PATTERNS OF SPECIAL EDUCATION TEACHERS'

ASSISTIVE TECHNOLOGY KNOWLEDGE

AND USE IN P-12 EDUCATION

by

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ABSTRACT

This exploratory research study used quantitative methods to explore patterns of special education teachers' assistive technology knowledge and use. Barriers to assistive technology (AT) use and facilitators that impact assistive technology use were also identified and explored. The following research questions were addressed: 1) what do special education teachers know about assistive technology and its application in P-12 education; 2) to what extent do special education teachers perceive the Quality Indicators of Assistive Technology (QIAT) being present in their school districts; 3) what are the barriers to assistive technology use for special education teachers; and 4) what factors facilitate assistive technology use by special education teachers?

A self-report online survey was administered to special education teachers in Alabama. The survey consisted of five sections: demographics, knowledge of assistive technology, indicators of assistive technology, barriers to assistive technology, and facilitators of assistive technology. Findings in this study uncovered a disparity in knowledge related to AT consideration, AT services, and AT tools. Participants perceived their knowledge level to be highest in the area of AT tools, especially low-tech and mid-tech devices. In addition, lack of knowledge and training, lack of device options, and lack of funding were most frequently reported as barriers to assistive technology use. Barriers and facilitators of assistive technology were found to have a significant impact on special education teacher knowledge.

It is recommended that the Alabama State Department of Education collaborate with school districts and higher education institutions to create training options that equip special education teachers, present and future, to appropriately consider and implement assistive

technology for students with disabilities. In addition, a re-examination of policies and procedures throughout the state is recommended to assure alignment with current practices and mandates associated with assistive technology.

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CHAPTER I:

INTRODUCTION

Assistive technology (AT) provides creative solutions that enable individuals with disabilities to be more independent, productive, and included in society and community life (Ripat & Woodgate, 2017; Boisselle & Grajo, 2018; Green, 2018). Today, in many ways, individuals with disabilities are breaking barriers through the use of assistive technology. For example, augmentative and alternative communication methods are giving individuals with complex communication needs a way to communicate with family, friends, and colleagues (Green, 2018) and computer software options, such as text-to-speech software, are giving individuals with dyslexia access to computers and mobile devices (Dawson, Antonenko, Lane, & Zhu, 2018). Also, augmented reality can increase independence for students with intellectual and developmental disabilities (Bridges, Robinson, Stewart, Kwon, & Mutua, 2019) and switch-operated toys are giving children with physical disabilities access to their environment through play (Schaefer & Andzik, 2016). Essentially, anything that can "increase, maintain, or improve the functional capabilities of a student with a disability" can be considered an assistive technology device (IDEA, 2004).

The positive benefits of assistive technology have been noted through research over the years but not defined in public education until the Individuals with Disabilities Act (IDEA) of 1990. The 1997 reauthorization of IDEA, which was upheld by the 2004 reauthorization, included additional language specific to assistive technology, stating that the Individualized Education Program (IEP) team should consider a list of special factors in the development,

review, and revision of the student's IEP, including assistive technology. Despite mandates for team members to consider assistive technology during IEP development, it was, and still is, left up to the discretion of school districts to decide how consideration is carried out, resulting in broad inconsistencies. In addition, research has shown that IEP team members are undertrained in the use and selection of assistive technology and therefore unable to adequately consider the need for assistive technology and how it might improve education outcomes for individuals with disabilities (Maich, Rhijn, Woods & Brochu, 2017; Okolo & Diedrich, 2014).

Problem Statement

An IEP team is comprised of multiple individuals, including parents, general education teachers, administrators, and special education teachers. Due to a special education teachers' typical role as the primary case manager while the student is on their caseload, success of students with disabilities using assistive technology is often directly related to the knowledge of a special education teacher (Judge & Simms, 2009). If the special education teacher and/or other members of the IEP team have a lack of knowledge, the student misses out on the opportunity to utilize a potentially life changing tool due to local, state, and federal inconsistencies in policies, procedures, and training (Dell, Newton, & Petroff, 2016). In Alabama, there has been no data showing special education teachers' patterns of knowledge and use of assistive technology.

Purpose of the Study

The purpose of this study is to explore patterns of special education teachers' knowledge of assistive technology use in Alabama. Barriers and facilitators of assistive technology use are also being identified and explored, establishing a basis for a statewide professional development agenda for the Alabama Department of Education's Special Education Services. In addition, the findings in this study could guide educator preparation programs in curriculum development in

this area as well as provide critical data that could prompt future research related to assistive technology. In order to move forward with future research, we must have a clear understanding of special education teachers' knowledge and use of assistive technology use at the local, state, and federal level.

Significance of the Study

There are currently 6.7 million students ages 3-21 receiving special education services in the United States (National Center for Education Statistics, 2015-2016). For students with disabilities, assistive technology can increase independence, boost engagement, improve self-confidence, and make curriculum more accessible (Alper & Raharinirina, 2006; Chmiliar & Cheung, 2007; MacLachlan, Banes, Bell et al., 2018). All are positive gains to students' educational experiences, and in turn, to their overall quality of life. However, existing research has suggested that students with disabilities are underutilizing assistive technology (Bouck, 2016). Studies have shown that this could be indicative of a lack of teacher expertise, supporting the need for an increase of training and instruction through professional development and preservice education (Zhao & Cziko, 2001; Crider, Johnston, Rutledge, Doolittle & Beard, 2014; Dell, Newton, & Petroff, 2016). Unfortunately, the ultimate impact of inadequately trained special education teachers is on the students with disabilities who are being denied services (Bausch & Hasselbring, 2004).

Research Questions

The following questions will be addressed in the proposed study:

1. What do special education teachers know about assistive technology and its application in P-12 education in the State of Alabama;

2.   To what extent do special education teachers perceive the Quality Indicators of Assistive Technology Use being present in their school districts in the State of Alabama;

3.   What are the barriers to assistive technology use for special education teachers in the State of Alabama; and

4.   What factors facilitate assistive technology use by special education teachers in the State of Alabama?

Scope of the Study

This exploratory research study uses quantitative methods to explore patterns of special education teachers' assistive technology knowledge and use in Alabama. In addition, possible barriers to assistive technology use and facilitators that may impact assistive technology are explored. A self-report online survey was administered. The survey was developed based on literature related to assistive technology, an existing survey titled *Survey of Knowledge & Skills for Guiding Professional Development (UKAT Toolkit, 2002)*, and the Quality Indicators for Assistive Technology (QIAT Consortium Leadership Team, 2012).

