of graphic organizers allowed students to read with a purpose which focuses students' attention on particular aspects of a text. Graphic organizers can include pictures, diagrams, charts, or other visual representations of the content and meaning of a text (Barrett-Mynes et. at. 2014). These visual representations can depict the setting, initiating event, problem, goal of the main character, and solution, as well as how these elements relate to one another (Barrett-Mynes et. al. 2014). Reading with a purpose through the use of graphic organizers allows teachers to provide guidance in helping readers engage and become more active in their reading (Cheon and Hyun Ma, 2014). The information that students identify from a text while completing a graphic organizer also supports their skills in summarizing a text. Graphic organizers help students to identify key elements of a text which they can then refer to after reading the text to support the literacy skill of summarizing.

Another form of assistive technology that supports students' comprehension skills is text-to-speech software programs. Text-to-speech (TTS) is one form of assistive technology that lets students see a text and hear it read aloud at the same time. TTS can be used with books, emails, web pages and any digital text and are read by computer-generated voices. Audiobooks also allow a student to hear a text read aloud. This form of assistive technology creates a more level academic playing field for students who do not decode or comprehend well enough to read grade-level text independently (Hasselbring and Bausch, 2006). Using TTS software in the classroom provides students with access to grade level reading materials and can address low performance in reading (Roberts, Takahashi, Park, and Stodden, 2012). Struggling readers and students with reading disabilities focus the majority of their efforts on decoding words or understanding vocabulary resulting in a lack of comprehending a text (Roberts et. al., 2012).

Studies conducted by Schmitt, Hale, McCallum, Mauck, 2011, Roberts et. al., 2014, and Gonzalez and Johnson, 2012 found that by providing students with a text-to-speech software while reading a text, decreased or eliminated the need for students to focus on decoding the text, which allowed them to focus on comprehending the text instead. This accommodation circumvents poor phonemic awareness, underdeveloped alphabetic principles, and dysfluent word decoding, deficiencies known to manifest in poor text comprehension (Kirby, Parrila, & Pfeiffer, 2003, Morris, 1998; Torgesen & Mathes, 2000, as cited in Schmitt et. al. 2011). These studies showed that this AT support enhanced both students' factual comprehension and inferential comprehension. These positive effects occurred for students from third grade to high-school for students with disabilities. The high school students in particular who used text-to-speech software for 40 minutes or more per week improved positive attitudes towards reading, increased engagement in reading, and obtained significant gains in vocabulary and comprehension in comparison to measures obtained when they were not using the software (Roberts, 2012). These stud-

ies show that providing struggling readers with the assistive technology support of text-to-speech software, they are able to increase their literacy skill of comprehension.

AT supporting reading development within UDL framework.

Google Read and Write is an application that provides users with many of the previously mentioned forms of assistive technology all in one place creating a UDL opportunity with literacy. For example, text to speech, talking dictionary, word prediction, translator, and highlighters are just a few of the many literacy supports built into the program Google Read and Write. A complete list of tools can be found in Appendix 1. Unfortunately, due to the recent development of this computer program there is not been any empirical research done on this form of UDL. The Center for Applied Special Technology (CAST) is an education research organization co-founded by David Rose that specializes in the research and development of Universal Design for Learning. The goal of this non-profit organization is to make education more inclusive and effective. CAST has developed UDL guidelines to be used as a framework to improve and optimize teaching and learning for all people based on scientific insights into how humans learn (CAST, 2018). These guidelines offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in meaningful, challenging learning opportunities (CAST, 2018). The guidelines are comprised of three categories that are broken down into ways to access information, build upon that knowledge, and finally internalize the information. The first guideline is to provide multiple means of representation which includes providing options for perception, providing options for language, mathematical expressions and symbols, and providing options for comprehension. The second guideline focuses on providing multiple means of action and expression. This portion of UDL relates to providing options for physical action, expression and communication, and options for executive function (i.e. managing information and monitoring progress). The third component to the UDL guidelines includes

providing multiple means of engagement. This has to do with providing options for recruiting interest (i.e optimizing individual choice), providing options for sustaining effort and persistence, and providing options for self-regulation. Google Read and Write has been recognized by CAST as a exemplary way to implement UDL with students to support literacy skills by meeting all UDL guidelines (CAST, 2018). This makes Google Read and Write a reliable form of an instructional strategy that follows the framework of UDL. This AT provides users with a plethora of various supports all in one place which allows each individual student to have tools to use that best meet their unique needs.

Barriers for Teachers Implementing Technology

*"*Despite the promise of technology in education, many practicing teachers face several challenges when trying to effectively integrate technology into their classroom instruction" (Wachira & Keengwe, 2010, p. 17). Although national statistics cite a remarkable improvement in access to computer technology tools in schools, teacher surveys show consistent declines in the use and integration of computer technology to enhance student learning (Wachira & Keengwe, 2010). Surveys of teachers show consistent declines in the classroom use of technologies (Wachira & Keengwe, 2010).

> "A report by the National Center for Education Statistics (2005) indicated that 44% of teachers used technology for classroom instruction, 42% for computer applications, 12% for practice drills, 41% required research using the internet, 27% assigned multimedia projects, 23% assigned graphical presentations of materials, 21% assigned demonstrations, 20% required students to use technology to solve problems and analyze data, and 7% assigned students to correspond with others using the Internet. These low figures imply that effective integration of technology into classroom instruction has yet to be realized" (Wachira & Keengwe, 2010, p. 17).

Adelman, Donnelly, Dove, Tiffany-Morales, Wayne, and Zucker (2002) and Wachira and Keengwe, 2010 identified that one barrier is that teachers are uncertain about how to use technology for instructional purposes and lack confidence in their own ability to develop ways to do so. As a result of this uncertainty, they feel unprepared to integrate technology into their instruction (Zucker, Dove, and McGhee, 2000, as cited in Feldman and Weiss, 2010). Teachers' decisions on whether and how to use technology for instruction ultimately depends on the teachers themselves and the beliefs they hold about technology (Bitner and Bitner, 2002; Ertmer, 2005, as cited in Wachira and Keengwe, 2010). Due to teachers' lack of expertise, confidence, and knowledge on technology integration within their teaching practices, they need a significant amount of time to figure out how best do this. Lack of time to do this is another barrier to the incorporation of technology into teachers' practice (Adelman et. al. 2002; Cuban, Kirkpatrick, and Peck, 2001; Zucker, Dove, and McGhee, 2000, as cited in Feldman and Weiss, 2010).

Cuban, Kirkpatrick, and Peck (2001); Beggs, 2000; Bauer and Kenton, 2005 identified three other barriers that teachers face as they attempt to use technology in their classrooms (as cited in Feldman and Weiss, 2010). This includes the structure of the school that may require teachers to share equipment, the demands place on teachers, such as high stakes testing, that may lead to them believing they don't have time to try something new or it may be too risky, and thirdly, even the best technology fails at times (Feldman and Weiss, 2010). Zhae (2002) found that although schools have computers housed in laboratories or the media center, access to them is limited because of competition with other teachers for laboratory time (as cited in Wachira and Keengwe, 2010). Some teachers lack technology skills and pedagogy in using technology (Hughes, 2005; Koehler and Mishra, 2005), while others are unwilling to try because of anxiety, lack of interest, or lack of motivation (Duhaney, 2001, as cited in Wachira and Keengwe, 2010). Wachira and Keengwe (2010) found in their research with educators teaching in an urban envi-

ronment that where technology was available, it was underutilized with teachers expressing reasons due to lack of time, lack of knowledge on appropriate technology use, anxiety and lack of confidence in using technology.

Types of Effective Professional Development Focused on Technology Integration

Although much is now known about the essential elements of effective literacy programs (i.e., alphabetics, vocabulary, comprehension, fluency, and writing), we also know that simply including these elements in instructional frameworks is not enough to ensure success with the elusive goal of closing the achievement gap between students (Kennedy, E., & Shiel, G., 2012 p. 372). Professional development becomes a way to support teachers to become highly-qualified and effective in their instructional strategies within literacy programs.

Previous research on professional development indicates that traditional professional development used in many content areas is not appropriate for professional development as it relates to the integration of technology into instruction (Wells, 2007 and cited in Hutchison, 2012). For example, traditional professional development is often delivered in short-term workshops and focuses on teaching discrete skills and techniques (Little, 1994, as cited in Hutchison, 2012). Educators are not given the chance to experience the new teaching approaches themselves. They are only lectured to about what to do, leaving teachers to construct for themselves a notion of what the particular reform means (Tinoca & Valente, 2001). The topics covered in the traditional professional development format of a one-time face-to-face meeting are often too broad for any given teacher, and are disconnected from application in their own classrooms (Tinoca & Valente, 2001). There is also a lack of input from the teachers, leaving them disconnected from the learning experience (O'Brien, 1992, as cited in Tinoca & Valente, 2001). Workshops were the teachers are lectured to are common and the lack of participation from them follows as a natural consequence (Radford, 1999, as cited in Tinoca & Valente, 2001).

This type of an approach is not conducive to integrating technology, which requires not only conceptual knowledge and specific curricular goals, but more practically also requires support in basic operations as well as expertise to solve technical problems (Hutchison, 2012). This has lead to a need for increased and varied professional development on technology integration in order to have sustained results (Hutchison, 2012). The International Technology Education Association (2007) published a report indicating the need for more professional development related to technology use (Hutchison, 2012). Doering, Hughes, and Huffman (2003) argued that pre-service programs should spend less time focused on learning how to use tools and more time on teaching how to integrate learning-with-technology perspectives into classrooms (as cited in Hutchison, 2012). These studies indicate the need for improved professional development on technology integration.

Online professional development.

In recent years, online professional development (OPD) has become an alternative method for delivering high-quality PD to in-service teachers (Magidin, D.K., Masters, J., O'Dwyer, L. M., Dash, S., & Russell, M., 2012, p. 237). T. Anderson (2008) defines online learning as "the use of the Internet to access learning materials; to interact with the content, instructor, and other learners; and to obtain support during the learning process, in order to acquire knowledge, to construct personal meaning, and to grow from the learning experience" (p. 5, as cited in Levenberg & Caspi, 2010). Online professional development is a research method that creates learning opportunities that are flexible for participates in terms of time and location. With participates not restricted to a particular time and location to receive the professional development, this method is more accommodating to teachers who may already have time consuming schedules. The evaluation process is similar to the traditional face-to-face format by having teachers share their knowledge, thoughts and opinions on the information they received in their professional devel-

opment through written or oral responses. “Recent meta-analysis (Means, Toyama, Murphy, Bakia, & Jones, 2009) found more than a thousand empirical research studies concerning online learning. They observed that online learning has been reported to have better learning results than face-to-face learning in terms of self-reflection, self-regulation, and self-monitoring” (as cited in Levenberg & Caspi, 2010).

Recent publications have described the current state of professional development in an attempt to focus attention on providing more effective opportunities for teacher learning (Huebner, 2009, Smith 2009, Wei, 2009, as cited in McConnell, Parker, Eberhardt, Koehler, & Lundeberg, 2012). Most of these studies cite the continued presences of one-time, short-duration workshops and presentation that are mandated by school leaders for all teachers, which have been shown to be inadequate strategies for bringing change to teacher practices (Guskey, 2002; Kesson and Henderson, 2010; Wei, 2009, as cited in McConnell, 2012). Having continuous communication and collaboration between the instructor and participants has been shown to be a critical component in making both face-to-face and online professional developments successful (Navarro, Zervas, Gesa, and Sampon, 2016). This aspect of professional development supports teachers so they are able to effectively apply the strategies given in their classrooms.

Hybrid professional development.

Hybrid or blended learning is a “combination of face-to-face expereinces, in which learners are co-located, with online experiences” (Owston, Sinclair, & Wideman, 2008, p. 202). Hybrid professional development approaches have the potential to provide foundational and ongoing development for teachers, giving the possibility for facilitating a broader adoption of effective practices in a flexible way for time-pressed educators (Moore, Haviland, Moore, Tran, 2016). The online component of learning can provide teachers with continuous support as they work towards implementing what they learn from the face-to-face portion of the professional de-

velopment in the classrooms. This online component is independent of time, place, or learning pace restrictions, therefore this portion of the PD has the potential to expand the range and duration of the face-to-face session (Harasim 1989, Johnson, 2002; Macdonald, 2003; Owston, 2006; Smith and Taylor, 1995; Vaughan and Garrison, 2005, as cited in Berger, Eylon, and Bagno, 2008).

Even though hybrid professional development takes place in varied contexts, the reason to implement this approach is the same, including (a) more effective teaching and learning; (b) greater instructional flexibility and access to leanring; and (c) more cost-effective instruction (Graham, 2013). Dede, Ketelhut, Whitehouse, and McCloskey (2009) provided a review of research related to hybrid professional development and found that most research centers on program design and effectiveness (as cited in Ilaria, 2016). Dede et. al. (2009) made several suggestions for future research related to hybrid learning, with one of them being to research the impact the professional development had on teacher change. This is an area that will be addressed in the study by looking at the impact the professional development had on teachers' instructional practices.

The literature on blended learning appears to demonstrate that there is not a correct blend of strategies (Hofmann, 2001, as cited in Kitchenham, 2005). However, there are models and principles to follow when implementing hybrid learning. Douglis (2002) presented a blended learning model based on six key components that are particularly well-suited to the professional development of teachers: (1) audience, (2) learning outcomes, (3) context, (4) organization, (5) infrastructure, and (6) content (as cited in Kitchenham, 2005). This involves knowing the learners and their needs, having an end goal the learners should reach from the professional development, considering the learning environment, having support from the school, anticipation of any barriers for PD delivery, and utilizing the best match of activity and delivery methods for the

learners are all ways to implement these six key components (Kitchenham, 2005). Darnum and Paarmann (2002) discuss four components of their blended learning model used with teachers which included web-based delivery, face-to-face processing, creating deliverables, and collaborative extension of learning (as cited in Kitchenham, 2005).

The research conducted by Moore at.el. (2016) found that hybrid professional development can have positive impact on the adopting of technology for instructional purposes. Navarro (2016) and Baldiris, Zervas, Gesa, and Sampson's (2016) research on hybrid professional development (combination of face-to-face and online) on inclusion was successful with educators when using UDL as the framework. This professional development design using both formats was to ensure that the instructor and participants maintained their communication while activities were being completed. Participants demonstrated a considerable amount of growth between pre-test and post-test when designing inclusive lesson plans, and their scores on an assessment activity were considerably high and within the excellent performance level. Another theme within these studies was that the professional development was aligned with the Competence Framework for Inclusive Teachers (CFIT). The core values of this framework include valuing learner diversity, supporting all learners, working with others, and personal professional development (Baldiris at. el., 2016). Assessing teachers' understanding of the material presented to them on inclusion involved having teachers complete a technology-supported inclusive lesson plan that followed UDL principles within the CFIT framework. Having teachers create an artifact to reflect their learning is one way for instructors to assess the level of understanding teachers having after receiving their professional development in addition to pre and post assessments.

Collaborative professional development.

Professional development programs differ greatly in the context they are used in and the specificities, however, there are several key characteristics that have been identified as critical to

improve their success. Among them are elements unique to adult learning, attention to the change process in which teachers are engaged, duration of the program, opportunities for modeling exemplary practices, and a collaborative structure (Tinoca and Valente, 2001). Current research conducted on professional development has investigated the qualities of professional developments in face-to-face, online, and hybrid settings that teachers deemed beneficial via survey instruments or questionnaires.

> "The research literature on effective professional development indicates that teachers who experience collaborative approaches to professional development involving classroom observation and feedback have stronger beliefs in themselves and their power to change things compared with those who have experienced observation in a supervisory or accountability context and have not received feedback" (Kennedy, E., & Shiel, G., 2010, p. 377).

Unfortunately this does not always take place in many given professional developments opportunities. A common practice in professional development is to have a speaker share information and the participants sit and listen; resulting in minimal interaction between the instructor and learners. Having continuous communication and collaboration between the instructor and participants has been shown to be a critical component in making both face-to-face and online professional developments successful (Kennedy & Shiel, 2010). This aspect of professional development supports teachers so they are able to effectively apply the strategies given in their classrooms. All studies that documented success in training teachers in the area of literacy included the component of continuous communication between instructor and learners (Kennedy & Shiel, 2010).