The self-report online survey was distributed via email, by the researcher, to special education coordinators within each school district of each Local Education Agency (LEA) in the state. The survey consists of five sections totaling 58 questions including 32 closed-ended, Likert scale questions, one ranking question, one open-ended question, and 24 demographic questions. There are currently 2,500+ special education teachers in Alabama and all had an opportunity to respond to the survey if their school district agreed to participate.

Conceptual Framework
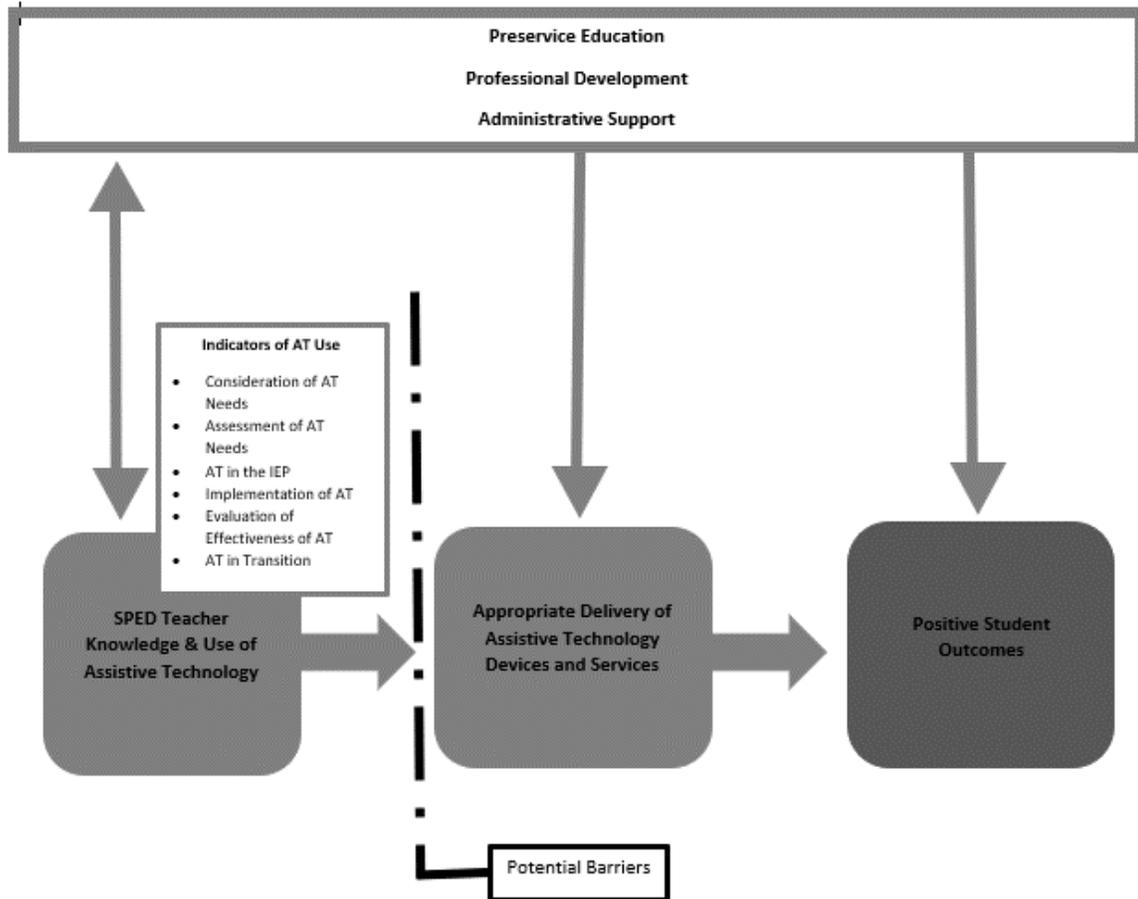
Figure 1. Conceptual framework

Figure 1 represents a conceptual model of understanding the variables that impact appropriate delivery of assistive technology, both in terms of services and devices. The conceptual model positions the relationship between the teacher knowledge and use of assistive technology and preservice teacher education, professional development, and administrative support as a synergistic one. This model suggests that the effects of the interaction between the variables in this synergistic relationship is greater than the sum of their separate effects. For instance, the likelihood of utilizing assistive technology by a teacher who learned about assistive technology in their preservice program and who works in a school with a supportive

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administrator is more likely to score higher on the indicators of assistive technology use compared to one who graduated from a similar program, but working in a school with a non-supportive administrator.

Assistive technology can positively impact student outcomes when appropriate assistive technology devices and services are in place. However, due to barriers currently associated with the delivery of assistive technology services, assistive technology use remains inconsistent for special education teachers and/or other members of a student's IEP team. In this study, assistive technology use is framed by six of the Quality Indicators for Assistive Technology Services, (QIAT), which was developed to provide guidelines for the development and delivery of assistive technology services. There are eight total areas included in the QIAT and six that frame assistive technology use in this study: 1) consideration of assistive technology needs, 2) assessment of assistive technology needs; 3) assistive technology in the IEP; 4) assistive technology implementation; 5) effectiveness of assistive technology; and 6) assistive technology in transition (QIAT Consortium Leadership Team, 2012). Professional development, preservice education, administrative support, as well as other variables, could potentially facilitate assistive technology knowledge and use among special education teachers and/or other members of an IEP team and would, in turn, increase positive student outcomes.

Assumptions

A number of assumptions were made pertaining to this study. First, assistive technology considerations were happening in schools across the state. This assumption is premised on the fact that IDEA (2004) mandates special education teachers to consider assistive technology during the IEP process. Second, participants in this study would respond honestly to all survey questions. Since this study relies on teacher self-report, this assumption is critical for the validity

and reliability of this research study. Last, the anonymity of the study provides assurance to participants that the information they share about their practices related to assistive technology will not be linked to any one participant. This assumption, therefore, encourages participants to not only respond honesty, but to view this study as a critical first step to improving outcomes for students with disabilities.

Limitations

This study was not without limitations. The self-report survey was sent to special education coordinators in Alabama for dissemination to special education teachers in their district. Therefore, if a special education coordinator failed to disseminate the survey to special education teachers in their district, the special education teachers did not have access to the survey. This could result in lower participation.

In addition, the Covid-19 pandemic started shortly before data collection. In Alabama, and across the United States, schools closed or resumed remotely. This was a time of global fear and uncertainty which potentially lowered survey participation.

Definition of Terms

The following definitions are included to provide the reader with a greater understanding of the proposed study.

Assessment of Need: In this study, assessment of need refers to discussing and gathering information while assistive technology is being considered, as well as after an assistive technology tool is chosen, to ensure effectiveness.

Assistive Technology (AT) Device: IDEA (2004) defines an assistive technology device as "any item, piece of equipment, or product system, whether acquired commercially off the

shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of a child with a disability."

Assistive Technology Services: IDEA (2004) defines assistive technology services as, "any service that directly assists a child with a disability in the selection, acquisition, or use of an assistive technology device."

Assistive Technology Consideration: IDEA (2004) stated that, "the requirement to consider the need for assistive technology devices and services brings the issue of assistive technology to every IEP team. In order for IEP teams to be able to effectively, address assistive technology devices and services, teams must use a collaborative decision-making process to determine whether or not an individual student requires assistive technology."

Special Education Teacher: Special education teachers work with individuals with a variety of disabilities (Bureau of Labor, 2012-2013). The surveyed state requires teachers to have completed a bachelor's degree from an educator preparation program from an accredited university.

Individuals with Disabilities Act (IDEA) 2004: IDEA 2004 is a United States law that establishes policies and procedures for P-12 students with disabilities. "It has the greatest impact on P-12 students since it requires consideration of assistive technology for students with disabilities during the IEP process" (Dell, Newton, Petroff).

Individualized Education Plan (IEP): The term individualized education plan or IEP means a written statement for each child with a disability that is developed, reviewed, and revised with a team (IDEA, 2004).

Quality Indicators for Assistive Technology (QIAT): The QIAT are a set of indicators established through research specific to eight areas of need related to assistive technology. The

instrument used in this study will be based off of the QIAT Indicators for Professional Development and Training.

SETT Framework: The SETT Framework was created by Joy Zabala and is a framework for evaluating assistive technology needs. SETT stands for Setting, Environment, Task, Tool (Zabala, 2005).

Educator Preparation Program: In this study, Educator Preparation Programs are postsecondary undergraduate, graduate, or certificate programs for special education teachers to gain knowledge and licensure.

Professional Development (PD): In this study, professional development is training that's received while working as a special education professional.

Summary

This chapter has provided an overview of assistive technology and the impact that assistive technology can have on the success of individuals with disabilities. Unfortunately, assistive technology use in P-12 education is often inconsistent and ineffective, causing students with disabilities to underutilize assistive technology (Bouck, 2016). In Alabama, there is currently no data showing special education teachers' patterns of knowledge and use of assistive technology. In this study, patterns of special education teachers' assistive technology knowledge and use in Alabama were explored along with possible barriers and facilitators that may impact assistive technology use. Current assistive technology practices, frameworks, and barriers to assistive technology use will be explored in depth in Chapter II.

CHAPTER II:

LITERATURE REVIEW

Introduction

In order to address patterns of special education teachers' assistive technology knowledge and use in Alabama, as well as possible barriers and facilitators that may impact assistive technology use, the following topics were reviewed including the history of assistive technology in education, indicators of assistive technology use in education, barriers to assistive technology use in education, and facilitators of assistive technology use. Empirical research related to this topic is limited, especially in the targeted state, thus strengthening the need for the research associated with this study.

History of Assistive Technology in Education

There are many factors that have contributed to the increase of assistive technology knowledge, acquisition, and implementation over the years. Assistive technology was first written into legislation through the Technology Related Assistance for Individuals with Disabilities Act of 1988 (TECH ACT, 1988). However, assistive technology was not officially recognized in public education until the 1990 reauthorization of the Individuals with Disabilities Act (IDEA).

As knowledge of assistive technology grew, it was clear that the policies and procedures that were in place were too broad to cover the assistive technology needs of individuals with disabilities. The 1997 reauthorization of the Individuals with Disabilities Act (IDEA), which was

upheld in the 2004 reauthorization, included additional language specific to students with disabilities, stating that the Individualized Education Program (IEP) teams should consider a list of special factors in the development, review, and revision of the student's IEP. Those special factors included assistive technology. This reauthorization also constituted clear definitions of assistive technology *devices, services,* and *consideration* that helped to navigate the different components of this seemingly broad term. It is important to note that this multi-tiered definition includes assistive technology *devices*, assistive technology *services,* and assistive technology *consideration* (Mittler, 2007; Dell, Newton, & Petrof, 2017). All are equally important to the assistive technology process and need to be fully understood in order to explore how and why the assistive technology process directly impacts student outcomes in P-12 education.

IDEA (2004) defined an assistive technology *device* as, "any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve the functional capabilities of a student with a disability." There is an extensive range of assistive technology devices, therefore, using a continuum from low tech to high tech can be a helpful way to organize the large variety of tools (Dell, Newton, & Petroff, 2017) (see Figure 2).