Professional development research in recent years supports collaboration among teachers into topics and issues happening in teachers' classrooms (Steeg & Lambson, 2015). Desimone

(2011) states that collective participation as an interactive community is a core feature in effective teacher professional development (as cited in Steeg & Lambson, 2015). There have been initiatives, such as the Teachers' Professional Learning Framework, that promote teachers collaborating by sharing professional practice among themselves rather then being passive recipients of training courses (Eaton and Carbone, 2008). Tsui and Law's (2007) research found that globalization requires educators to cross community boundaries and engage in collective sharing of knowledge (as cited in Eaton and Carbone, 2008). The use of collaboration brings teachers together for conversations about the questions arising out of their practice (Darling-Hammond & Richardson, 2009 as cited in Steeg & Lambson, 2015).

One method of collaborative professional development consist of Collaborative Continuing Professional Development (CPD). Cordingley, Bell, Rundell, and Evans (2005) define Collaborative CPD as "teachers working with at least one other related professional on a sustained basis" (Cordingley at. el. 2005). Most studies utilizing this form of collaboration within their Professional Development have experienced the most success when employing an external specialist to provide input on the topic in addition to collaborative peer support. For example, Kirkwood (2001) reported that the 'outside expert' played the leading role at the beginning of the project, with the participants gradually taking on a more central role (Cordingley at. el. 2005). Harwell (2001) found that 'professional development for practicing teachers must combine the expertise of researchers and the knowledge of practicing teachers in a collaborative effort to inform instructional design (as cited in Cordingley at. el. 2005). Bryant (2001) found that in addition to receiving guidance from experts on topics, time must be allocated for teachers to share their own personal knowledge about their students and teaching to be the most effective collaborative professional development (as cited in Cordingley at. el. 2005).

A professional development method that is also supportive of collaboration is the professional learning community (Hord & Hirsh, 2008 as cited in Hord 2009). Also referred to as communities of learning, and professional communities, the common goal of "community" models is to promote collaboration among teachers by creating a collaborative professional culture (Battersby & Verdi, 2015). Professional learning community (PLC) is a professional development initiative derived from day-to-day work practices (Dunne, 2000, as cited in Ning, Lee and Lee, 2015). PLCs are defined as "educators committed to working collaboratively in ongoing processes of collective inquiry and action research to achieve better results for the students they serve" (DuFour, 2008, p. 14, as cited in Ning et. al. 2015). The benefits of PLCs are well-documented in the literature, in that a large body of existing research has established the positive impact of PLCs on both teacher and student outcomes (Vescio, 2008, as cited in Ning et. al. 2015).

McConnel, Parker, Eberhardt, Koehler & Lundeberg (2012) reiterate the importance of collaboration by claiming that professional development that engages teachers in instructional inquiry over an extended time through collaborative professional learning communities (PLCs) is effective in improving instruction and student achievement. This collaborative method to professional development is best known through the work of Richard DuFour (DuFour & Eaker, 1998) who created a basic premise for PLCs that teachers can and should be working together to plan lessons, develop assessments, study curriculum, and otherwise improve student learning (Servage, 2009)."The professional learning community model formalizes these collaborative efforts and embeds them in the school day as a regular component of teachers' work" (Servage, p. 150, 2009). The professional component to PLCs are those individuals who are responsible and accountable for delivering an effective instructional program to students so that they each learn well (Hord, 2009). The learning component to PLCs include collaborative efforts that encourage

teachers to become an active and diligent learner who wants to ensure they are providing an education that will prepare their students for the future. Teachers a part of PLCs collectively take responsibility to learn new content, strategies, or approaches to increase the effectiveness of their teaching practices (Hord, 2009). The group of teachers within a PLC learn how to learn together (Hord, 2009). The final component to PLCs involves the sense of a community that assumes a focus on a shared purpose, mutual regard and caring, and an insistence on integrity and truthfulness (Hord, 2009). This type of learning community models a self-initiating learner who comes together in a group in order to interact in meaningful activities to learn deeply with colleagues about an identified topic (Hord, 2009).

Research conducted by Sjoer and Meirink, 2015, and Ning, Lee and Lee (2015) found that a key factor to the success of the PLC was the exchange of the teachers experiences to highlight critical elements in their approaches to teaching. Characteristics conducive to a strong professional development include all of the participants expressing the importance of the curriculum and having a mutual trust among each other. Through discussions, teachers are able to successfully develop and/or implement curriculum. These researchers also found that team collectivism had a positive effect on team collegiality. Bryk, 1999, Brownell, 1997, Little 2003, and Smylie, 1995, also found that when teachers share their expertise and effective instructional strategies with each other through continuous inquiry and reflective dialogue, a shared understanding is formed and collective professional advancement is fostered (as cited in Ning, 2015).

There are challenges to implementing professional learning communities that should be considered. Although PLCs are assumed to be a powerful learning method for teachers, Stoll (2006) argues that there are influences both within and external to schools that can either facilitate or severely inhibit the process, such as teachers individual mental models (as cited in Sjoer and Meirink, 2015). Exchanging ideas and experiences can broaden and deepen the development

of a shared idea, however if the differences are related to teachers' core beliefs about teaching and learning it is difficult to change them which can hinder the development and objective of the PLC (Sjoer and Meirink, 2015). Group dynamics can also be a challenge during this form of collaborative professional development, therefore Platteel (2009) expresses how critical it is to develop group norms that reflect having a positive dialogue with colleagues (as cited in Sjoer and Meirink, 2015). Even though research supports that PLCs can have a positive impact on teacher practices, Horn and Kance (2012) argue that more knowledge on the development of teacher communities is needed to successfully create professional learning communities in schools (Sjoer and Meirink, 2015).

Mentoring teachers is another way to implement collaboration among educators in regards to professional development. Fairbanks, Freedman, and Kahn (2000) defined mentoring in teacher education as "complex social interactions in which mentor teachers and pre-service teachers construct and negotiate for various professional purposes and in a response to contextual factors" (as cited in Liu, Tsai, and Huang, 2015). Mentoring has also been defined as an "intense caring relationship in which persons with more experience work with less experienced persons to promote professional and personal growth (Ledford, Peel, Good, Green and O'Connor, 2005). Mentors and pre-service teachers can develop teaching expertise collaboratively while doing so in a school environment (Nilsson & Van Driel, 2010, as cited in Liu at. el. 2015). Pre-service teachers and mentors learn from each other by sharing knowledge, expertise, discussing subject content, and reflecting on teaching practices (Liu at. e.l. 2015).

Even though pre-service teachers have been provided information on classroom practices, they lack opportunities to apply that knowledge (Liu et. al. 2015). This is why allowing in-service and pre-service teachers to work together would lead to a productive and effective professional development (Grove, Strudler & Odell, 2004, as cited in Liu et. al., 2015). For exam-

ple, in a qualitative case study conducted by Liu et. al (2015) involving a teaching team consisting of three mentor teachers and three pre-service teachers, the mentor teachers were able to learn new ways to integrate technology into their teaching from the pre-service teachers, and the pre-service teachers were able to learn how to successful teach using technology through the use of a collaborative professional development approach. The benefits of this practice can also take place with in-service teachers in terms of professional development (Liu at. el. 2015).

Another form of mentoring occurs between veteran teachers and initial educators. Israel, Kamman, McCray, and Sindelar (2014) found that supports that take place between initial educators and mentors include assistance with instruction, aligning instruction to the content standards, behavior management, compliance processes, and understanding school wide policies (Algozzine, 2007, White & Mason, 2006, as cited in Israel et. al., 2014). These researchers found that having a structured evaluation process for the mentor to follow provided guidance for issuing feedback about the new special educators instructional practices, emotional supports provided by the mentors were embedded within their assistance, and the new educators indicated that having their mentors evaluating them in addition to their supportive role did not hinder their mentoring experience (Israel et. al., 2014). Darling-Hammond (2012) claim that teaching and learning can be viewed as part of a coherent system of teacher development, teaching quality, and evaluation along a continuum for licensure (as cited in Israel et. al., 2014). For effective mentoring to occur, mentors need to have demonstrated knowledge and skills and proper PD and support for their roles, which should include the ability to lead constructive mentoring conversations about the initial educators performance, well-developed interpersonal skills, opportunities to work with other mentors (Hobson, Ashby, Malderez & Tomlinso, 2009 as cited in Israel et. al. 2014), and training to conduct evaluation if required.

Collaboration among educational professionals may take place in various ways, however they all share the same goal, to improve the education and learning experience of children. Drawing on experts, implementing PLCs, and providing pre-service educators with mentors have all been proven ways for collaboration to have a positive impact on teacher practices. However, where the literature becomes less dense on professional development is when specifically looking at teacher professional development on AT and UDL, and more specifically the effect that a given professional development has in the classroom. Current research on AT has studied what specific devices were successful or not for students using the research methodology of a case study. In order for students to gain more access and become successful using AT, which consequently creates an inclusive classroom setting, teachers need to be more educated on the various devices and uses which can be made possible through professional developments.

Chapter III

Research Design and Methodology

Introduction

This study addresses the following research questions: *To what extent does a hybrid professional development influence the implementation of an assistive technology tool for reading and writing, and the classroom application of this resource? What are the driving factors to use or not use the assistive technology within literacy instruction?*

The design of this study was a qualitative approach with the primary goal being to "uncover and interpret the meaning of how people make sense of the meaning they construct" (Merriam & Tisdell, 2016, p. 4). This took place within the study by examining how teachers constructed their own meanings from a given professional development and the degree to which that meaning impacted their instructional practices. Teachers were interviewed, observed, surveyed and lesson plans were collected prior to being provided the professional development to determine the participants' current understanding, use, and perspective of assistive technology and UDL in their classrooms. Teachers were observed one week prior to the professional development starting to gain insight into how teachers were currently using assistive technology within their literacy instruction. The pre-survey was used to gain an understanding of the participants' background and current use of technology, and previous experiences with professional development. This was provided to the teachers and collected three week prior to the professional development beginning. One lesson plan within the area of literacy was collected two weeks prior to the professional development which represented an aspect of the artifacts in this study. Teaches were in-

terviewed two weeks prior to the start of the PD. This pre and post data collection process is also depicted in Table 3: Professional Development Pre and Post Data Collection and Analysis.

The professional development began by teachers receiving two sixty-minute face-to-face sessions of professional development on Universal Design for Learning and the assistive technology of Google Read & Write. Following this portion of the professional development, teachers had the opportunity to begin trying to incorporate and use the assistive technology in their lesson plans and literacy instruction. Two weeks later following the previous professional development, teachers reconvened for a third sixty minute face-to-face professional development session where they discussed any challenges and questions they had in regards to implementing the assistive technology. Teachers received additional modeling and feedback during this time. The participants then had the opportunity to work on using the assistive technology in their classroom during literacy instruction and two weeks later received a fourth sixty-minute face-to-face professional development session where they were provided additional feedback on lesson plans they had created and were shown additional modeling of ways to incorporate the assistive technology into their literacy instruction. During this time that included having teachers begin implementing the assistive technology within their classrooms teachers were observed once. An overview of what took place during each professional development can be found in the next section within Table 2: Professional Development Overview.

Following the four sessions of face-to-face professional development, participants engaged in an online discussion forum that involved teachers posting questions, sharing lesson plans, resources, ideas, and any thoughts they had towards the assistive technology. Teachers were also able to discuss how they were currently using Google Read and Write in their classrooms. Support was provided on a weekly basis throughout the online platform of Google Class-

rooms to the teachers on ways to utilize the assistive technology within their literacy instruction. This support included providing teachers responses to questions, posting resources, providing ideas on ways to incorporate the assistive technology into their literacy instruction, and reminders. The professional development sessions were guided by myself and a district AT Specialist. Following the completion of all professional development sessions, teachers were then interviewed, observed, and lesson plans were collected for analysis.

Methodological Approach

This study aimed to understand the perspective of teachers on the use of assistive technology in their classrooms, so therefore phenomenology guided this research. The phenomenological approach is "concerned with the study of experience from the perspective of the individual" by placing an emphasis on gaining insight into peoples' motivations and actions (Lester, 1999, p.1). Phenomenological researchers observe, interact, describe, and interpret, all in an effort to uncover the "essence of an experience" (Jones, Torres, & Arminio, 2006, p. 47). In this research I did just that by gaining insight into the driving factors for teachers to use or not use assistive technology within their classrooms through interviews, observations, and artifacts.

Phenomenological researchers engage in four major processes throughout an investigation: epoche, phenomenological reduction, imaginative variation, and synthesis (Moustakes, 1994). Epoche, meaning "to stay away from or abstain," is what the researcher attempts to do by beginning the investigation through reflection and setting aside any prejudgments, biases or preconceived notions regarding the research topic (Moustakes, 1994, p. 85). As a qualitative researcher, I began working towards this first step through my reflexivity by recognizing my own personal beliefs and perspectives and became aware of how they influenced my thinking. This

allowed me to continuously monitor myself to not let my preconceived notions influence the research during the next step of phenomenological reduction.

The process of phenomenological reduction begins by the researcher "bracketing" personal views or preconceptions so that no position is taken with the data (Groenewald, 2004). This process allows the researcher to suspend their presuppositions and prevent their meanings and interpretations or theoretical concepts to enter the unique world of the participant (Creswell, 1998, as cited in Groenewald, 2004). Then the researcher considers every aspect of the data in relationship to the research topic and the data that seems to illuminate the researched phenomenon are extracted or isolated (Creswell, 1998; Holloway, 1997; Hycner, 1999, as cited in Groenewald, 2004). The units of data that are relevant to the research topic are extracted and carefully scrutinized and the clearly redundant pieces of data are eliminated (Moustakes, 1994). This data is then organized into themes to create a "textural description" of the experience for each participant (Moustakes, 1994). These clusters of themes are typically formed by grouping units of meaning together (Creswell, 1998; King, 1994; Moustakas, 1994) and the researcher identifies significant topics (Sadala & Adorno, 2001, as cite din Groenewald, 2004). Through interrogation of meanings from various clusters, central themes are determined which express the essences of the clusters (Groenewald, 2004).

The next step of the research process, imaginative variation, is the process that "seeks possible meanings through the utilization of imagination, varying the frames of reference, employing polarities and reversals and approaching the phenomenon from divergent perspectives, different positions, roles, or functions" (Moustakes, 1994, p. 98). This process allows the researcher to reach descriptions that account for how the experience of the participants came to be. This process provides the researcher with an opportunity to gain a holistic context by exploring

time, space, causality, and relationship to self and to others as possible factors that account for what is being experienced for each participant. From this information the researcher is able to engage in the final synthesis phase by integrating the themes to capture the essence of the phenomenon as a whole. According to Moustakes (1994), essences are never totally exhausted, with the synthesis simply "representing the essences at a particular time and place from the vantage point of an individual researcher following an exhaustive imaginative and reflective study of phenomenon (p. 100).

Using a phenomenological approach was essential to understand the teachers' point of view on how a hybrid professional development influenced their instructional practices. Through this methodology the focus was placed on the experience the participants had throughout a hybrid professional development on assistive technology used within the UDL framework. This information allowed for insight into the influence the PD had on the teachers' instructional practices and the driving factors that lead the participants to use or not use the AT.

Setting

The school district that was used for this study is located in a Mid-Western city that services 75,568 students. This school district includes 154 schools. The student demographics of this school district includes 89.2% students of color, 82.5% of students are economically disadvantaged, and 20.3% of the students have disabilities.

The school where all of the participants work had a student population of 546 students. All of the students qualify for free lunch, with 92.9% identified as being economically disadvantaged. The student population is made up of 94.1% African American, 1.6% Hispanic, 0.7% American Indian or Alaska Native, 0.7% Asian, 2.4% Multiracial, and 0.4% White. Of this population of students, 22% (122) are identified as having a disability with Other Health Im-

pairment and Specific Learning Disability as the most common disabilities represented in this population of students (54%).

A review of data from the 2017-2018 school year from district and state assessments indicates that 90% (170) of all students in grades 6th-8th are below, well below, and significantly below in literacy. Of the 170 students, 53 of them are students with disabilities. Administration works with teachers to ensure that there is as close to the same number of students with disabilities within each classroom across grade levels. This has led to there being between eight to ten students with disabilities in each classroom. Current actions that have been taken by the school to address the lack of students being proficient in literacy include teacher-led small groups, progress monitoring, and computer based interventions (i.e. Achieve3000 and Odyssey). Students in grades third through eighth use computer based interventions once a day for thirty minutes. This however has resulted in no major changes to the number of students significantly below in literacy, include both students with and without disabilities. The future goal of this school is to plan, deliver, and implement engaging and differentiated strategies for students to improve their literacy skills.