Low-Tech Tools	Mid-Tech Tools	High-Tech Tools
Pencil grips	Digital recorder	iPad and other mobile tablets with apps
Pens, pencils, crayons, and markers with extra-wide shafts	Calculator	Desktop computer
Raised-line paper and graph paper	Electronic dictionary/thesaurus	Laptop/Chromebook
Slant board	Audio book	iPod
Paper holder	Mini-book light	"The Cloud"
Non-Slip surfaces	Switch-operated toys and small appliances	Apps
Magnetic letters, tactile letters	Step-by-step communicators	Augmented Reality
Bar magnifier	Inexpensive augmentative communication devices	Alternative inputs and outputs
Rubber stamps		Dedicated augmentative communication devices
Sticky notes		Augmentative communication apps on iPads
Keyguard		
Moisture guard		
Head pointer/mouth pointer		
Dowel (held in fist)		

Figure 2. Assistive technology continuum

Assistive technology, low tech, mid-tech, and high tech provides creative solutions that enable individuals with disabilities to be more independent, productive, and included in society and community life (Ripat & Woodgate, 2017; Boisselle & Grajo, 2018; Green, 2018). For example, augmentative and alternative communication methods are giving individuals with complex communication needs a way to communicate with family, friends, and colleagues (Green, 2018) and computer software options, such as text-to-speech software, are giving

individuals with dyslexia access to computers and mobile devices (Dawson, Antonenko, Lane, & Zhu, 2018). Also, augmented reality can increase independence for students with intellectual and developmental disabilities (Bridges, Robinson, Stewart, Kwon, & Mutua, 2019) and switch-operated toys are giving children with physical disabilities access to their environment through play (Schaefer & Andzik, 2016). Essentially, anything that can "increase, maintain, or improve the functional capabilities of a student with a disability" can be considered an assistive technology device (IDEA, 2004).

Assistive technology *services* are defined in IDEA (2004) as, "acquiring AT devices; customizing, and maintain AT devices; coordinating other therapies with AT devices; training for the student and family; and training for professionals involved with students". For a student to be successful with an assistive technology device, assistive technology services are critical. For example, when a student with a complex communication need receives an augmentative communication device, the staff needs to be trained on the device and how to facilitate communication with the student. Otherwise, the student will have less of a chance for success, often leading to the device being underused or abandoned (Bruinsma, 2011; Cruz, Emmel, Manzini, Mendes, 2016).

Assistive technology *consideration* is defined as, "the requirement to consider the need for assistive technology devices and services and bring the issue of assistive technology to every IEP team. For IEP teams to effectively address assistive technology devices and services, teams must use a collaborative decision-making process to determine whether or not an individual student requires assistive technology" (IDEA, 2004). The consideration process is at the forefront of assistive technology device and service selection and is an integral piece of the IEP process. It is mandated that assistive technology be *considered* by the IEP team for every student

with a disability receiving Free and Appropriate Public Education (FAPE) services (IDEA, 2004). Despite mandates for team members to consider assistive technology during IEP development, it's left up to the discretion of school districts to decide how consideration is carried out. This, unfortunately, leaves this standard of practice up to the school districts, resulting in broad inconsistencies.

Indicators of Assistive Technology Use in Education

Assistive technology use is understood in this study through the lens of the Quality Indicators for Assistive Technology (QIAT), which were developed in 2012 by the QIAT Consortium Leadership Team to provide guidelines for the development and delivery of assistive technology services. There are eight areas included in the QIAT, six of which are used to help guide the understanding of assistive technology use in the proposed study including assistive technology in the IEP, consideration of assistive technology needs, assessment of assistive technology needs, assistive technology implementation, evaluation of effectiveness of assistive technology, and assistive technology in transition (QIAT Consortium Leadership Team, 2012).

Assistive Technology in the IEP

The IEP drives the provision of special education services for students with disabilities (Dell, Newton, & Petroff, 2017). Therefore, integrating assistive technology into the IEP is critical. Knowledge is essential for all IEP team members completing an IEP (Diliberto & Brewer, 2012), including knowledge of assistive technology. When IEP team members lack knowledge, they are unable to adequately consider assistive technology. Assistive technology consideration, at a minimum, would include reviewing the student's goals and objectives and an in-depth discussion regarding the need for assistive technology to help meet these goals (Dell, Newton, & Petroff, 2017; Bugaji, 2018).

Although assistive technology may be incorporated throughout an IEP, there are three places where specific assistive technology needs to appear (*Mastering the Maze*, 2018; Dell, Newton, & Petroff, 2017): 1) special instructional factors (see Figure 3); 2) supplementary aids and services; and 3) related services. Documents used for IEP development are different in each state.

Figure 3. Special instructional factors (Mastering the Maze, 2018)

In Alabama, when *yes* is checked for the question "Does the student need assistive technology devices and/or services," the IEP team is confirming that assistive technology has been *considered* and the student needs an assistive technology device or service(s) for academic or functional needs (see Figure 3)(Mastering the Maze, 2018). Therefore, assistive technology must be addressed in the IEP. Unfortunately, this *yes* or *no* question relies entirely on the IEP team's consideration of assistive technology. If the question is checked *no*, then the student does not receive assistive technology services. If an IEP team is not knowledgeable about assistive technology options or how to consider assistive technology needs, there would be nothing stopping them from checking *no* and continuing to the next question. This would leave the

student without access to assistive technology based on the IEP team's knowledge, or lack of knowledge, of assistive technology. According to Ault, Bausch, and McLauren (2013), even when assistive technology experts are employed or identified by a school district, a low percentage of IEP meetings are attended. This leaves members of the IEP team that are not always knowledgeable to make decisions about assistive technology services.

In addition to federal, state, and local policies and procedures put into place during the IEP process, the Quality Indicators for assistive technology in the IEP were developed to provide guidelines for the development and delivery of assistive technology services. There are common mistakes made during this process. For example, sometimes IEP's are created in a similar fashion and the individual needs of the student are not taken into consideration or the team does not know how to include assistive technology in the IEP (QIAT, 2012). Many school systems choose to use these indicators as a guide to ensure appropriate services are being provided. The Quality Indicators for assistive technology in the IEP were used in the development of the survey instrument in the proposed study (see Appendix B).

Assistive Technology Consideration

As stated above, assistive technology consideration is defined as

the requirement to consider the need for assistive technology devices and services brings the issue of assistive technology to every IEP team. For IEP teams to effectively address assistive technology devices and services, teams must use a collaborative decision-making process to determine whether or not an individual student requires assistive technology. (IDEA, 2004)

Several theories, models, and frameworks have been developed over the years to help establish assistive technology policies and procedures for the consideration of assistive technology in P-12 education. The WATI Assistive Technology Consideration Guide, AT Consideration checklist of the Georgia Project for Assistive Technology, and the Texas 4-step

model are frequently used by school systems as a guide or framework to appropriate AT

consideration and service delivery. In addition, the SETT Framework (Setting, Environment,

Task, Tool) was designed to assist teams in gathering, organizing, and analyzing data to make

decisions regarding assistive technology (Zabala, 2005) (see Figure 4).

S Student	What is the functional area(s) of concern? What does the student need to be able to do that is difficult or impossible to do independently at this time? Special needs (related to area of concern) Current abilities (related to area of concern) Expectations and concerns Interests and preferences
E Environment	Arrangement (instructional, physical) Support (available to both the student and the staff) Materials and Equipment (commonly used by others in the environments) Access Issues (technological, physical, instructional) Attitudes and Expectations (staff, family, other)
T Task	What SPECIFIC tasks occur in the student's natural environments that enable progress towards mastery of IEP goals and objectives? What SPECIFIC tasks are required for active involvement in identified environments?
T Tools	Tools include devices, services, strategies, training, accommodations, modifications - everything that is needed to help the student succeed.

Figure 4. SETT framework (Zabala, 2005)

Also, the Quality Indicators for Consideration of Assistive Technology Needs were

created by the QIAT Consortium to provide guidelines for the development and delivery of

assistive technology services. These indicators are specific to the consideration of assistive

technology during the IEP process. There are common mistakes made during this process. For example, sometimes no one on the IEP team is knowledgeable about assistive technology or consideration of assistive technology is done using only tools that are familiar to the team (QIAT, 2012). Many school systems choose to use these indicators as a guide to ensure appropriate services are being provided. The Quality Indicators for the Consideration of Assistive Technology Needs were used in the development of the survey instrument in the proposed study (see Appendix C).

Assessment of Assistive Technology Needs

Assessing assistive technology needs during the IEP process is a critical component to success for individuals with disabilities. There are common errors made during this process. For example, the team may not have adequate time to conduct a meaningful assessment or the team conducting the assessment may not be qualified or knowledgeable enough to make appropriate decisions (QIAT, 2012). According to Mavrou (2011), it was found that ongoing assessment was one of the biggest challenges for members of a collaborative team assessing assistive technology needs. This was linked to the complexity of disabilities and the lack of a multidisciplinary approach. In addition, Federici and Borsci (2016) found that a faulty assessment process can often lead to device abandonment due to a mismatch of user needs and device selection.

The Quality Indicators for the Assessment of Assistive Technology Needs were developed to provide guidelines for the assessment of assistive technology needs during the IEP process. Many school systems choose to use these indicators as a guide to ensure appropriate services are being provided. The Quality Indicators for the Assessment of Assistive Technology Needs were used in the development of the survey instrument in the proposed study (see Appendix D).

Assistive Technology Implementation

Assistive technology implementation refers to the collaborative process of supporting assistive technology use for students with disabilities across environments based on devices and services included in the IEP (QIAT, 2012). There are common errors made during this process. For example, sometimes plans for implementation are not collaborative and are carried out by only one team member or the focus is on device acquisition and not implementation (QIAT, 2012). Both examples can be detrimental to the success of the student. Chris Bugaji (2019) stated in his book, *The New Assistive Tech,* that you should plan with an end in mind and unless a long-term goal is set, steady progress can be demonstrated by the student but no overarching goal met in the end.

The Quality Indicators for Assistive Technology Implementation were developed to provide guidelines for the development and delivery of assistive technology services. Many school systems choose to use these indicators as a guide to ensure appropriate services are being provided. The Quality Indicators for Assistive Technology Implementation were used in the development of the survey instrument in the proposed study (see Appendix E).

Evaluation of Assistive Technology Effectiveness

The evaluation of effectiveness of assistive technology includes data collection, documentation, and analysis to monitor student performance (QIAT, 2012). There are common errors made during this process. For example, sometimes an observable, measurable behavior has not been targeted for change or team members to not share responsibility for evaluation of effectiveness (QIAT, 2012).

The Quality Indicators for Evaluation of Assistive Technology Effectiveness were developed to provide guidelines for the development and delivery of assistive technology

services. Many school systems choose to use these indicators as a guide to ensure appropriate services are being provided. The Quality Indicators for AT Effectiveness were also used in the development of the survey instrument in the proposed study (see Appendix F).

Assistive Technology in Transition

Assistive technology in transition refers to the use of a student's assistive technology when transferring from one setting to another. This involves a collaborative team of people including school personnel and service providers in the community (QIAT, 2012). According to Ripat and Woodgate (2017), young adults with disabilities rely on their AT to participate in employment and extracurricular activities, but often needed strong self-advocacy skills or someone advocating for them to ensure their needs are met. However, Boauck (2016) noted in her research low rates of self-reported and educator-reported assistive technology access and/or use for secondary students with disabilities.

The Quality Indicators for Assistive Technology in Transition were developed to provide guidelines for the development and delivery of assistive technology services. Many school systems choose to use these indicators as a guide to ensure appropriate services are being provided. The Quality Indicators for Assistive Technology in Transition were used in the development of the survey instrument in the proposed study (see Appendix G).

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Barriers to Assistive Technology Use

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For more than twenty years, research has identified barriers that special education teachers acting as case managers and advocates to roughly 13% of public-school students have reported related to the consideration, use, and implementation of assistive technology. Lack of training and knowledge (Lesar, 1998; Edyburn, 2004; Nelson, 2006; Bausch, Ault, Evmenova, & Behrmann, 2008; Alkahtani, 2013; Maich, Rhijn, Wood, & Brochu, 2017), inconsistencies in

policies and procedures (Mavrou, 2011), lack of funding/cost (Alper & Raharinirina, 2006; Flanagan, Bouck, & Richardson, 2013; Desch & Gaebler-Spira, 2013), student and/or parent resistance (Oien, Fallang, & Ostensjo, 2016), lack of time for planning (Ault, Bausch, & McLaren, 2013), access to technology (Bausch & Hasselburg, 2004; Okolo & Diedrich, 2014), and lack of technical support (Dell, Newton, & Petroff, 2017) were among the reported. Although federal mandates, frameworks, and national standards have developed to improve consideration, use, and implementation of assistive technology, these barriers have remained consistent over the years.