Participants

There were six participants in this study who are all general education teachers. All of the teachers work at the same school in an urban school district. The teaching experience of the teachers range from three years to 29 years of teaching experience. All of the teachers have at least five and up to nine students with disabilities within their classrooms. The following table provides demographic information for each participant, including the pseudonym name that was used throughout the study.

Table 1: Participants Demographics

Teacher	Years of teaching experience	Grade level	Total number of Students	Total number of students with IEP's	Total number of students at or above grade level in literacy	Total number of all students below grade level in literacy
Sam	3 years	3rd	21	5	8	13
Rose	4 years	3rd	25	7	5	20
Mike	18 years	4th	26	8	11	15
Kim	29 years	4th	23	5	8	15
Lisa	22 years	6th	34	9	0	34
Wendy	18 years	7th	28	7	3	25

Participants for this study were teachers from the school I have also taught at, resulting in the use of a purposeful and convenience sample. Participants are general education teachers from third through eighth grade. All teachers in the school were given the professional development, however a selection criteria was used to recruit participants for this study. Morse (1994) suggests at least six participants for a qualitative study so therefore the number of participants was six teachers. I recruited teachers that support students in the areas of reading and writing in grades third through eighth. I targeted teachers that work at these grade levels due to third grade being the earliest grade level that students are actively using Chromebooks and computers to read and write from. In grades Kindergarten through second grade the students are exploring the features of a computer, recognizing the cause and effect that occurs, and using them for enjoyment more-so then learning experiences in this school setting. Teachers also require a level of digital literacy

skills in order to incorporate and utilize technology within their instructional practices. Wisconsin's Department of Public Instruction states that to be a 21st century educator and work with today's students, there are certain instructional technology skills that teachers require proficiency in. These skills include creating and/or using: word processing documents, spreadsheets, presentations (i.e. PowerPoint), online collaboration tools (e.g. Google Apps, Skype), internet searchers, interactive white boards, content management systems (i.e Moodle), date management tools (i.e. dashboards), digital video cameras, online learning tools, video resources, blogs/wikis, interactive communication tools (i.e. social media/Web 2.0/3.0), and professional virtual learning communities. This study aims to include teachers from varying backgrounds, ages, and teaching experience in an attempt to have a range of teachers with varying levels of digital literacy skills.

The selection criteria for the participants included: (1) having at least five students with disabilities within their classroom, (2) they have access to technology on a daily basis that includes a laptop and Smartboard for the teacher and Chromebook cart for students to use, (3) they do not have any extended leave of absences scheduled during the time of the study, (4) teachers represent varying grade levels between third through eighth grade, and (5) teachers have different years of experiences ranging from second year teachers to veteran teachers. Having teachers with varying levels of experience and grade levels gave insight into different perspectives on the influences of the professional development and driving factors that lead to implementing or not implementing the assistive technology.

Participation was completely voluntary and participants had the ability to forgo their involvement at any time. There was minimal risk for the teachers to partake in the study. Teachers had the opportunity to collaborate with their peers in an online discussion forum following the face-to-face portion of the professional development. This took place with teachers sharing ideas,

resources and commenting on the use of the assistive technology. This collaborative aspect to the study made teachers at risk for disagreements with their colleagues. There were not any incentives provided to participations, other than receiving information to support their teaching practices from the professional development.

Rationale for Research Design

The vast majority of current research on professional developments have used quantitative methods to assess teachers' understandings. For example, Baldiris, Zervas, Gesa and Sampson (2016) and Magidin, Masters, O'Dwyer, Dash, and Russell (2012) conducted studies on the effects of professional development programs by assessing teachers' understanding of the content through pre and post assessments and surveys. These studies found that teachers' instructional practices improved by increasing the accessibility of diverse learners following the completion of the given professional development based on pre and post test scores and surveys. Their results show that providing teachers with professional development can have positive effects on teachers' instructional practices.

Previous research indicates that professional development centered around integrating technology into instruction are must successful when teachers receive collaborative, on-going support that includes practical applications in both face-to-face and online formats (Hutchinson, 2012). Therefore the design of this hybrid professional development that the teachers received included both face-to-face and online instruction and modeling of how to integrate the assistive technology into lesson planning and instructional practices. The face-to-face portion of the professional development included opportunities for the participants to collaborate and have discussions centered on the content. They received modeling and feedback throughout these sessions and were provided opportunities to engage in practical applications by working with their own

literacy curriculum. The online component provided the participates with the opportunity to collaborate and receive on-going support in addition to receiving practical applications of ways to utilize the AT with the UDL framework during literacy instruction.

In addition to exploring the literature on professional developments, I also investigated the research on assistive technology due to the fact that the professional development the participants received focused on using assistive technology as a teaching strategy to meet the needs of their diverse classrooms. The majority of the current literature on the use of assistive technology with students who have disabilities have used a case study approach. For example, Gonzalez-Ledo, Barbetta, Unzueta (2015) and Brackenreed (2008) conducted case studies to look at the impact a form of assistive technology had on student learning. Multiple baselines across content areas and descriptive analysis were used to assess the impact of the assistive technology. These studies are related to my research because they used assistive technology as a strategy to accommodate areas of difficulty to increase access to instruction (Brackenreed, 2008). The assistive technology that was presented to teachers in the professional development was intended as a way to support students. However, this study expanded on the current literature by exploring the use of assistive technology within the UDL framework.

Contribution to the Literature

In the qualitative studies that have been completed on professional development, researchers have examined the opinions teachers have towards professional development with a goal being to understand what educators felt were effective strategies included within a professional development. For example, Bayar (2013) looked at the components to an effective professional development from the teacher's perspective through interviews. This study also took a qualitative approach and considered the opinions of how teachers felt towards the given profes-

sional development on an assistive technology, however this was not the focus of the data collection and analysis. This research on professional development using assistive technology within the context of UDL examined the influence a professional development had on teachers' implementation of the AT, and what their driving factor were to use or not use the AT. This study expanded on the current literature on professional development by going beyond the focus of the participants' opinions of the PD and studied how and why teachers implemented content from a professional development. This gave insight into the influence the PD had on teachers' literacy instruction and the driving factors for them to use or not use the AT. The results from this study are informative to improve future professional developments.

The majority of previous research in the area of assistive technology used a case study approach and examined the affects a particular form of AT had on student achievement. This study also contributes to the current literature in the area of assistive technology because the focused was placed on the teachers' implementation of AT using the framework of UDL within their literacy instruction from a SCT perspective by focusing on how the collaboration between participants influenced their utilization of the assistive technology. By shifting the focus to the teachers' instruction with AT and UDL a new perspective is gained on the use of AT to support students in the area of literacy.

Professional Development Design

The professional development that was provided to teachers consisted of a face-to-face portion and online component to create a hybrid format which is displayed in Table 2: Professional Development Overview. The school district's current model is to provide teachers with a one hour face to face session on Universal Design for Learning and a one hour face-to-face session of the assistive technology Google Read and Write, followed by individual support upon

request. These professional developments are provided upon the school's request, with schools typically requesting only one of the sessions. This study expanded on the current model by providing the school staff with both professional developments, along with two additional sixty minute face-to-face sessions and an online component.

The entire length of the professional development was eight weeks. This was due to studies showing that, on average, 20 separate instances of practice need to take place before a teacher has mastered a new skill (Joyce and Showers, 2002). Over the course of eight weeks, teachers were encouraged to implement the assistive technology between 2-3 times a week to reach the desired 20 instances of practice. Research has also shown that teachers desire professional learning opportunities that focus on practical classroom strategies targeting their specific needs (Leask and Younie, 2001, as cited in McConnell at. el., 2013). This is why teachers had the opportunity to practice using the assistive technology within their classrooms and the instruction during the professional development focused on practical classroom applications of the AT.

The face to face portion of the professional development consisted of four 60 minute sessions. The first session included an overview of what UDL is and the principles that makeup this framework. This was followed by a second 60-minute session that included the procedural aspects of Google Read and Write, including how it connects to the principles of UDL and ways to implement the AT using the framework of UDL. These two sessions were led by the district's assistive technology specialist. During these sessions, teachers were also shown how the AT can be used to guide instruction through example lessons, handouts and videos. Teachers also had opportunities to ask questions, share ideas, and discuss ways to implement UDL principles within their instructional practices with their colleagues.

Upon entry into the second face-to-face PD session, teachers wrote down a challenge that their students were having in reading and writing. Each participant was given a Chromebook to use to follow the steps and features explained by the presenter throughout the professional development. The staff was walked through a step by step process to install the program and the basic features. Participants then had the opportunity to freely explore the tools a part of Google Read and Write. The tools that were shown included: Text to Speech, Word Prediction, Talking Dictionary, Vocabulary List Builder, Word Prediction, and Speech to Text. With a partner the participants then shared a feature(s) that could help address the challenges their students were having when engaging in reading/writing activities and completing assignments. Following this discussion, participants had the opportunity to share with the whole group and listen to each other's ideas of how to incorporate the assistive technology into their literacy instruction. Modeling of how to use the assistive technology within the classroom was conducted and ways to incorporate it into literacy instruction was demonstrated.

Teachers then had a week to practice utilizing the AT within their classrooms following the first two face-to-face sessions. After this time to practice using the AT, there was another sixty minute face-to-face session where teachers received modeling of ways to incorporate the AT into their literacy instruction and receive feedback on their lesson plans. Teachers had the opportunity to create lesson plans using their curriculum with support and collaborate with their peers by sharing ideas and engaging in discussions. Teachers then had an additional week to apply what they had learned in their classrooms. This was then be followed by a fourth face-to-face session of sixty minutes where teachers continued to receive modeling, feedback, and had opportunities to collaborate with their peers while planning and discussing ways to implement AT into

their literacy instruction. These face-to-face sessions were led by the district's assistive technology specialist and supported by myself.

Following the face-to-face portion of the professional development, participants engaged in an online, collaborative component. Research has shown that professional development is most effective when it is ongoing, collaborative, and includes opportunities for teachers to work directly on incorporating the new techniques into their instructional practices (Odden, Archibald, Fermanich, and Gallagher, 2002). During this time the participants had the opportunity to work collaboratively with others online by posing questions and sharing their ideas, thoughts, concerns, and resources while exploring the use of the AT with their students. This portion of the professional development was led by myself, while the district's AT specialist took on a supportive role. The online platform that the participants used was Google Classrooms. This platform allowed the teachers to share their lessons and materials with one another. Each week the participants were encouraged to explore the use of a specific feature of Google Read and Write with ideas and suggestions on how to incorporate it into their lesson plans and instruction. This online support helped the teachers learn how to embed and incorporate Google Read and Write into their instruction, lesson plans, assignments, and practice how to apply it in a practical sense. The participants were required to respond to the weekly online postings at least one time per week. This included responses to posts made my either myself, the district AT specialist, or their peer. If teachers did not respond to a post they were sent a reminder email and if they still did not respond after the written reminder they were reminded through a face-to-face conversation. This information was also a component to the data that was analyzed. An overview of the professional development, including when data collection and analysis took place during the PD can be found in the following table (Table 2: Professional Development Overview). An additional overview of

the pre and post data collection and analysis process is then presented in table 3. There was also data collected during the PD which took place while the teachers practiced using the AT within their classroom. This information is displayed in Table 4, along with a description of the artifacts that were collected using the online discussions teachers had throughout the online portion of the PD.

Table 2: Professional Development Overview

Professional Development	Beginning	Middle	End	Provider	Data Collection	Data Analysis
Week 1 Face-to-Face Session 1 (UDL) 60 minutes	20 minutes spent giving participants an overview of what UDL is and the guiding principles. Information was provided through powerpoint and handouts	20 minutes spent giving teachers information on how UDL can provide the theoretical basis for planning effective instruction to meet diverse student needs. Information provided through handouts, readings and videos.	Applications of how to incorporate UDL within lesson planning and instruction was given and discussed.	District AT Specialist		

Week 2 Face-to-Face Session 2 (Google Read and Write) 60 minutes	30 overview of how to Google Read and Write connects to the frame-work of ULD, how to download and access this AT tool, and the basic features	15 minutes for teachers to explore Google Read and Write and discuss with others how they could incor-porate it into their class-rooms	15 minutes of teachers sharing with one another how they could poten-tially use Google Read and Write in their class-rooms and any ques-tions they have	District AT Specialist will be providing this session of the PD		
Week 3: Teachers prac-tice in their classrooms	Teachers are expected to practice us-ing the AT during litera-cy instruction 2-3 times per week				Second Observation Conducted -60 minutes -1-2 obser-vations completed peer day with all ob-servations completed this week	

Week 4: Face-to-face support 60 minutes	~15 minutes was spent with teachers sharing challenges and successes that they have experienced thus far while incorporating AT into their literacy instruction.	~20 minutes instructors modeled for teachers ways to incorporate AT into literacy instruction	~25 minutes teachers collaborate with their peers while developing lesson plans using their literacy curriculum. While teachers are working with their peers, instructors walked around and provide feedback to the teachers' lesson plans	District AT Specialist		

Week 5: Teachers practice in their classrooms	Teachers are expected to practice using the AT during literacy instruction 2-3 times per week				Second Observation Conducted -60 minutes -1-2 observations peer day with all observations completed this week	-Narrative recording -Observational Protocol completed -Identify how teachers used or did not use AT throughout literacy instruction -Compare data to first observational data to identify similarities and differences for each teacher and across teachers

Week 6 Face-to-face support 60 minutes	~15 minutes was spent with teachers sharing challenges and successes that they have experienced thus far while incorporating AT into their literacy instruction.	~20 minutes instructor modeled for teachers ways to incorporate AT into literacy instruction	~25 minutes teachers collaborated with their peers while developing lesson plans using their literacy curriculum. While teachers worked with their peers, instructors walk around and provide feedback to the teachers' lesson plans	District AT Specialist		

Week 7, 8,9, 10 Online Support	Online discussions began by teachers sharing an questions or concerns they had using Google Classroom. Each week will be focused on integrating a specific AT tool within Google Read and write	Online discussions continued with three new tools being the focus (1 per week) with examples and strategies on how to incorporate the tool into lesson planning and instruction.	Summary of the tools that have been explored will be given while discussions continue among participants	I provided this portion of the PD with support from the AT specialist		

Table 3: Professional Development Pre and Post Data Collection and Analysis

Prior to PD	**Activity**	**Timeframe**	**Data Analysis**
3 weeks prior to PD	Survey	1 week to complete	Identify commonalities between participants survey results
2 weeks prior	Literacy Lesson Plan	1 week to collect	Use the Lesson Plan Assessment Instrument to determine the level of AT present and how it is/is not being used during literacy instruction
2 weeks prior	Interview	60 minutes	-Audio record interviews -Transcriptions completed -Initial analysis of transcriptions that includes identify the data that relates to the research questions
1 week prior	Observation	60 minutes	-Narrative recording used -Observation protocol completed -Initial analysis: identify how AT was present or not present throughout literacy lesson

Post PD	Activity	Timeframe	Data Analysis
1 week following PD	Interview	60 minutes	- Audio record interviews -Transcriptions completed -Identify data as it relates to each research question -Compare pre-interview transcript to post-interview transcript for each teacher -Compare post-interviews across participants and identify themes
2 weeks following PD	Observation	60 minutes	-Narrative recording used -Observation protocol completed -Identify how AT was present not present during literacy instruction -Compare initial observation and second observation to final observation for each teacher and identify any changes -Compare changes between teachers and identify common themes
3 weeks following PD	Lesson Plan	1 week to collect	Use the Lesson Plan Assessment Instrument to determine the level of AT present and how it is/is not being used during literacy instruction
			-Compare pre and post lesson plan data and identify any changes for each teacher -Compare changes between teachers to identify themes between participants
3 weeks following PD	Survey	1 week to collect	-Compare initial survey results to post survey results for each teacher; identifying themes -Compare those commonalities found for each teacher across all participants to identify themes

Table 4: Data Collection and Analysis during Professional Development

During PD	Activity	Timeframe	Data Analysis
3 weeks into PD	Observation	60 minutes	-Narrative recording -Observational Protocol used -Identify how AT was present or not present during literacy instruction -Compare initial observation to second observation for each participant and across participants -Compare changes and identify themes
4 weeks of online PD	Online discussions	4 weeks	-As teachers posted to the online discussion throughout the online portion of the PD, teachers' posts and comments were analyzed for relevant units of data -Teachers comments were compared among the rest of the participants

Data Collection and Instrumentation

Data was collected through pre and post interviews, observations, surveys, and artifacts. By collecting data through triangulation, which is the process of collecting multiple data sources to develop a comprehensive understanding of a phenomena, I was able to have enough information to reach "saturation" to know that I had obtained all meaningful data (Mirriam & Tisdell, 2016). There was also additional trustworthiness by implementing triangulation due to more than one method of data collection being used, and having consistency when collecting data. Through

the use of pre and post interviews, observations, surveys, and artifacts, data was compared to interrupt the influence the professional development had on teachers' instructional practices. The protocols that were used throughout the data collection can be found in the Appendix.

Interviews were conducted prior to the given professional development and again after the completion of the professional development. Both interviews were conducted using a protocol to maintain a semi-structured dialogue and interviews were audio-recorded. The interviews were transcribed using the audio-recordings from each participant. Information that needed to be clarified or required further explanation after completing the initial interview, was obtained in the follow-up interview that occurred after teachers had received the professional development and had time to explore the AT. During the interviews I was looking to gain insight into the influence the professional development had on teachers implementation of the AT in the area of literacy, and what the driving factors were to use or not use this instructional strategy.

There was a total of three observations conducted throughout this study. One baseline observation was conducted to see how the teachers were currently incorporating technology into their instruction. This information was cross referenced with the interview data. One observation was conducted following the first two face-to-face professional development sessions while the teachers were practicing using the AT in their classrooms. The final observation was completed two weeks after the teachers had finished the duration of the professional development. All observations took place during the teachers' literacy instruction. Subjects are taught in 60 minute blocks so therefore the observations were 60 minutes in length. Naturalistic observations was the approach used for this portion of data collection. This type of observation involves studying the behavior of participants in natural surroundings. The aim of naturalistic observations is to examine behavior within the normal context for which it occurs (Gay, 1996, as cited in Ammah

& Hodge, 2005). I did not alter or adjust the participants' classroom settings and simply recorded what I saw taking place with their instruction. Gay (1996) argued that "classroom behavior--behavior of the teacher, behavior of the students, and the interaction between teacher and student can best be studied through naturalistic observations" (p. 265, as cited in Ammah & Hodge, 2005). This type of observation allowed me to gain insight into the influence the hybrid professional development had on teachers' instructional practices by seeing the participants teaching and either using or not using the assistive technology within the UDL framework. While conducting the observations I did not engage with the participants and took on the role as an observer. Other than the teachers greeting me when I entered their classrooms prior to the observation there was no interaction between myself and the teachers while I conducted the observations.

Narrative recording was the method used during these observations. Narrative recording provides an ongoing description of the events that take place during an observation as they occur in real time (Haddad, 2017). It is not limited to a particular event, but instead encompasses all events taking place in a given time frame (Haddad, 2017). A narrative observation includes recording details in the order they occur which help to better understand what took place and the context of those events (Haddad, 2017).

The artifacts that were collected from the participants during this study included pre and post lesson plans and the participants' online discussions held. This gave me additional data into if and how teachers are incorporating the assistive technology into their instruction and to what extend they engaged in collaboration with their peers. The assessment instrument, which can be found under Appendix B, was created for the purposes of this study. This protocol looked at whether assistive technology is not present at all, partially present, or strongly represented throughout the various components to a lesson plan. The targeted components of the lesson plan

were chosen based on the inclusion of them from the school-wide lesson plan template. This assessment tool did not give a holistic rating of a teacher, but instead is a way to track changes over time of in regards to the presences of assistive technology (Britten & Cassady, 2005). This assessment tool focused how they implemented technology within their instruction by removing the criteria to include technology standards within their lesson plans. The online discussions that participants had gave insight into their experience with collaboration.

A survey was also provided to the participants individually to gain insight into the participants teaching background and current level of comfort and use of instructional technology and assistive technology. The survey included a Likert scale for participants to complete for every question, and was administered pre and post to them receive the professional development. A paper-based and an electronic copy of the survey was provided to teachers prior to conducting interviews.

Data Analysis

Data analysis began as interviews and observations were conducted. The first interviews and observations determined how I approached the follow-up interview and observations of the participants. Any interpretations and connections made from the first set of interview and observations I was able to invite the participants to comment on in the second interview. This increased the reliability of my analysis by member-checking the data with the participants.

Data analysis of the three observations that were conducted began after each observation. Narrative recording was used as well as an observation protocol. After each observation, this information was analyzed for data that pertained to how teachers used or did not use assistive technology throughout their literacy instruction. Comparisons between the first and second observations were made by using the rubric and narrative recordings. Once the third observation

was conducted, analysis continued by comparing the first two rubrics and narrative recordings to the third rubric and narrative recording. This process was done for each participant. When analyzing the interviews conducted, comparisons between the pre and post transcripts were conducted for each participants. Throughout this study, there were two lesson plans collected from each participant that included a pre and post. Comparisons were made between these lesson plans for each teacher using the lesson plan rubric. This type of data analysis also occurred with the surveys that were conducted by comparing participants' pre and post surveys. When analyzing the online discussions that took place, comparisons were made between each of the four weeks that took place.

When beginning to analyze the data, I engaged in the process of open-coding. This involved making a note next to any information that I found interesting, potentially relevant or important to my study. From the notes and comments made in the margins of the data while "tagging," I then developed categories or themes that were present. These categories are the answers to my research question and were eventually exhaustive by being able to place all data into a given category (Merriam & Tisdell, 2016). Merriam and Tisdell (2016) state that "the fewer the categories, the greater the level of abstraction, and the greater the ease with which you can communicate your findings to others" (p. 214). When creating my categories to sort data into I followed Merriam and Tisdell (2016) suggestions which included: developing categories that were responsive to the purpose of the study, they were exhaustive by being able to place all data that is important to the study into a category, and categories were mutually exclusive, meaning that a unit of data only fit into one category. I then began the process of identifying connections that could be made between categories. From the connections made within all of the data sources, I was able to establish triangulation to then be able to identify influences and factors that affected

the implementation of Google Read and Write. I knew I had reached saturation when while coding I found that no new codes occurred within the data (Urquhart, 2013), and when I reached the point that additional data had not lead to any new emergent themes (Given, 2016).

The theoretical perspectives of socio-cultural and constructivist guided this analysis. By looking at the data through this lens there was a focus placed on the collaboration the participates engaged in to support their knowledge of the assistive technology. Vygotsky (1978) described learning as being embedded within social events and occurring as a learner interacts with other people, objects, and events in the environment. The interactions the teachers had throughout the PD with their collaborative opportunities represents SCT while their experiences throughout the PD support a constructivist perspective by the teachers constructing understandings through their experiences. These frameworks were kept at the forefront of the data analysis by focusing on the data that reflected the teachers' collaboration and experiences with the PD and how that did or did not result in changes to their literacy instruction.

Reflexivity

Reflexivity is the "critical reflection on how researcher, research participants, setting, and research procedures interact and influence each other" (Glesne, 2015, p.145). As a researcher, I brought my own perspectives and understandings of the world to my work. By taking on a "reflexive lens" I was able to become more informed of what influences my understandings of what is being studied. This awareness is a critical practice for qualitative researchers because the study of people has variables that need to be part of the research instead of trying to isolate information in an attempt to eliminate my predispositions as the researcher. I had insider status when conducting my research because I currently work at the school with the participants of the study. This required me to continually be aware of how my established relationship with the par-

ticipants impacted the interviews and observations conducted. I used a protocol which helped me to keep the interviews semi-structured and on-topic. This helped to establish a professional conversation with my participants.

I also brought my own lenses into the study which stem from the many characteristics I have such as, race, gender, and age. Those characteristics interacted with other variables such as previous experiences, context of situations, and institutional association, to begin to form the values one has. The values and ideologies that I hold result in how I view myself and others. My values towards education stem from believing that every child deserves the right to an education that meets their needs so they are able to reach their full potential. This belief has lead me to be very supportive of inclusionary practices and educating students with special needs in the least restrictive environment. Throughout this study I kept an open-mind with participants who are reluctant or feel that students with special needs should not be included within the regular education setting. I strived to keep from making judgements of teachers' decisions to implement or not implement Google Read and Write by following my interview and observational protocols. While analyzing the data, I did not have the participants' information visible in order to keep my beliefs removed from the analysis and maintain objectivity.

I also believe that education should focus on teaching the whole child in order to meet the needs of individuals. This supports their personal growth and makes society stronger. These beliefs fall under the Progressive ideology. I feel that students are most successful when they are able to learn through experiences; making learning active instead of passive. The use of assistive technology can make learning more active for students with special needs by increasing the level of engagement and participation. My progressive ideology also impacted the questions I asked, and how I interrupted the responses that I got.

This ideology influenced my responsibility as a researcher because it has shaped my interests in what I want to study. My belief that education needs to meet the needs of the child has lead me to research the professional development of teachers using Google Read and Write to support a diverse population of students. While working in an urban setting I have come to understand that the school system and content leaves students of color at a disadvantage. Through my ideology I have seen that the curriculum and content that students learn is not representative of their culture and interests. I have also become aware that with the societal disadvantages that students of color are faced with, classroom teachers need to be more proactive in meeting the diverse needs of students in an urban setting. This is what has led me to conduct my study within an urban environment.

My concept of knowledge, or epistemology, is constructivism. I believe that people build their own understandings and knowledge through experiences and reflecting on those experiences while learning builds on someone's previous knowledge. As new information comes to a person they make connections between what they already know and what they are learning. As a teacher, I encourage my students to always be assessing how their activity is increasing their understandings of concepts. My goal is to transform students into active participants in their learning.

As a researcher, this epistemology impacts the responsibilities I have because I need to be aware that my observations and interpretations are from this perspective. I realize that teachers may hold alternative epistemologies and for the purposes of this study I am seeking insight into why teachers are choosing to implement or not implement Google Read and Write. I was reflective of this in order to recognize that the questions I ask and my understanding of classroom situations is impacted by my epistemology. This is not to say that I tried to keep my beliefs removed

from my research, because it is a part of the whole picture that I worked towards understanding in a qualitative manner. As I constructed the narratives of my participants from a constructivist epistemology, I was naturally inclined to represent the information in a way that builds off of previous knowledge. However, with gathering data from a diverse population I needed to ensure that my perspective did not impact the narratives in such a way that it limited the authenticity of the data in any way. As a researcher I managed my ideology and epistemology through respect, building trusting relationships, and working with participants toward the common goal of meeting the needs of the students.

I am currently a special education teacher at the same school the participants are from which gave me insider access. Due to my position with the school, I maintained consistency by using protocols while conducting my interviews and observations. I also maintained confidentiality by using pseudonyms for my participants.

Trustworthiness

This qualitative study has trustworthiness due to the use of data source triangulation. With the use of observations, interviews, and artifacts that included lesson plans and online discussions, I was able to get a clearer understanding of the extent to which the professional development influenced the implementation of Google Read and Write and the classroom application of this resource. Through multiple data sources I was able to see where information is apparent across sources. This allowed me to identify themes within the data sources to develop interpretations.

Member-checking was also employed due to holding pre and post interviews and observations. This granted me an opportunity to cross-check any interpretations I had made from the

data in the initial interviews and observations with the participants in the follow-up interviews. I presented the participants with any interpretations I had made up to that point, at which time they were able to clarify any misconceptions. By holding a second interview I was able to increase the validity of my conclusions by confirming with the participants that I accurately understood what they were trying to convey in their interviews.

Summary

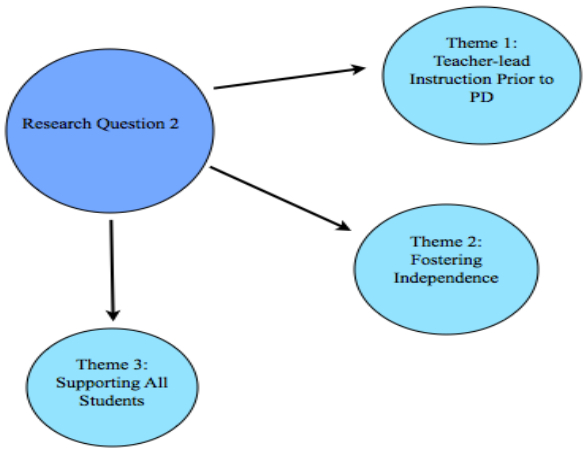
A qualitative study was conducted to examine the influence a professional development had on the implementation of Google Read and Write. This study contributes to the literature on professional development and the use of assistive technology, while working towards addressing the problem of increase teachers' instructional strategies. Teachers received a face-to-face and online professional development with opportunities to collaborate with peers through both forums. Participants included six general education teachers that are currently working at an urban school. Interviews and surveys were conducted prior and post to receiving the professional development. Observations took place prior to the professional development, once during the course of the PD, and again after the completion of the PD. Artifacts included lesson plans which were also analyzed pre and post, and online discussions.

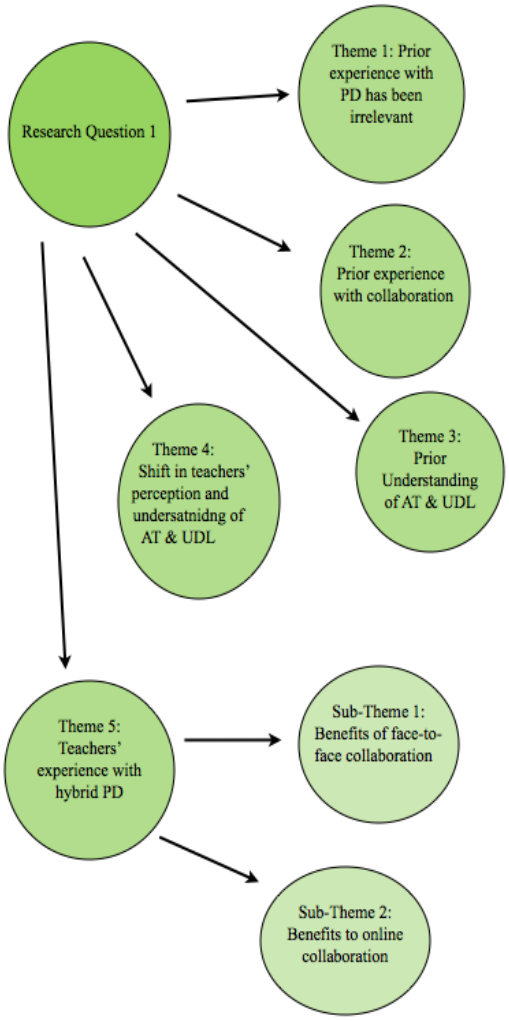
Chapter IV

Results

The analysis of the data began by addressing each research question, identifying themes that emerged, and an analysis of those themes. A summary of the themes and sub-themes that emerged from the data collected are illustrated in the following figure.

Figure 3: Themes Addressing Research Questions




Research Question 1
Theme 1: Prior experience with PD has been irrelevant
Theme 2: Prior experience with collaboration
Theme 3: Prior Understanding of AT & UDL
Theme 4: Shift in teachers' perception and undersatnidng of AT & UDL
Theme 5: Teachers' experience with hybrid PD
Sub-Theme 1: Benefits of face-to-face collaboration
Sub-Theme 2: Benefits to online collaboration

Research Question 1: **How Does a Hybrid Professional Development Influence the Implementation of Assistive Technology for Reading and Writing and the Classroom Application of These Resources?**

The aim of this research question was to gain insight into the way in which the design of the PD influenced actual change in teacher practices. By looking at the data from a sociocultural perspective, I explored how the experience the teachers had with the professional development influenced them in any way by specifically looking at how the teachers collaborated and engaged in the different formats (face-to-face and online) throughout the PD. In order to understand how this professional development influenced change in teacher practices, a look into what the teachers' came into the PD with in terms of their prior experiences with professional development and collaboration will first be addressed. A description of the teachers' prior understanding and use of assistive technology and Universal Design for Learning will then be discussed. This will be followed by an analysis of the teachers' experience with the professional development, including both the face-to-face and online portions of the PD and the collaboration aspect of the PD that occurred throughout. This analysis will include observations of the teachers' interactions among one another, interviews, and online discussions held during the online portion of the PD.

Theme 1: teachers' prior experiences with professional development.