Facilitators of Assistive Technology Use

Lack of training and knowledge has been one of the most widely reported barriers over the years (Lesar, 1998; Edyburn, 2004; Nelson, 2006; Bausch, Ault, Evmenova, & Behrmann, 2008; Maich, Rhijn, Wood, & Brochu, 2017). In a study done by Keetam Alkahtani (2013), teachers were surveyed regarding their knowledge and use of assistive technology with students with disabilities. Seventy-two percent of the respondents reported little to no knowledge related to assistive technology and 98% reported never taking a college or graduate level course about assistive technology. In addition, Maich, Rhijn, Woods, and Brochu (2017) examined perceptions of teachers regarding their current ability to support the use of assistive technology in a study done in Newfoundland. It was found that although 96% of teachers believed AT to be important in their classrooms, 68% of those teachers reported that lack of training was a critical barrier. Preservice education and professional development are both valuable ways for special education teachers to gain knowledge. In fact, teacher preparation programs, undergraduate, graduate, and certification, can directly influence service providers' feelings of preparedness to instruct students who use assistive technology (Conner, 2010). Although the actual number of

assistive technology courses currently offered in colleges of education nationwide is unknown, the inconsistency of assistive technology focused courses in educator preparation programs has been noted through research over the years. Studies have shown that teachers do not have adequate training from their teacher education programs (Lee & Vega, 2005; Ajuwon & Chitiyo, 2016) and very few educator preparation programs include mandatory courses or even class sessions on assistive technology (Abner & Lahm, 2002; Lee & Vega, 2005; Edyburn, 2005; Judge & Sims, 2009).

Due to the impact assistive technology has on student success, several organizations have also chosen to include assistive technology in their standards for special education teacher certification. The Council for Exceptional Children (CEC), a leader in teacher standards, stated that "special education professionals should be familiar with augmentative and alternative communication systems and a variety of assistive technologies to support the communication and learning of individuals with exceptionalities" (Council for Exceptional Children, 2015), and the National Board for Professional Teaching Standards (NBPTS) (2010) stated that "accomplished exceptional needs teachers provide access to assistive technology so students can communicate with others, participate meaningfully in a wide range of activities, and expand their learning. Each of these standards are representative of an expectation placed on all special education professionals as they enter the classroom, yet, teachers are still exiting their pre-service training with a lack of knowledge (Ajuwon & Chitiyo, 2016) and insufficient teacher expertise is still continuously noted as a barrier to successful assistive technology implementation (Van Laarhoven & Conderman, 2001; Bausch, Ault, Evmenova, Behrmann, 2008; Alkahtani, 2013; Maich, Rhijn, Wood, & Brochu, 2017).

The Quality Indicators for Assistive Technology in Professional Development were developed to provide guidelines for the development and delivery of assistive technology services. There are common errors that school systems make related to professional development and training. For example, sometimes school systems don't have an ongoing plan for professional development, or the plan isn't based on an assistive technology needs assessment or goals (QIAT, 2012). Many school systems choose to use these indicators as a guide to ensure appropriate services are being provided. The Quality Indicators for Professional Development and Training in Assistive Technology were used in the development of the survey instrument in the proposed study.

In addition to preservice education and professional development, administrative support is also critical to successful assistive technology services. The Quality Indicators for Administrative Support for Assistive Technology Services were developed to provide guidelines for the development and delivery of assistive technology services. Administrative support refers to the leadership creating policies and procedures related to assistive technology (QIAT, 2012). There are common errors seen from administration related to assistive technology. For example, if policies and procedures are in place, they are not widely known or when AT procedures are in place, they are never evaluated (QIAT, 2012). Many school systems choose to use these indicators as a guide to ensure appropriate services are being provided. The Quality Indicators for Administrative Support for Assistive Technology Services were used in the development of the survey instrument in the proposed study (see Appendix I).

Summary

As stated, the purpose of this study was to describe patterns of special education teachers' assistive technology knowledge and use in Alabama. Barriers and facilitators of assistive

technology use were also identified and explored, establishing a basis for a statewide

professional development agenda related to assistive technology in P-12 education. The existing

research base offers minimal insight into teacher practices and experiences related to assistive

technology use in P-12 education, thus strengthening the need for the research associated with

this study. The success of students with disabilities using assistive technology is directly related

to the knowledge of a special education teacher (Judge & Sims, 2009). Therefore, this study

could provide fundamental data to help inform service providers in their current practice as well

as guide a statewide professional development agenda. Details of the study will be discussed in

depth in Chapter III.

CHAPTER III:

METHODS

Study Design

This descriptive-exploratory research study used quantitative methods to explore patterns

of special education teachers' assistive technology knowledge and use in Alabama. In addition,

barriers to assistive technology use and facilitators that may impact assistive technology use

were identified and explored.

Data on assistive technology knowledge and use was collected by way of an online

survey. The survey was developed for this study based on literature related to assistive

technology, an existing survey titled *Survey of Knowledge & Skills for Guiding Professional*

Development (UKAT Toolkit, 2002), and the Quality Indicators for Assistive Technology

Services (QIAT Consortium Leadership Team, 2012). The research questions are as follows:

1.   What do special education teachers know about assistive technology and its

          application in P-12 education in the State of Alabama;

2.   To what extent do special education teachers perceive the Quality Indicators of

          Assistive Technology Use being present in their school districts in the State of

          Alabama;

3.   What are the barriers to assistive technology use for special education teachers in

          the State of Alabama; and

4.   What factors facilitate assistive technology use by special education teachers in

          the State of Alabama?

Setting

Participants were recruited based on their role as a special education teacher in the public-school system of the State of Alabama. Alabama has a total of 138 school systems and 1,463 public schools employing 46,766 teachers with roughly 2,500 with the title of special education teacher. During the 2018-2019 school year, 739,716 students enrolled in public education in Alabama, 90,319 of these students (ages 3-21) qualified for special education services under IDEA. 379,760 students were male and 355,344 females. Race/ethnicity was as follows: White – 401,066, Black – 240,190, Hispanic – 62,089, Asian – 16,252, Pacific Islander – 881, American Indian/Alaska Native – 6,918, Multi-Race – 17,685 (ALSDE Quick Facts, 2019). During the 2016-2017 school year, 76% of students were receiving free or reduced lunch (ALSDE Quick Facts, 2018).

Participants

Participants were P-12 special education teachers working in public schools across the state of Alabama. An online survey was distributed to all Local Education Agencies (LEAs), by the researcher, for dissemination to special education teachers within each school building of each LEA in the State. Alabama employs approximately 2,500 special education teachers and all had the opportunity to participate if their school district agreed to disseminate the survey. While IEP teams are comprised of multiple individuals who are legally mandated to serve as team members including parents, general education teachers, other service providers, administrators, and a person/s qualified to interpret evaluation results, this study focused solely on special education teachers as they are frequently the case managers and/or primary advocates on the IEP team.

Data Collection

Measures

A self-report online survey titled *Survey of Special Education Teachers Assistive Technology Knowledge and Use in P-12 Education: A statewide exploration.* Appendix A is the primary data collection tool. This survey was developed based on literature related to assistive technology, an existing survey titled *Survey of Knowledge & Skills for Guiding Professional Development* (UKAT Toolkit, 2002), and the Quality Indicators for Assistive Technology Services (QIAT Consortium Leadership Team, 2012).

The instrument consists of five sections totaling fifty-eight questions; thirty-two closed-ended, Likert scale questions, one ranking question, one open-ended question, and twenty-five demographic/predictor questions. The five survey sections are as follows: 1) demographics; 2) knowledge of assistive technology use; 3) indicators of assistive technology use; 4) barriers of assistive technology use; 5) facilitators of assistive technology use. Each survey section will be discussed in more detail below.

Demographics. Demographic data on the participants was collected including age, gender, current teaching assignments, Least Restrictive Environment (LRE) of students on participants' caseload, years of teaching experience, and degree attained. These demographic variables were selected because previous research has linked them to teaching and factors that impact one's success (Shaukat, Vishumolakala & Bustami, 2019). Participants were reminded that the survey was anonymous and there was no identifying information collected.

Knowledge of assistive technology use. A modified version of the University of Kentucky Knowledge and Skills Survey (2002) was used to asses teachers' knowledge and use of assistive technology. The Knowledge and Skills Survey can be found in the University of

Kentucky Assistive Technology (UKAT) Toolkit that was created to guide assistive technology practices for school personnel, students using AT, and their parents. Although the UK Knowledge and Skills Survey was developed almost 20 years ago, it is still a relevant measure of knowledge regarding assistive technology use in P-12 education. In section II, participants were asked to complete 13 Likert scale questions using the responses no knowledge, little knowledge, some knowledge, and extensive knowledge.

      Indicators of assistive technology use. The Quality Indicators for Assistive Technology, QIAT, was developed to provide guidelines for the development and delivery of assistive technology services. There are eight areas included in the QIAT; Consideration of AT Needs, Assessment of AT Needs, AT in the IEP, AT Implementation, Effectiveness of AT, AT in Transition, Administrative Support for AT, and AT Professional Development (QIAT Consortium Leadership Team, 20012). Survey items for Section III focus on six of the eight Quality Indicators; Consideration of AT Needs, Assessment of AT Needs, AT in the IEP, AT Implementation, Effectiveness of AT, and AT in Transition. Participants were asked to complete 19 Likert scale questions replicated from the QIAT, using the responses strongly disagree, disagree, agree, and strongly agree.

      Barriers to assistive technology use. As described in the Literature Review, research has identified multiple barriers to assistive technology use, especially among special educators and case managers. These barriers include lack of training and knowledge of assistive technology (Lesar, 1998; Edyburn, 2004; Nelson, 2006; Bausch, Ault, Evmenova, & Behrmann, 2008; Alkahtani, 2013; Maich, Rhijn, Wood, & Brochu, 2017), inconsistent policies and procedures for assistive technology use (Mavrou, 2011), lack of funding/cost (Alper & Raharinirina, 2006; Flanagan, Bouck, & Richardson, 2013; Desch & Gaebler-Spira, 2013), student and/or parent

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resistance (Oien, Fallang & Ostensjo, 2016), lack of time for planning (Ault, Bausch, & McLaren, 2013), access to technology (Bausch & Hasselburg, 2004; Okolo & Diedrich, 2014), and lack of technical support (Dell, Newton, & Petroff, 2017). Although federal mandates, frameworks, and national standards have been developed to improve consideration, use, and implementation of assistive technology, these barriers have remained consistent over the years and are therefore relevant to this study. Section IV asks participants to identify current barriers from a list of seven barriers noted in research. They were given the option to select all that apply. Participants were then asked one open ended question related to these barriers.

Facilitators of assistive technology use. Lack of training and knowledge has been one of the most widely reported barriers over the years (Lesar, 1998; Edyburn, 2004; Nelson, 2006; Bausch, Ault, Evmenova, & Behrmann, 2008; Alkahtani, 2013; Maich, Rhijn, Wood, & Brochu, 2017). Preservice education and professional development are both ways for special education teachers to gain knowledge. In fact, educator preparation programs, undergraduate, graduate, and certification, can directly influence service providers' feelings of preparedness to instruct students who use assistive technology (Conner, 2010). The actual number of AT courses currently offered in colleges of education nationwide is unknown. Studies have shown, however, that teachers do not have adequate training from their teacher education programs (Lee & Vega, 2005; Ajuwon & Chitiyo, 2016) and very few educator preparation programs include mandatory courses or even class sessions on assistive technology (Abner & Lahm, 2002; Lee & Vega, 2005; Edyburn, 2005; Judge & Sims, 2009). Section IV asks participants 12 multiple choice questions related to preservice education, professional development, and admin support, two of which were replicated from the Quality Indicators for Assistive Technology Services (QIAT, 2012), and two open ended questions.

Data Analysis

The findings of this study were analyzed using the IBM Statistical Package for the Social Sciences (SPSS) version 27.0 and employed quantitative methods for data collection and analysis. Specifically, descriptive statistics including frequencies and percentages were utilized to report demographic data. Descriptive research is vital to this study because the field of AT implementation and use is still emerging and because the knowledge and use patterns of teachers in Alabama is unknown.

To answer the first research question (RQ1), "What do special education teachers know about assistive technology and its application in P-12 education?" descriptive statistics using percentages and frequency tables were utilized.