A common theme among teachers' prior experiences with professional development in general is that they have been irrelevant. This was consistent regardless of the years of teaching experience the educators had coming into the professional development with. The topics were either not applicable to their grade level or classroom needs, the information was repetitive, or the content was delivered at the wrong time of the year, resulting in the teachers feeling disengaged and uninterested in the information being presented to them. For example, Wendy who

has been teaching for 18 years expressed that "some professional developments are redundant to me because I have been doing this for so long, so if it's not anything new than it's kind of a waste of time to me, because it's not meeting my need for professional development so I feel disengaged." Rose who taught for four years also has had a similar experience with professional developments in the past by stating "I think some PDs are beneficial but some of them are very redundant and it feels like information you already know that you don't even need." Also, the needs that teachers had for their classroom varies, which was especially true for a school with a wide range of grade-levels. This particular school that the participants taught at ranges from grades K4-8th. With professional developments currently being provided to the entire staff, teachers felt the PDs then become more general which can then lead to information not being relevant for certain grade levels. For example, Lisa stated that she had "often not found professional developments to be beneficial in the past because they're directed at the entire staff so with kindergarten to middle school they usually just teach to the middle grades."

When professional developments on a given topic were not provided to teachers at the time of year when they would most benefit from the information, this caused teachers to feel the PD was irrelevant. For example, at the beginning of a school year teachers are working with their students to establish routines, including how small group and stations will be conducted during literacy instruction. When a professional development on ways to implement reading circles in your classroom is given at the end of the school year, teachers can find the information irrelevant, because they have already established their routines when using literacy circles at that point in the school year. This was discussed with Rose as she stated that "sometimes the placement of time with PDs, like last year our PDs introducing reading literacy centers it was at the end of the

year, so what's the point of that?" This frustration with the timing of previous PDs was also expressed by Kim who stated

> "professional developments have sometimes been given at the wrong time. It may have been a good PD but it was just the wrong time so they weren't really relevant to what we're currently doing, like we get something at the end of the year that we wish we would have had at the beginning of the year."

The delivery style and lack of applicability of previous PDs also was an influence for teachers to feel that they have been irrelevant in the past. How the information is presented to teachers and the role they play during the PD can have an impact on how well they receive the content. For example, one middle school teacher felt that she was wasting her time and that there was a lack of communication during a PD that required her to take on the role of a student. "It was almost like we are pretending to be students being taught to and I think our time could be spent in a much, much better way" (Lisa). Teachers also expressed becoming disengaged with a PD if they felt that they are being dictated the information. For example, Sam stated
"we usually have people come in from the district. They don't know the school culture and come in and tell us 'you should be doing this, this, and this,' but if we could have someone become familiar with our school and really help us tackle some of our deficits then I think PDs could become beneficial."

From a sociocultural perspective, learning takes place through social interactions. When teachers are not afforded the opportunity to collaborate with others as they learn the information being presented, they are not able to engage in this learning process. Teachers prior expriences with professional development have reflected that they were disengaged throughout the PD

which demonstrates that they were not learning through social interactions, which is viewed as the fundamental role in the development of cognitition (Vygotsky, 1978). Teachers are able to construct meaning from a professional devleopment when they are able to socially interact with others using the information. However, when these opportunities are not provided to teachers during professional developments, the results may lead to teachers feeling disengaged with the information.

Theme 2: teachers' prior experience with collaboration.

Prior to the professional development, the teachers from this study would engage in unstructured collaboration among their peers. Teachers were meeting with their grade-level partners on a weekly basis after school to discuss upcoming lesson plans, challenges they were having with students and ways to address those concerns, and coordinating field trips to take together. Emails between colleagues were also exchanged on a daily basis that included sharing ideas to meet the needs of the students, changes in schedules, and upcoming school events. Teachers within this school were also required to be a member of at least one school-based committee. This included a reading committee, math committee, science committee, Holiday program committee, Black History Program committee, learning team committee, and Positive Behavior Interventions and Supports. Each committee was required to meet at least once a month to discuss ways to share information with the rest of the school, including parents, and to organize afterschool events for the students and families to participate in. This created a more structured setting for teachers to collaborate with one another throughout the school year. Through teachers meeting and sharing ideas, they were engaging in the practices of sociocultural theory. These collaborative interactions granted teachers the opportunity to have social interactions when working towards meeting the needs and repsonsiblities of their classroom and school.

The majority of the collaboration the participants had engaged in prior to the PD was face-to-face. For example, Mike stated "most of the collaboration I have had has been face-to-face. Not too much online." Some of the participants have had the opportunity to collaborate with their peers online and have said that they found it to be beneficial as well. Wendy stated that "I haven't done online collaboration with my peers here at this school yet, but I love being able to collaborate with people online and face-to-face." Rose has also done both forms of collaboration in the past and expressed that "collaborating with my peers has been very positive both online and face-to-face." Kim also shared that "depending on the situation, we might collaborate online, but face-to-face was always good for me. I can read you and you can read me and it's hands-on."

A common theme among teachers' prior experiences with collaboration in terms of professional development was that they found it beneficial when they had colleagues who were willing to participate in collaboration. Lisa expressed how she has found collaborating with colleagues to be beneficial because she's

> "been teaching for years, and we all have our strengths and weaknesses so we can build off of each other's strengths and weaknesses, and that's the best part of having each other. It's nice being able to do that and to find other things that can help you or things that you can do to help."

Another one of the middle school teachers, Wendy also shared how collaboration can be supportive by stating

> "I love the team that I work with because we are so on top of it and we do a good job of supporting each other and collaborating and sharing ideas and information and where one

of us is kind of shaky and weak in the area, than someone else picks up. So I think we really gel together well and we collaborate really nicely."

Mike also has had prior face-to-face collaborative experiences that have included spending Mondays to go over lesson plans which is then followed up with another meeting on Friday to talk about anything that needs to be retaught and what went well throughout the week. Sam also enjoys the exchanging of ideas which he shared that he and his grade-level partner "bounce ideas off of one another daily, throughout the night, and on the weekends."

These collaborative experiences that teachers previously had reflect the engagement of sociocultural theory. When comments were made towards building off one anothers strenghts and weakness, and sharing ideas, this demonstrated the social interactions the teachers engaged in through collaboration. Sociocultural theory looks at learning occuring by acquiring knowledge from others through social interactions, at which point the learner is able to internalize the information to fully understand. By teachers expressing the support they recieved from their peers, this demonstrated sociocuclutral theory by teachers constructing meaning through social interactions. Teachers were able to build off of their current knowledge through the collabrative opportunites with their peers which supports learning through a sociocultural lens.

A second commonality that was present among the teachers' experiences with collaboration was the challenge they encountered when their peer(s) were not willing to participate. For example, Wendy stated "in the past I have had peers who always found a reason not to collaborate and so in those cases I just worked with the people who agreed we needed to work together." This demonstrates that this teacher focused on learning through a sociocultural perspecitve with collaborative opporutnities as opposed to trying to spend time on those collegues that would not engage in this process. This was also evident with Lisa who shared that she has had productive

experiences collaborating, however, she did mention that it can be hard to work with others because "some years I have had teachers who I just wasn't on the same page with." Mike discussed that in the past, collaboration among teachers was mandatory and structured by the administration so teachers did not have a choice whether or not to collaborate with others. However, that is currently not the case, and with him having a grade-level partner teacher who is about to retire he has had a difficult time trying to get her to collaborate; but with other teachers in the past collaborating happened on a regular basis.

Theme 3: teachers' prior understanding of assistive technology and UDL.

Prior to the teachers participating in the hybrid professional development on the use of assistive technology, five out of the six teachers expressed they had some knowledge of what AT was, with four of those teachers being able to give specific examples of AT and how it is used to support students. There was a range of detailed explanations of AT among the teachers, with the most detailed being from Mike who stated:

> "Assistive technology is using technology to assist learners who are not on level or to provide them with technology to assist with what that need and to assist them in understanding or developing skills that are missing. It doesn't have to be computers. Sometimes it could be just little manipulatives or balls or-- anything that you can use to assist kids to understand a concept that they're missing. So it's using technology to assist that kid with learning" (Mike).

Other teachers referred to their previous exposure to assistive technology and mentioned devices they recalled students using in classrooms, such as "little spellers, and audio books" (Lisa). Teachers also frequently mentioned AT being specifically for students with hearing or visual impairments. For example, Rose stated that "I think assistive technology is for students who are

blind," while Kim also mentioned that she went to a PD once and was showed tools to use for students with hearing impairments. Only one out of the six teachers stated that "I have not heard of assistive technology before" (Sam).

All of the participants started this study with a lack of understanding as to what Universal Design for Learning was prior to the professional development. Half of the teachers shared that they think they have heard of it but weren't sure or able to explain what they thought UDL was, while two of the teachers said they had never heard of it before. Only one teacher attempted to give an explanation as to what UDL means and expressed that he believed it had to do with the three different types of ways to learn, such as auditory, visually, or kinesthetic (Sam).

Theme 4: shift in teachers' perception and understanding of AT and UDL.

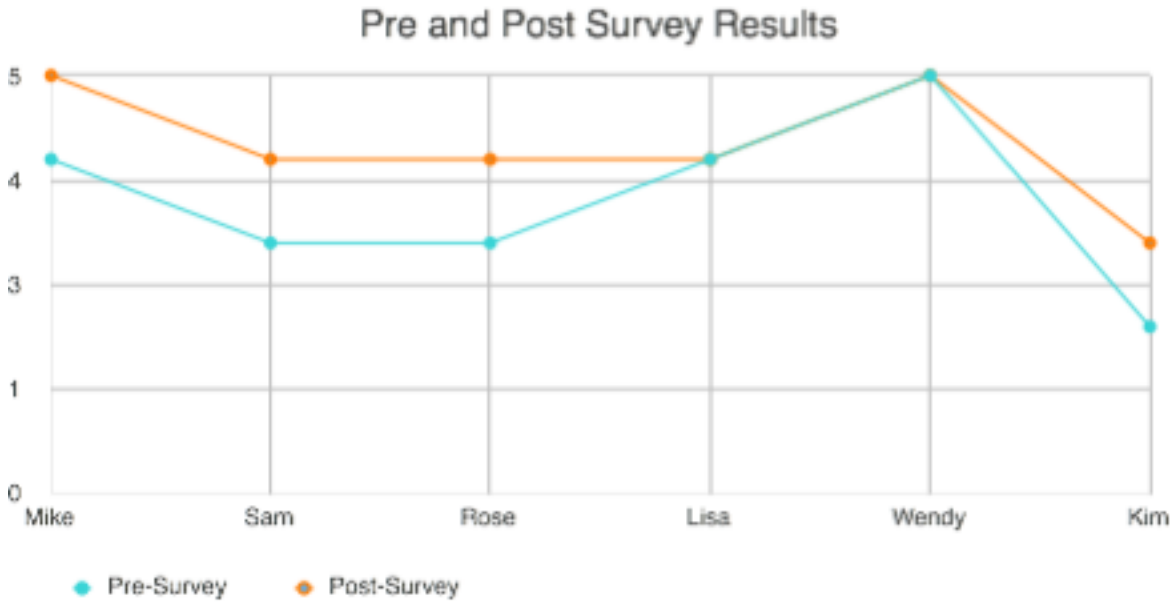
There was a shift in the teachers' understanding of what assistive technology is and the role it can play within a classroom when used with the UDL framework to support students following the professional development. The first indication of this came through in the participants' surveys. Prior to the professional development there was variability among the participants' responses on their surveys to the statement: "I feel comfortable implementing assistive technology into my classroom using the Universal Design for Learning framework." One teacher indicated that they "strongly agree," two teachers "somewhat agree," two teachers were "neutral," and one teacher selected "somewhat disagree" with this statement. However, after the PD, the post-survey results demonstrated a shift towards a development in understanding in this area with two teachers now "strongly agreeing," three teachers "somewhat agreeing," and one teacher was "neutral" with their comfort level with implementing AT in their classroom using the UDL framework. When analyzing these results a likert scale was used with the response choices including: strongly agree-5, somewhat agree-4, neutral-3, somewhat disagree-2, and

strongly disagree-1. These results from the pre and post survey are reflected in the following table and graph. As seen in the table and graph, two out of the six teachers remained the same (Lisa and Wendy) while the remaining four teachers increased in their level of comfortabilty implementing AT using the UDL framework.

Table 5: Pre and Post Results of Survey Question: I feel comfortable implementing assistive technology into my classroom using the Universal Design for Learning framework.

Teachers	Pre-Survey	Post-Survey
Mike	4	5
Sam	3	4
Rose	3	4
Lisa	4	4
Wendy	5	5
Kim	2	3

Figure 4: Pre and Post Result of Survey Question: I feel comfortable implementing assistive technology into my classroom using the Universal Design for Learning framework.



This change in teachers' perception and understanding of AT and UDL was also present within their post interviews when teachers shared how the AT has helped them support their students more in literacy. For example, Kim stated that "I really want to support my struggling readers and writers, I don't want them to ever feel left out, so this AT was a nice way to keep them included and keep them up to pace." Lisa shared how the use of AT has been supportive for her students because it "definitely keeps them more engaged. They really love using it. Even the students that aren't struggling so much, they like to use it. I think it just really helps them to stay on task and stay focused." This change in perception of how AT can be used to support students in the classroom was also reiterated by Rose expressing that "my struggling readers and writers, I don't want them to feel left out, ever, so it (Google Read and Write) was a nice way to just keep them included and keep them up to pace."

This shift in the teachers' perception and understanding of assistive technology also came through in their philosophy and thoughts towards inclusion and supporting the students in their classrooms in the area of literacy. Teachers began to see their students with disabilities able to engage and participate more in classroom activities. For example, Rose stated that she

> "wasn't too fond of inclusion because it was kind of distracting to the other students in the classroom, but when they're using the assistive technology and they're in the classroom, it is not distracting at all because they are engaged and able to participate more."

Sam expressed how the AT supported the practice of inclusion by saying that "the scholars love the extra assistance that they're able to receive, especially with reading, those who struggle with different vocabulary words at times, and how they can look up those words instantly was very beneficial." This teacher went on to further explain the impact AT had for one specific student in his classroom by stating:

> "there's one scholar in particular that I'm really thinking of and he flourishes when using Google Read and Write. Even though he struggles with reading, once he had this extra tool, he was right there in the game, and able to keep up with everyone else when it came to answering comprehension questions."

Another teacher noted that "when the students were using the assistive technology they were more motivated" (Wendy). Mike stated that he felt "Google Read and Write became another tool to use to better assist my kids in an inclusive setting." It was also expressed by Wendy that the AT gave her students a sense of independence by expressing "for my students they weren't held back, they were able to keep moving forward, even if I became occupied by misbehavior from other students, they were able to keep going and finish things, and that was exciting for me."

This shift in teachers' understanding of assistive technology and how it can be used to support their diverse learners continued to present itself through the teachers' discussions on the impact the AT and UDL had for their students. For example, Mike stated

> "Google Read and Write became a tool where I felt it could assist students who were behind in reading, or students who have disabilities, or for my regular ed kids to use, assisting them with staying focused and being able to assist in the comprehending with the work they're doing."

This demonstrates that this particular teacher was using the AT within the UDL framework due to all of their students having access to the AT and seeing the effects it had on their entire class. Rose also expressed this perspective by stating "I think the AT definitely keeps students engaged. They really love using it. Even the students that aren't struggling that much, it still really helps them." Lisa also went on to share how the AT supported her class by expressing "there is

such a range of ability levels from pre-primer to sixth grade and the AT helps a lot with reaching to such a broad range of students." Additional teachers shared their experience using the assistive technology in their classrooms and the support it gave their students, such as Kim explaining how the AT helped support her students in writing, particularly for those students who were not able to write legibly and had a difficult time with spelling. Sam also stated that the assistive technology helped his students with reading comprehension and decoding.

This change in teachers' perspective with assistive technology was also present in their lesson plans, which included a total of two lesson plans that were collected pre and post to the professional development. There was an increase in addressing student needs through the use of AT within the teachers' literacy lesson plans. Five out of the six teachers included AT in an adaptable way by offering various tools for students to use to complete a given task within their post lesson plans. This was an increase from the pre-lesson assessment instrument where none of the lesson plans demonstrated the use of AT to this extent. Teachers further supported students through the use of AT in an inclusive manner by five out of the six lesson plans also having AT strongly represented through pairing/grouping of three or more AT tools in a given activity. This is in comparison to the pre-lesson plan assessment instrument that showed zero of the six lesson plans including three or more AT tools for a given activity.

With the use of assistive technology being one way to implement inclusive practices within a classroom, it is important to analyze teachers' responses to the survey question "I use technology to support students in order for them to experience greater success with academic tasks." Four teachers indicated that they "strongly agree," and two teachers selected that they "somewhat agree" with that statement on their post-survey. This is a shift from the pre-survey which had two teachers select "strongly agree," three teachers choosing "somewhat agree," and

one teacher indicated that they "somewhat disagree." When the teachers were asked on their survey to respond to the statement "I need more training to use technology effectively within my classroom," three teachers indicated that they "somewhat disagree," while one teacher was "neutral," and two teachers "somewhat agreed" with the statement. This is a change from the pre-surveys that all six teachers expressed they "strongly agreed" with needing more training to use technology in their classrooms. This reflects that following the PD, the majority of teachers used technology to support their students and felt that they did not require additional training in this area.

When analyzing this change in understanding of AT from the socio-cultural perspective, one has to consider how the experience the participants had throughout the PD influenced this to occur, specifically in regards to the collaboration and interaction with their peers. This perspective allows for insight into how the interactions the teachers had with the professional development and with one another impacted how they interrupted and understood the information.

Theme 5: teachers' experience with the hybrid professional development.

Participants shared their perspective on the professional development in general, and the common theme among them was that they found it to be supportive and motivating. Teachers expressed that by receiving explanations of the information, along with opportunities to have their questions answered and working both in small groups and online, they were able to increase their knowledge of UDL and AT and begin incorporating it into their classrooms. These experiences reference sociocultural theory due to the interactions the participants had between expert and novice people transferring knowledge through their social interactions. This supports the teachers working towards being able to internalize the information from the PD and reflect it in their teaching practices. Prior to someone being able to internalize information, which Vygotsky

refers to as having an extensive understanding which occurs when someone is able to describe a concept in their own words, there needs to be an excessive amount of guidance from a teacher or expert, to the student of novices (Vygotsky, 1978).

This process of transferring knowledge was evident among the participants when they depicted their experiences with the professional development. The teachers acknowledged their social interactions that occurred through the support and guidance they received to help their success with understanding the content from the PD. For example, Mike stated "I think the PD that we had was great in assisting me to get a better understanding of Google Read and Write." Rose reiterated this when she shared that she felt "the PD gave a nice explanation and walked us through how to use it. It was very helpful." Lisa expressed that the professional development "gave me ideas on things that I can do, and 'aha' moments when I saw things that I can incorporate into my classroom. It's just nice to be able to talk to a group or to ask a question, because I'm pretty good at trying to figure out a new piece of technology, but it's nice to go to those PD's and ask those questions."

This theme that the PD was a supportive environment was also expressed by Sam who stated that he "struggles with technology, so it was great to have that one on one help in the small group sessions even though I do feel like if I needed extra assistance in the whole group or online we were able to receive that assistance." Wendy described the professional development as a "lifesaver, and helpful for students to access resources online." She went on to further elaborated on the professional development being motivating by stating that "it was nice to see that other people were using it and it was effective for them, and worth me carving out the time, even though we don't have a lot of extra time." Wendy also shared that she

> "liked the combination that was used for the PD. Online I liked because I can do things at my pace when I'm able to focus more. I liked the small group and the whole group because the whole group exposed me to things when people would make comments or ask questions I was like "oh I hadn't thought about that. The small group was nice because I got a chance to go at a different pace than when we were with the whole group."

This theme of becoming motivated to use the AT from the professional development was carried on when Mike shared that the PD gave him "another tool to use to assist me with my learners and come up with an efficient way to help my students be more on grade level with what they are doing." He went on to further elaborate that:

> "Google Read and Write became a tool where I felt it could assist students who were behind in reading, or students who have disabilities with reading. Or, with not just students with disabilities, but it became another tool for my regular ed kids to use, assisting them with staying focused and being able to assist in the comprehending with the work that they're actually doing."

By the teachers describing the PD as a way for them to learn how they could use the assistive technology through the sharing of ideas, reflects the importance their social interactions were for them. An aspect of the professional development that also all of the teachers' recognized further supported this experience throughout the PD was the opportunity to collaborate with one another and further engage in the process of transferring knowledge from peer-to-peer.

Sub-theme 1: benefits of face-to-face collaboration.

An intricate component to this PD was the face-to-face collaboration aspect. In order to fully understanding the teachers' experience with the professional development a close look into

this aspect of the PD will be discussed. Teachers were provided opportunities to collaborate among one another both face-to-face in small groups and during online discussion. All of the six participants indicated that the collaboration component to the PD improved their knowledge of AT and their ability to implement it in their classrooms. For example, Mike expressed that

> "collaborating with my colleagues was beneficial because things that I had problems understanding I could talk to some individuals who had worked with it before who had a better understanding to assist me with getting a clearer understanding of the Google Read and Write program."

Rose also expressed how she gained a better understanding through collaboration "because you could ask questions and have a conversation about it." Teachers also shared that collaborating "gave ideas that we probably wouldn't have come up with on our own and it was nice hearing what other people are doing with the technology" (Rose). Sam also stated that the PD was "really good to have someone who was knowledgeable in this field, all of the support we had outside of the professional development and the collaboration we were allowed to do so we know, hey this how we can support our students." Ms.W felt more confident to try the AT in her classroom because once she "saw other people using the Google Read and Write tools it motivated me to try using it." Mike also expressed his increase in motivation from the opportunities to collaborate when he stated that by "collaborating with colleagues it made me prefer to use it more, or to be wiser using it, and how to use it better."

The small-group PD sessions began by the teachers being provided examples on ways to incorporate specific AT tools into their literacy instruction through demonstration, with the focus being to align assistive technology tools with specific activities. For example, if students need to work on developing their vocabulary, they could use the highlighting tool and then create a vo-

cabulary list of the highlighted words. The teachers were asked prior to bring a literacy lesson plan with them to the small group sessions which they used during their collaboration to discuss their ideas of incorporating AT into their literacy lesson plans. They were encouraged to adapt their lesson plan to include AT supports for their entire class.

While the teachers worked in groups of three, myself and the AT Specialist floating among the groups to support discussion and answer any questions. One discussion that came up for a group was how to balance giving students supports to use to help them be successfully while still having them complete tasks independently. The AT specialist reiterated to these teachers to keep in mind what they are assessing the students on. If the focus of a writing assignment is on ideas, then allowing a student to use speech-to-text to get their ideas across in their essay does not take away from the objective of the assignment. Another group talked about how in the past they may have provided specific tools for specific students, but moving forward they would offer AT supports to all students because you never know what may work best for someone.

Teachers brought copies of a literacy lesson plan to share with their peers which allowed for the other teachers to give written and oral feedback on ways to incorporate AT into the given lesson. Teachers gave feedback on each others' lesson plans and any verbal feedback was recorded by the teacher whose lesson plan was being discussed. Once each teacher in the group had shared their lesson plan, conversations began to occur more fluidly with the teachers by suggesting ideas that were previously discussed for one teacher to also consider. Suggestions that were given included: providing students with an opportunity to listen to a story either as a whole group, small group, or individually using text to speech. To support students with vocabulary they could make use of the picture dictionary and highlighting feature to create a vocabulary list

was also discussed. In addition, teachers talked about encouraging students to use spelling assistance (i.e. word prediction) and the speech to text tool as a way to support students during the writing process. Teachers also shared ideas of how they have used the AT in their classrooms in the past, and how they would like to try using this AT in the future. For example, one teacher shared how she's had students listen to a story read aloud who aren't reading on grade-level so they were able to participate more in classroom discussions. Teachers left these collaborative sessions with a literacy lesson plan of their own that incorporated AT.

The experiences that the teachers described during their face-to-face collaborative opportunites touches upon the reciprocal teaching that can occur within sociocultural learning opporunities. One person takes on the role as the expert while the other person takes on the role as the novice learner as they explain and share ideas between one another. This is what took place for the teachers as they shared their collaborative expeirences that included sharing their ideas and suggestions with one another as to how to best support their students through the use of assistive technology. This theme also rang true as teachers discussed their expereinces collaborating online.

Sub-theme 2: benefits of online collaboration.

In addition to the face-to-face collaboration, the online portion of the professional development also granted opportunities for collaboration. This online portion of the PD took place over four weeks, with each week focusing on a different topic for teachers to discuss in addition to videos and resources being shared on ways to use the AT in their classrooms. The online platform of Google Classroom was used to conduct this portion of the PD. Each week teachers were given a prompt to respond to in addition to replying to at least one other teachers' post. Through-

out the online PD, myself and the District AT Specialist would occasionally comment on teachers posts to add to the discussions.

A common theme among the participants when collaborating online was the teachers relating to one another's experiences in the classroom with their students and the use of AT in literacy. During the online discussions held, teachers co-constructed meaning around the use of AT and UDL from their peers by sharing ideas with one another on ways to implement AT into their classrooms and helping to problem-solve and find ways to support students through the use of assistive technology and UDL. One teacher summarized their online PD experience by sharing that it was

> "really nice to talk to colleagues about just similar things that we're going through and how they're using this (AT) in their classroom and they gave different tips on what's working for them, and we can share the struggles that we're having and just really kind of support each other using the technology" (Rose).

By teachers' relating to one another's experiences, along with sharing ideas and suggestions to try and address concerns and challenges, demonstrates how they co-constructed meaning on how to incorporate the AT using UDL within their literacy instruction. From a socio-cultural perspective, teachers looked to use the opportunity of online collaboration to improve their literacy instruction by seeking advice through shared experiences. For example, Kim stated that she had challenges with her students in the area of spelling. When she asks them to write and they get stuck on a word, they don't know how to continue on to get their thoughts down and come back to the misspelled word later on. Mike responded to this post by stating

> "I have found that when my students use the word prediction tool while they are writing it really seems to help them find the correct spelling of unfamiliar words. If your students

need more help with the revision process, you may also want to use the comments tool which lets you select parts of their text and make comments on it. This would work well if you have your students share their writing with you."

Another example of this took place when Mike shared that his students are having a hard time identifying words and knowing what to do when they come across an unfamiliar word. Kim responded by saying that she's had her students try using the highlighting tool when they come across words they don't know, and then they can get the definition, use the picture dictionary, or even create a vocabulary list to help them learn the new words.

Teachers also related to one another through the online discussions by sharing they have had similar challenges or successes with their students when using the assistive technology. For example, Mike expressed that he does not have enough headphones for all of his students which is a problem because he does not like students using the text to speech unless they have headphones to use to avoid being distracting to other students. Another teacher, Sam then shared how he also has this problem so he now does station work and has the students rotate to a station where they are then able to use headphones to listen to a text if needed. This also occurred when Wendy shared that she has a hard time remembering to consistently include the assistive technology tools in her literacy instruction. Rose then discussed that she can relate to this also being an issue for her and that she has found it helpful to include tools within her lesson plans that could be used for specific activities.

Through this collaborative process of sharing ideas and relating to one anothers expreiences, teachers were able to learn and co-construct meaning about the implementation of AT and UDL from a Sociocultural perspective. By applying a sociocultural lens to this data, the collaboration that the participants engaged in supported their development of the AT within the

ULD framework. Vygotsy (1978) described learning as embedded within social events and occuring as a learner interacts with other people, objects, and events in the environment. Through the online collaboration, teachers had the opportunity to learn from one another which helped to support their construction of knowledge with Google Read and Write. By teachers learning how others were using the AT in their classrooms, sharing ideas on how it could be used to support their own students, and sharing their perosnal experiences with the AT, they were able to take the informaiton from the PD and internalize it by making personal conections to the content through the online collaboration.

Research Question 2: What are the Driving Factors to Use or Not Use Assistive Technology within Literacy Instruction?

To begin addressing the second research question, I will provide a description of the changes that occurred to the teacher's literacy instruction following the professional development, which will also include a summary of what their literacy instruction looked like prior to the PD to provide a clear scope of the changes or lack thereof with the use of AT in the classrooms. Changes to literacy instruction were found with five of the six participants.

Following the completion of the eight week professional development on assistive technology tools using Google Read & Write, there was a noticeable change in the presence of AT within teachers' literacy instruction. Five of the six teachers were observed modeling the use of AT tools to their students and providing assistance and support with using tools to complete given tasks following their participation in the professional development. This was also evident in their lesson plans by including possible AT supports for specific activities for students to utilize which was not present within their lesson plans prior to the PD. Social interactions using the

assistive technology also took place within these classrooms by students working together with the AT in small groups, which was an example of SCT being present and supporting the growth in knowledge of the AT. The following are examples of literacy instruction that took place prior to the PD and then after the PD to demonstrate the change in the integration of AT. These changes in literacy instruction that occurred following the PD are described below.

Theme 1: teacher-lead instruction prior to PD.

A common theme among the pre-observations and pre-lesson plans of the teachers consisted of teacher-lead instruction without explicit supports provided to students. Prior to the professional development teachers provided students with explanations of assignments they were expected to complete, such as a vocabulary worksheet. Students were expected to work independently or in a small group to complete their given tasks without any additional supports or modifications provided to the class. For example, Lisa had students work in groups of three to write down the main events of a story in chronological order from their literature textbook. Students were expected to read the story from the grade-level textbook and record the main events. A literacy activity that Wendy conducted included students following along to a story in their literature textbook while they listened to the story being read aloud with periodic classroom discussions summarizing what had occurred in the story. Prior to the PD, Kim had students complete the same vocabulary worksheet during literacy which required the students to write the definition and give examples for a list of words. A literacy lesson that Mike conducted prior to the professional development was also teacher-lead by reading a fluency passage in small chunks while the students repeated after him. This was then followed by him completed a graphic organizer for vocabulary words on the Smartboard while calling on students for answers.

This form of literacy instruction that was teacher-lead was also reflected in the pre-lesson plans. These pre-lesson plans included the students receiving the same assignment or worksheet to complete without any specific supports or tools to make available for the students to increase their level of success. Assistive technology was not mentioned or aligned to any student activities throughout the pre-lesson plans. For example, Kim's lesson plan included students working in small groups completing a vocabulary worksheet, practicing with flash cards, and reading a passage aloud to focus on fluency. Teacher-lead instruction was present within Mike's lesson plan which included reading a text aloud as a whole group using the literature textbook and completing a worksheet that required students to identify main components of the story.

Theme 2: fostering independence.

A core theme that emerged from the post-observations and post-lesson plans was the fostering of independence through the use of AT following UDL. In the post-observations, one way teachers did this was by modeling for the students how to use AT tools for specific tasks following UDL. This was evident as Kim demonstrated to the students how and when it is helpful to use certain tools available by thinking aloud while typing an example paragraph to her class. For example, she pretended to not know how to spell the word "entrance" so she said to the class "hmmmm, entrance, I forgot how to spell that word. How about I use the word prediction because if I sound it out I think it will start with "en-tr-" yes here it is, entrance. This teacher also showed the students how to use speech to text for assistance, and text to speech to listen to her writing which helped her to identify sentences that needed to be reworded as she continued on with this example essay, emphasizing to students the learning objectives to include topic sentences and supporting details.

This type of literacy instruction also took place in Wendy's classroom following the PD when she had the students follow along using Chromebooks as she showed them various tools that may be helpful while they completed their assignment. For example, as she showed the students the videos they needed to watch, Wendy enabled closed captioning, and adjusted the volume and size of the video. The article that students would need to read was then displayed on the smartboard, and Wendy showed the students the text-to-speech feature that was available to use and the highlighting feature to identify important ideas. She also demonstrated highlighting unfamiliar words within the article to then use the picture dictionary feature to identify the meaning of the word. Students were also shown how to create a vocabulary list if there was more than one unfamiliar word for them in the article. Wendy encouraged to try using these tools during her modeling and ask any questions they had.

A second way teachers' fostered student independence during post-observations was through encouragement of AT tools when they asked for assistance. This took place in Kim's post-observation when one student raised their hand asking Kim how to spell a word. She responded by asking the student what tool could use to help them spell that word. The student responded by saying "well I could talk into the computer and say the word, I'll try that." Kim continued to support and encourage students to utilize assistive technology tools that are available when another student raised their hand and asked her to read what they wrote to see if it sounded ok. Kim told the student to first use the text-to-speech tool to listen to her writing to begin the proof-reading and editing process. This encouragement to use AT tools when students appeared to need assistance or support was so evident in Lisa's classroom as the students work through literacy activities. As students worked independently and in small groups during her post-observation, Lisa walked around the room supporting students by showing them what tool may

be beneficial for a given task they were working on and reminders on how to access tools. This support and encouragement to use AT with students also took place in Rose's classroom when she prompted the students to use AT tools while typing an essay. She expressed to the class if they were having challenges spelling a word they could use to speech-to-text feature or word prediction, and if they wanted to begin the editing process they could start by using the text-to-speech feature to listen to what they wrote.

The core theme of teachers' fostering independence came through in their lesson plans by the teachers increasing their use of AT tools using the framework of UDL by providing a variety of AT tools to access for various activities to all students. For example, a literacy lesson plan of Wendy's before the professional development included given students an excerpt from a text with short answer comprehension questions and an associated rubric she would use to assess students' written responses. Following the PD, a literacy lesson plan of Wendy's included students still needing to answer comprehension questions based on a text, however she also included tools (speech to text, word prediction, and text to speech) to suggest and encourage students to use while working on their given tasks of written responses, creating a poem, and Venn Diagram. This also was evident in Kim's post-lesson plan which plan included modeling assistive technology tools that students have access to and explaining how these tools could be used to complete various tasks of a given assignment during the whole group introduction. This post lesson plan also included various assistive technology tools that may be beneficial for students to use for each given task being completed during small group activities. This included reading a text and giving students the option to listen to the text being read, creating a vocabulary list of unfamiliar words using the highlighting tool, and answering comprehension questions about the story with speech-to-text and word prediction as options of AT tools to use. The lesson conclud-

ed with the whole group coming back together and sharing three new words they found in the text and explaining what they mean. These changes that took place within five out of six classrooms demonstrated a focus on promoting student indendpence through the use of AT following the UDL framework.

Theme 3: support for all students.

The common theme among teachers as to what the driving factor was for them to use or not use AT within a UDL framework was focused on the fact that this instructional strategy provides support for all students. All six of the teachers expressed in their post-interview that they felt the use of the AT within the UDL framework would help all of their students be more successful in the area of literacy. For example, Lisa shared that she liked the idea that is makes students more independent and the tools can be very benefical for all studnets, specifially the highlighting tool to help them learn the words they don't know and being able to listen to texts. Sam expressed that he felt the AT could be extrememly benefial for his scholars so he wnated them to use it which lead to the incorproation of the AT within the UDL framework more into his literacy instruction. Kim focused on a specific skill she was motivated in improving with her students when she shared

> "my students' handwriting is what first motivated me to try using the AT with them. I thought the AT tools could really help my students be more succcessful in writing while also helping me be able to read what they write. It ended up also hlepig the students with their spelling."

This theme of the AT being able to support students in the area of literacy was further reiterated by Mike who stated that the driving factor for him to use the AT was becuase it became a tool that could assist not only his students with disabilties but all of his students. He went on to

further explain that the AT assisted his students with staying focused and comprehending texts. Rose also reiterated this theme of supporting students through the use of AT within the UDL framework by conveying the idea that she doesn't want her struggling readers and writiers to ever feel left out so using the AT was a nice way to keep them included and keep them up to pace.

Chapter V

Discussion

The goal of this study was to gain insight into the influence a hybrid professional development had on teachers' implementation of assistive technology within their literacy instruction. In order to begin to do this, a phenomenological approach was used to focus on the experience the participants had with the hybrid professional development. Teachers had opportunities to collaborate with one another throughout the professional development, which is why a Sociocultural lens was applied with this approach to analyze the data.

By looking at the data through the sociocultural lens, it is apparent that the interactions the participants had among one another was an important and significant contributor towards their implementation of the assistive technology in their classrooms. Sociocultural theory looks at learning taking place through interactions with other people. These social interactions the participants had with their colleagues both face-to-face and online, developed their understanding of the assistive technology Google Read and Write and supported their use and implementation of the AT using the UDL framework in their classrooms. The teachers were able to share ideas, learn from one another, and have their questions answered which supported their learning experience throughout the professional development. Based on the data collected from the participants, the teachers' peer interactions provided motivation, clarification, and a level of engagement with the information from the PD, leading to the teachers increasing their understanding and knowledge of the assistive technology, resulting in an increase of implementation. From a constructivist persepctive, the peer colloboration provided opportunities for teachers to reflect on

their current teaching practices and consider ways inwhich the use of the AT within the UDL framework could be an instrucutioanl strategy to suport their students in literacy.

It is important to take into consideration that the design of this PD was strategic to include the researched-based strategies that it had in an attempt to impact teachers instructional strategies to support the diverse needs of their students. All of the components to the PD were provided to the teachers as a whole and not seperate elements. The core features to the PD included AT, UDL, and collaboration. These main components to the PD were presented to the teachers as related and packaged elements. Therefore the results from this PD are based on all of the components to the PD being implemented as a package. Results would be expected to vary if this PD was carried out with changes made to the inclusion of additional componenets or removeal of what was included for this study.

When teachers discussed the positive impact that the AT had for their students, they discussed the AT from a UDL perspective. This was evident when teachers shared how they used the AT with all of their students and not just those who were struggling or received Special Education services. This shows that even though teachers did not explicitly seperate AT and UDL, they discussed their use of the AT within the UDL framework. When analyzing the change in teachers' perception of AT and UDL it was evident that teachers' mindset on how AT can be used in their classroom changed due to their development in understanding of UDL. Even though teachers did not explicit separate AT and UDL through their surveys, interviews, and lesson plans, it is apparent as they developed their knowledge of the UDL framework it impacted the way they used the AT in their classrooms to support the needs of all of their students. This comes through particularly when teachers discussed how the AT supported inclusionary practices

One consideration that may have lead to the results for the first research question that focused on the influence the PD had on teachers' classroom application of the AT may have been due to an accountability factor. Due to the PD continuing over a span of eight weeks, the teachers were aware that they would be meeting with their peers and having to post online which may have been an additional accountability factor to implement the AT using UDL. I also sent reminder emails and spoke with teachers face-to-face on a regular basis which may have aided in the teachers keeping the information from the PD more at the forefront of their lesson planning and instruction.

A consideration as to why the results occurred when looking at the second research question that focused on the driving factors to use or not use the AT within the UDL framework may have been influenced by my insider status. As a fellow teacher at the school where the study took place, I have insider access. I had previously established a relationship with all of the participants that was positive and respectful. Having this type of relationship with the participants may have lead to the teachers being more willing to engage in the PD activities and work towards implementing the AT within the UDL framework throughout their literacy instruction. Some of the teachers had expressed in their interviews that their previous expereinces with PD had been negative because of people coming into the school telling them what they should and shouldn't be doing without taking the time to learn the school culture and specific needs. With me having worked at the school, the teachers did not have that element of an "outsider" coming into their school and telling them what to do.

The teachers also had consistent support throughout the PD both when meeting in small groups face-to-face and online. By being able to ask questions and have time to practice and come back and discuss their progress, teachers were able to learn about the AT in a supportive

enviornment that went beyond the school's PD model of a one-time session. This PD provided teachers with a unique experience to this particular school year that may have lead to their motivation to incorporate the AT using UDL into their classrooms.

The collaboration piece from the PD continued on among the participants outside of the study which may be another potenial benefit to using this model of PD. Two groups formed among the participants, with the third and fourth grade teachers meeting outside of the PD to discuss the use of AT, while the sixth and seventh grade teachers also met. After school on three separate occasions, the third and fourth grade teaches were observed meeting in a classroom and were discussing how they were including the use of AT tools within their lesson plans, and where sharing ideas of what was working with their students. These teachers were also observed problem-solving with one another. For example, one teacher mentioned that she was not sure how to support a student in their classroom due to their difficulties with reading and writing, which lead to another teacher giving suggestions on how they could give that student certain tools to use that may help them be more successful. On two separate occasions, the sixth and seventh grade teaches were observed meeting after school discussing how students were doing using the AT during literacy. These observations were made informally due to my insider status at the school and demonstrates the value that the participants place on this aspect of the PD that they are willing to continue this practice outside of the professional development.

Following the conclusion of the hybrid professional development, one out of the six participants did not display any changes to their literacy instruction when comparing their pre and post observations and lesson plans. This discrepancy that existed for the teacher named Mike throughout the study, was evident between his interviews and surveys reflecting the importance and implementation of AT and UDL while his observations and lesson plans did not. It should be

noted that Mike was not probed in this post-interviews or at any other time in regards to this discrepancy to gain an understanding as to what caused his lack of implementation within his lesson plans and observations.

Mike had taught for 18 years, with only one participant in this study having taught longer than him in this study. Mike's teaching experience has taken place at the same school, teaching the same grade, and in the same classroom. After this length of time, habits and routines that have been established for him which may have led to a lack of interest to change his teaching practices. Looking at Mike's experience with the PD from a sociocultural perspective, this discrepancy may be due to his previous experiences with district mandates and where he is currently at in his teaching career. He expressed in his interviews that the school-district continuously shifts their focus with mandated teacher practices, which has resulted in him over-time learning to do what is asked of him and carry-on with his teaching. These prior experiences may have lead him to not be as open to changing his teaching practices because in the past as soon as he gets comfortable with a strategy or practice he has had to shift his focus towards learning a new one. He might require more time to explore using AT within the UDL framework within his classroom so he can develop learning of this teaching strategy to view it as a long-term practice to support his student as oppose to a short-term strategy.

Implications

On a practical level, providing teachers with a hybrid professional development on the use of assistive technology to support diverse learners has positive implications on instructional strategies. In this study, the majority teachers increased their use of assistive technology within their literacy instruction after participating in the professional development. Five out of six teachers who participated included forms of assistive technology within their post lesson plans

and observations. The one teacher who did not have assistive technology present within this data did however express the benefits their students have had when using the assistive technology in their classroom. A common teaching strategy that the majority of these teachers used prior to the professional development included differentiation. After the completion of the PD, teachers were able to support the needs of their students by offering multiple forms of assistive technology for a given task. By increasing the instructional strategies that teachers are knowledgeable of through the use of a hybrid professional development, students are able to have their unique needs met.

On a research level, the practical implications of this study indicate the positive impact that a hybrid professional development which includes on-going support and collaborative opportunities has on teachers' instructional strategies. Future research could investigate the implications this type of hybrid professional development has on teachers use of AT on a larger scale. All of the participants from this study worked at the same school, which may have influenced their level of collaboration. The majority of the teachers expressed through their interviews and surveys that they found collaborating with their colleagues to be beneficial when learning to implement the AT in their classrooms. Future research could look into this component of the professional development to compare teachers experience collaborating with others they already know to people who they are meeting for the first time.

Limitations

Several limitations of this study suggest areas for strengthening future work related to this area. First, teachers are already very busy carrying out their day-to-day responsibilities, so when implementing a professional development that requires teachers to give up more of their time there can be challenges that occur. In this particular study, there were challenges getting teachers to initially engage with the online portion of the PD. Prior to this portion of the PD beginning, teachers were sent an email with directions on how to access the Google Classroom a week prior, followed by an additional reminder two days prior to the PD beginning. Five out of the six teachers required multiple reminders both electronically and face-to-face before they engaged in the first week of the online portion of the PD. It was not until I spoke to each teacher face-to-face to remind them to log into the online classroom that the five teachers did. When asked, participants expressed that they were unfamiliar with the platform Google Classroom that was being used or they were busy and were having a hard time finding the time to get logged in. For the participants that were unfamiliar with how to access the online PD, I walked them through how to get to the online classroom one-on-one at their convenience using their computer. Once teachers got through their initial first online session, they did not require as many reminders, however at least one reminder email was sent prior to a new session beginning. Future studies should consider giving teachers a brief overview of Google Classroom during a whole-group or small group session prior to the online portion of the PD beginning. This would grant teachers that have never used the platform to gain familiarity prior to using it during the PD.

Secondly, the observations conducted for this study were announced, meaning that the teachers knew in advance when I would be observing their literacy lessons. This was done to coordinate schedules due to teachers' schedules changing for assemblies and electives such as

physical education that may result in a change in time when their literacy instruction would be taking place. This may have affected how teachers conducted their literacy lessons as they were aware of the focus of this study and when I would be visiting their classrooms. Future studies may consider conducting unannounced observations as well to gain an even better understanding as to how teachers are implementing assistive technology within their classrooms.

A third limitation was the fact that I did not probe the participants beyond their post-observation, specifically with Mike, to better understand the differences in how the teachers received the traning. This would have given more insight into why there was a discrepency in how Mike received the professional development in comparision to the other teachers. Even through Mike's results varied from that of the other teachers, his experience still brings the same value to the study when looking to understanding how a professional development influences teacher practices. Further probing would have given additional data into why the results occurred the way they did.

Another limitation pertains to the limited number of observations and lesson plans collected. This makes the documentation of actual change or lack thereof untrustworthy. Prior to the professional development there as only one observation conducted and one lesson plan collected. This was consistent with after the completion of the PD, there was only one observation conducted and one lesson plan collected from the participants. Due to this limited amount of data, it can not be definitively decided the influence that the PD had on teachers' instructional practices. Additional post data would need to be collected in order have a more substantial understanding into the affects the PD had on teachers' implementation of the AT.

Lastly, all of the teachers participated in all of the face-to-face and online sessions with the exception of one teacher, Lisa who missed one whole-group session. This session was video-

recorded for this teacher and copies of handouts and resources were shared with this participants via email. A follow-up meeting was provided to the teacher where I went over the information after the teacher had viewed the recording of the PD session. Future researchers should have a plan in place that includes scheduled make-up times for teachers that were not able to attend face-to-face PD sessions. This would ensure that all teachers participating have access to the information provided in the PD.

Future Implications

The results of this study are particularly beneficial for policymakers to consider when selecting professional developments for teaching staff. This hybrid professional development that provided teachers with collaborative opportunities and on-going support led to an increase in the use of assistive technology to support the needs of students. With the cost of providing a staff with a professional development being a significant factor school districts consider due to budgetary constraints, this information from the study can be used to help make cost effective decisions when choosing a professional development.

One way for school schools to effectively spend money on professional developments could be to provide teachers with a survey that looks into the willingness to learn and being open to changing teaching practices. The results of this survey could then be used to provide professional development to teachers who will be accepting to the information on a given topic, as opposed to providing the information to all teachers which may include educators who are not willing to change their teaching practices regardless of the delivery of the PD.

The educational professionals that are responsible for delieverying PD, as well as adult educators, could also benefit from the findings of this study. Presenters of professional developments need to be aware of the affects of learning through a socio-culutral perspective has

on participants. The results from this study, which indicated the majority of teachers‘ literacy instruction was influenced by the PD, could impact how future PDs are designed and delivered. Not only do the district leaders need to be aware of the positive influence socio-cultural leaning has but, also the people who are designing and delivering the PD because by providing teachers with opportunites to collaborate and reflect on their teaching practicies, they are able to co-construct meaning from the PD and implement the information into their instruction. By looking at ways to utilize the learning approaches of inter-professional training and sociocultural theory, district leaders would be able to tap into internal forces by having teachers learn from one another. This has the potential to save on funds that may have previously been spent on outside resources, while granting teachers the opportunity to learn from one another through the use of sociocultural theory. Taking into consideration the results from this study also has the poential to improve the learning experience of adult learners through the use of sociocultural theory and inter-professional learning.

While working with the AT district specialist on the design of the PD used for this study, changes to the traditional PD were made to accomodate the inclusion of the online component as well as sociocultural theory through the fostering of collaboration. This created a culture of learning as we worked together on the desing and implemenation of this PD with our motivations and goals being aligned with one another. Future research could look into changes that occur with those delievering PD as they develop their understanding of Socio-cultural Theory as it applies to the way teachers learn the information they are presenting. Examining how SCT influences the design and delivery of PDs as well and the changes in practices for those delivery the PD would be an additional area of interest to study and explore.

Future researchers should consider including an additional component to this PD on Google classroom. This platform was used for the online portion of the professional development. For some of the teachers this was their first time using this program, so in the future, teachers could benefit from having an extension added onto this PD focusing on the use of Google Classroom, or by having an additional professional development solely on this technology. One of the common hesitations teachers had prior to engaging in the online PD was that they were unfamiliar with Google Classrooms. To access the Google Classroom, teachers were sent a link to follow in their email. Once they clicked on the link they are brought to a new browser that prompts them to log into their Google account after which point they are able to access the Google Classroom. These emails were sent out prior to the PD beginning, however, additional emails were sent to teachers who had still not joined after their first reminder. Face-to-face conversation were held to ensure that the teachers were aware how they would join the online PD. Any teachers who needed additional support were provided one-on-one assistance by myself which involved showing them how to login and use Google classroom. Adding further support using this platform would provide teachers with the additional information they need to successfully navigate and use the technology, while increasing their familiarity to successfully engage with the online portion of the PD.

Summary

Promoting the use of assistive technology within the Universal Design for Learning framework is a way to support the diverse needs of students. This study consisted of providing six general education teachers from grades third through eighth in an urban school district a hybrid professional development on assistive technology within the area of literacy. This study aimed to gain insight into the influence the PD has on teachers to implement AT within their lit-

eracy instruction. This hybrid professional development took place over the course of eight weeks. Four of those weeks the teachers received four face-to-face sessions on using Google Read and Write. The first two sessions were provided to the entire school staff, and the following two sessions took place in small groups. After these small group sessions, the teachers participated in four weeks of online professional development using the platform Google Classrooms. The data collected from this study included pre and post interviews, observations, surveys, lesson plans and online discussions.

The results from the data sets showed that five out of six participants increased their use of assistive technology within their literacy instruction. Following the completion of the hybrid professional development, teachers were observed instructing with the assistive technology, modeling ways to use it for students, and providing them with multiple tools to use when completing a given activity. Teachers' lesson plans also reflected an increase in the use of assistive technology by embedding the AT into the student activities with specific tools listed that would be used for certain activities. Interviews conducted with the teachers reflected an improvement with the use of AT in their literacy instruction. Teachers shared that using the AT became a tool they could use to further assist not just their students who are identified as having a disability or struggling with literacy, but all of their students have benefited from using the AT. Overall, by providing teachers with the hybrid professional development that included on-going support and collaborative opportunities, teachers began to implement assistive technology into their literacy instruction to support their diverse learners.

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Appendix A: Professional Development Format

60 minutes Face to Face Universal Design for Learning PD (week 1)

Introduction (15 minutes)

Provide the principles of Universal Design for Learning by sharing this following resource and video

http://www.cast.org/our-work/about-udl.html#.W2HpzZPwZR1

Whole group (15 minutes)

An example literacy lesson plan will be shared with the group. While going through the components of the lesson, the instructor will point out areas where principles of UDL is present and where it could be embedded or added to create a lesson that is more supportive to diverse learners.

Small group work (20 minutes)

Teachers will work together using one of their own literacy lesson plans and identify areas that principles of UDL could be incorporated that will lead to drafting or revising a new version of the literacy lesson that is more supportive to diverse learners.

Whole group wrap-up (10 minutes)

Each group will share out ways that they changed their groups lesson plan.

60 minute Face to Face Google Read and Write PD (week 1)

Beginning Warm-Up Activity (5 minutes)

Upon entry to the session the teachers would write down a challenge that their students are having in reading and writing.

Explicit Instruction (30 minutes)

Demonstration of how to incorporate Google Read and Write into a literacy lesson plan. As the teachers are walked through the lesson, explanations and examples will be provided on the connection between UDL and AT. Share the below resource with teachers and view the video.

https://www.texthelp.com/en-us/company/education-blog/may-2017/7-ways-to-introduce-udl-into-your-classroom/

Exploration/Small group work (20 minutes)

Review the definition of UDL and Assistive Technology. Walk staff through installing the program and show a few basic features. The hands on experience would be limited to the amount of time left after the extension is downloaded to their Google accounts. They would have a moment to try the tools as they are introduced and a bit more time to explore additional tools. Tools to be shown include; Settings, Hover Speech, Screen Mask, Dictionary, Vocabulary, Prediction and Talk&Type.

Participants share in a small group partner regarding a feature(s) that can help address the challenges their students have when engaging in reading/writing activities and completing assignments.

Wrap-Up (5 minutes)

The group will have a chance to share and listen to each others' ideas on how to incorporate use of this extension on a regular basis in order to increase the impact it can have on student achievement.

60 minute Face to Face Professional Development Session (weeks 3 and 5)

Whole group (20 minutes)

Review the tools available and answer any questions teachers have in regards to using the tools in their classrooms.

Demonstrate how to incorporate the AT into lesson plans and how that looks throughout a lesson by conducting a literacy lesson for the participants using the AT throughout.

Small group (30 minutes)

Teachers work in small groups to design literacy lesson plans based on their curriculum that incorporate AT using the UDL framework. Instructors walk around and provide teachers with support during this process.

Whole group (10 minutes)

Discuss how it has been working for the students they've introduced it to and additional ways that this tool can be used with their students and incorporated into their lesson plans.

Online Professional Development (weeks 6-8)

-General questions will be posed to teachers on a weekly basis to prompt discussions. For example, “share one success and one challenge you have had recently with the AT during your literacy instruction.”

-Teachers will be able to pose their own questions, concerns, and share ways they are using the tool in their classrooms at any time (i.e resources and lesson plans).

-Additional support will be provided in this forum through guidance and suggestions. This will include a “Tip of the Week,” videos, and sample lesson plans.

Appendix B: Lesson Plan Assessment Instrument

	AT Not Present	AT Partially Present	AT Strongly Represented
Learning Intention and Success Criteria	Assistive technology is not mentioned in the learning intention nor the success criteria	Assistive technology is mentioned in either the learning intention or success criteria	Assistive technology is mentioned in both the learning intention and success criteria
Delivery of Lesson	Assistive technology is not used or mentioned to students	Assistive technology is mentioned briefly to students but is not a part of instruction.	Teacher uses assistive technology to present lesson to students and uses it to support their instruction and gives an explanation of tools for students to complete given task. AT is discussed within the context of the lesson and not an external component.
Student Activity	Lesson does not state how students are going to use or could use AT to complete task	Lesson lists AT tools to offer students but does not specify connection between the task and the AT	Lesson includes a description or explanation of AT students will have available to use for a given task and how the AT will help support students to complete the task.
Attention to Student Needs	No mention of AT	All students use the same AT tool to complete activity	AT is used in an adaptable way by offering various tools for students to use to complete a given task

	AT Not Present	AT Partially Present	AT Strongly Represented
Assessment	Assistive technology is not utilized during the assessment	Assistive technology is mentioned as an option to be used during the assessment	Assistive technology is used to complete the assessment
Pairing and/or grouping of AT tools	Assistive technology tools are used individually or one at a time	Two AT tools are paired together in a single activity	Three or more AT tools are represented in a given activity

Appendix C: Interview Protocol Prior to PD

1. What technology do you currently use on a daily basis; personally and/or in your classroom (i.e. Microsoft word, email)?

2. What has been your experience with using technology in your classroom?

3. What challenges have you experienced when working with technology in the classroom?

4. How would you describe your comfort level utilizing technology within your instruction?

5. Describe your philosophy on inclusion. What are your thoughts on how students with special needs should be supported in school?

6. What are your thoughts about how the current special education system on inclusion is being implemented here at Carson?

7. How have you in the past, and how do you currently, support a diverse population of students in the past within the area of literacy?

8. How have you found professional developments to be beneficial?

9. What has been your experience with collaborating with others both face-to-face and online during a professional development? What did you find beneficial and what did you find challenging?

8. What is your current understanding of Universal Design for Learning?

9. What is your current understanding of assistive technology?

10. How do you feel assistive technology benefit, or could benefit, a diverse population of students?

Appendix D: Interview Protocol After PD

1. What is your current understanding of assistive technology?

2. What is your current understanding of Universal Design for Learning?

3. What are your current thoughts on supporting students in the area of literacy though the use of assistive technology?

4. What were the driving factors that made you decide to use or not use Google Read and Write with your students?

5. How do you feel Google Read and Write supported or could support students in the area of Literacy?

6. How did the professional development impact your instructional strategies, particularly when it comes to utilizing Google Read and Write during Literacy?

7. What aspects of the professional development did you find most beneficial?

8. What challenges did you experience when implementing Google Read and Write?

9. Describe your experience engaging in the online portion of the professional development. How did you feel it was beneficial? What were the challenges or difficulties?

10. Describe your experience collaborating with your peers?

11. How do you feel your experience collaborating with your peers or the lack there of impacted your use of the AT in your literacy instruction?

12. What benefits have you seen, or what benefits do you think could occur for students when using the assistive technology?

13. How has your philosophy on inclusion changed and stayed the same after receiving this professional development?

Appendix E: Survey

Please indicate how strongly you agree with the following questions:

1. I can perform basic computer operations, such as managing files, opening and closing programs (Microsoft Word, Excel), moving between programs.

   Strongly Agree Somewhat Agree Neutral Somewhat Disagree Strongly Disagree

2. I can help students learn basic computer operations in the context of instruction, such as file management, keyboarding, using the toolbar, or printing documents.

   Strongly Agree Somewhat Agree Neutral Somewhat Disagree Strongly Disagree

3. I can implement classroom activities in which students use presentation programs to complete assignments or projects.

   Strongly Agree Somewhat Agree Neutral Somewhat Disagree Strongly Disagree

4. I can make computers more accessible for students, for example by making the cursor speed slower, or increasing the font size.

   Strongly Agree Somewhat Agree Neutral Somewhat Disagree Strongly Disagree

5. I can locate software such as graphic organizers and text-to-speech software and/or other assistive devices such as adaptive keyboards.

   Strongly Agree Somewhat Agree Neutral Somewhat Disagree Strongly Disagree

6. I have participated in or have created at least one of these: online discussion board, blog, podcast, instant messaging

   Strongly Agree Somewhat Agree Neutral Somewhat Disagree Strongly Disagree

7. I look for ways to use new technologies in the classroom

   Strongly Agree Somewhat Agree Neutral Somewhat Disagree Strongly Disagree

8. I believe that students in my classroom require addition support in the area of literacy (reading and writing) to meet grade level expectations.

Strongly Agree Somewhat Agree Neutral Somewhat Disagree Strongly Disagree

9. I feel comfortable to implement technology within my instruction on a daily basis.

Strongly Agree Somewhat Agree Neutral Somewhat Disagree Strongly Disagree

10. I believe that assistive technology is one way to support diverse learners in my classroom

Strongly Agree Somewhat Agree Neutral Somewhat Disagree Strongly Disagree

11. I need more training to use technology effectively within my classroom

Strongly Agree Somewhat Agree Neutral Somewhat Disagree Strongly Disagree

12. I am willing to take risks and try new forms of technology in my classroom

Strongly Agree Somewhat Agree Neutral Somewhat Disagree Strongly Disagree

13. The can select technology appropriate for learning tasks

Strongly Agree Somewhat Agree Neutral Somewhat Disagree Strongly Disagree

14. I use technology to support students in order for them to experience greater success with academic tasks.

Strongly Agree Somewhat Agree Neutral Somewhat Disagree Strongly Disagree

15. I can incorporate technology supports into performance-based assessments, such as student presentations with PowerPoint.

Strongly Agree Somewhat Agree Neutral Somewhat Disagree Strongly Disagree

16. School systems expect teachers to learn and use technologies without formal training.

Strongly Agree Somewhat Agree Neutral Somewhat Disagree Strongly Disagree

17. Professional developments are beneficial to improving my teaching practices.

Strongly Agree Somewhat Agree Neutral Somewhat Disagree Strongly Disagree

18. I have taken, or am comfortable taking, professional development courses online.

Strongly Agree Somewhat Agree Neutral Somewhat Disagree Strongly Disagree

19. I believe opportunities for collaboration during a professional development are helpful and an effective way to learn the content.

Strongly Agree Somewhat Agree Neutral Somewhat Disagree Strongly Disagree

20. Universal Design for Learning is a framework that can help support a diverse population of learners.

Strongly Agree Somewhat Agree Neutral Somewhat Disagree Strongly Disagree

21. I feel comfortable implementing assistive technology into my classroom using the Universal Design for Learning framework.

Strongly Agree Somewhat Agree Neutral Somewhat Disagree Strongly Disagree

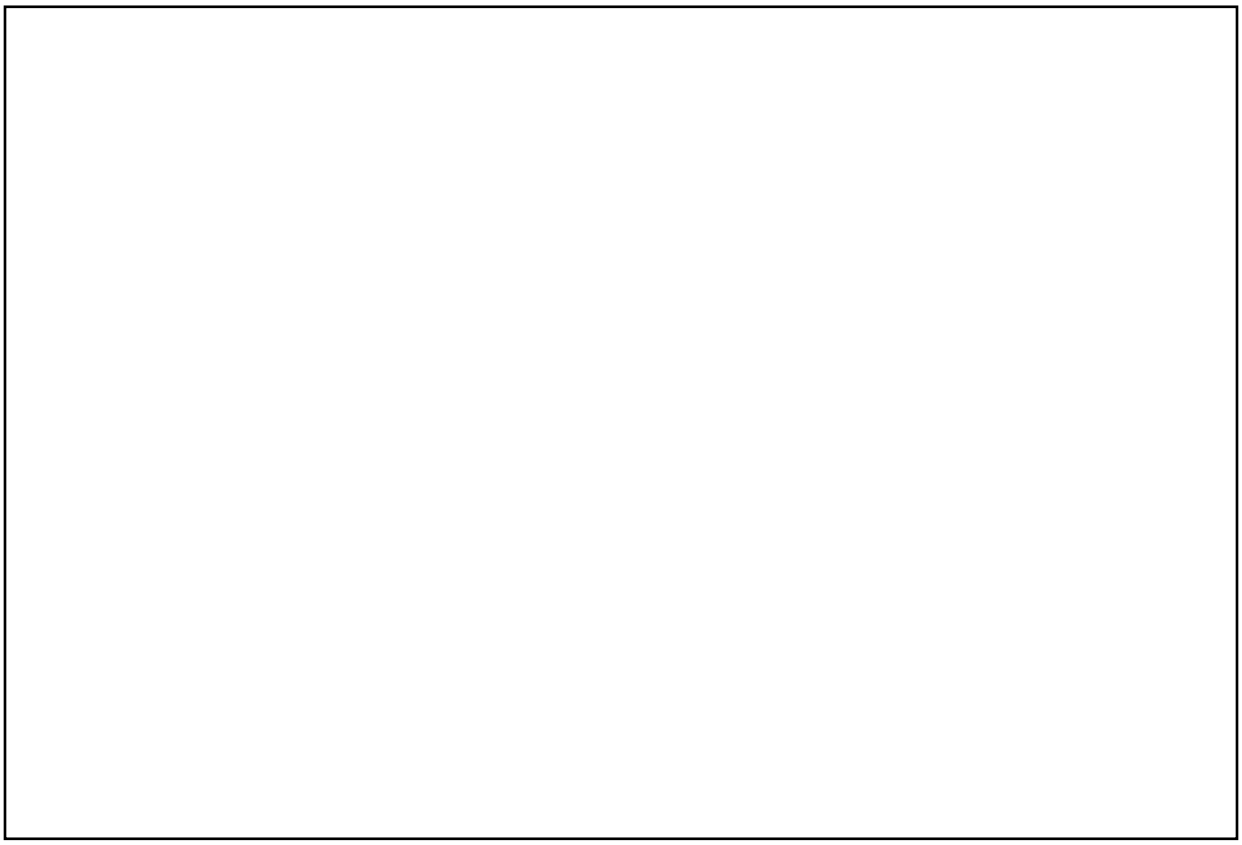
Appendix F: *Observational Protocol*

Goal: To observe how teachers are introducing, instructing, and utilizing AT within their classrooms following the ULD principles.

Date:

Subject Area:

Sketch of classroom design (i.e. desks are in rows or small groups) to show where technology is present and how students have access to technology (i.e. one-on-one, small group)



UDL Principle I. Provide Multiple Means of Representation

Description of teacher introducing technology to students including clarification and support

-Does the teacher model using the technology?

-Does the teacher clearly state the purpose or objective of the technology use?

-Do students ask any questions on how to use the technology?

-Are students able to try the technology right then and receive feedback?

ULD Principle II: Provide Multiple Means of Action and Expression

Description of how teacher facilitated information and resources (i.e various levels of support

-Are there multiple forms of technology available for students to use?

-Does the teacher provide clear forms of technology that could be used for a specific task?

UDL Principle III: Provide Multiple Means of Engagement

Description of how students engaged with AT (i.e what academic tasks such as practice work or assessment and what tools were being used to accomplish this)

-Are students working independently, with a partner, small groups, or whole group while using the technology?

-What are the academic task that students are completing while using technology?

-Are students using multiple tools?

CURRICULUM VITAE

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