In addition, factor analysis as a data reduction technique was utilized. Although the items of the survey instrument fell into four pre-specified response categories or four subscales of the instrument, (i.e., Knowledge of Assistive Technology Use; Indicators of Assistive Technology Use; Barriers to Assistive Technology Use; Facilitators of Assistive Technology Use), it was still necessary to perform data reduction in order to identify inter-item correlations and study the nature of the theoretical factors that led to the interitem correlations observed. Therefore, exploratory factor analysis using principle components with varimax oblique rotation procedure defined by Thurstone (1947) was conducted on three of the four response subscales (SPSS Inc., 2020). Varimax oblique rotation was utilized because the objective of the exploratory factor analysis was to study the nature of the theoretical factors that led to the inter-item correlations observed. Exploratory factor analysis using principle components with varimax oblique rotation procedure (SPSS Inc., 2020) extracted the smallest number of variables that maximized the amount of common variance explained in three of the subscales of the instrument (see Figure 5).

Research Question 1	Knowledge of AT Use (Likert Scale: 1-4: No Knowledge, Little Knowledge, Some Knowledge, Extensive Knowledge) (Q11-23)

What do special education teachers know about assistive technology and its application in P-12 education in the State of Alabama?
 	
Type of analysis:
 	
  1. Descriptive statistics using percentages and frequency tables.
 	
  2. Factor Analysis to determine the underlying factors of perceived assistive technology knowledge.
	Q11: Knowledge of concepts related to the process of consideration of assistive technology during the IEP.
	
	Q12: Knowledge of legislation and its implications for assistive technology in special education.
	
	Q13: Knowledge of low-tech assistive technology tools for students with disabilities (i.e. pencil grips, slant boards, highlighters, etc.).
	
	Q14: Knowledge of mid-tech assistive technology tools for students with disabilities (i.e. calculators, audio books, switch operated toys, etc.).
	
	Q15: Knowledge of high-tech assistive technology tools for students with disabilities (i.e. communication devices, screen readers, environmental controls devices, etc.).
	
	Q16: Knowledge of arranging for demonstrations and trial periods of assistive technology prior to purchase decisions.
	
	Q17: Knowledge of funding sources and processes of the acquisition of assistive technology.
	
	Q18: Knowledge of strategies of teaching students with disabilities to operate their assistive technology devices.
	
	Q19: Knowledge of determining whether a student needs a comprehensive evaluation for assistive technology.
	
	Q20: Knowledge of examining alternative solutions prior to making assistive technology decisions.
	
	Q21: Knowledge of equity, ethical, and legal issues related to assistive technology use in special education.
	
	Q22: Knowledge of organizations and publications relevant to the field of assistive technology.
	
	Q23: Knowledge of roles played by personnel (i.e., OT, PT, SLP, etc.) in providing assistive technology services.

Figure 5. RQ1 descriptive statistics using percentages and frequency tables

To answer the second research question (RQ2), "To what extent do special education teachers perceive the *Quality Indicators of Assistive Technology* being present in their school districts in Alabama," descriptive statistics using percentages and frequency tables were utilized (see Figure 6). A factor analysis was not performed for this subscale because the quality indicators are already separated into eight categories, six that were specific to this section: 1) consideration of assistive technology needs; 2) assessment of assistive technology need; 3) assistive technology in the IEP; 4) assistive technology implementation; 5) effectiveness of assistive technology; and 6) assistive technology in transition (QIAT, 2012).

Research Question 2	Question Item Content *Indicators of Assistive Technology Use* *(Likert Scale: 1-4: Strongly Disagree, Disagree, Agree, Strongly Agree) (Q24-42)*
To what extent do special education teachers perceive the Quality Indicators of Assistive Technology being present in their school districts in the State of Alabama? Type of analysis: Descriptive statistics using means, percentages and frequency tables.	Q24: Assistive technology devices and services are considered for all students with disabilities regardless of type or severity of disability. Q25: IEP team members have the collective knowledge and skills needed to make informed decisions about assistive technology and seek assistance when needed. Q26: Consideration of AT is limited to those devices that IEP team members know or are available in the district. Q27: During the AT consideration process, data are collected to show the potential need for assistive technology. Q28: Procedures for all aspects of assistive technology assessment are clearly defined and consistently applied. Q29: Assistive technology assessments are conducted by a knowledgeable team to determine possible assistive technology solutions. Q30: Assistive technology assessments, including needed trials, are completed within reasonable timelines. Q31: My school district has guidelines for documenting assistive technology needs in the IEP. Q32: All members of IEP teams at my school have assistive technology knowledge. Q33: The IEP teams at my school use a consistent process to make decisions regarding AT. Q34: If AT is not needed, IEP teams at my school keep documentation of AT consideration for the student. Q35: Assistive technology is integrated into the curriculum and daily activities of the student across environments. Q36: Learning opportunities for the student, family, and staff are an integral part of implementation. Q37: IEP team members at my school share clearly defined responsibilities to ensure that data are collected on AT effectiveness once AT is in place. Q38: Effectiveness of AT is evaluated across environments during naturally occurring and structured activities. Q39: Evaluation of effectiveness is an ongoing process that is reviewed periodically by IEP team members at my school. Q40: Changes are made in the student's assistive technology services and educational program when evaluation data indicate that changes are needed to improve student achievement. Q41: Transition plans address assistive technology needs of the student. Q42: Students' AT needs are addressed in transition plans.

Figure 6. RQ2 descriptive statistics using percentages and frequency tables

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To answer the third research question (RQ3), "What are the barriers to assistive technology implementation and use for special education teachers in Alabama," descriptive statistics using percentages and frequency tables were utilized. In addition, anexploratory factor analysis was conducted to determine underlying factors related to barriers of assistive technology use and multiple regression models were used to determine how barriers to assistive technology use predict special education teacher knowledge (see Figure 7).

Research Question 3	Question Item Content: *Barriers to AT Use (Q43-44)*

What are the barriers to assistive technology use for special education teachers in the State of Alabama?
 	
Type of analysis:
 	
Descriptive statistics using percentages and frequency tables.
 	
Factor Analysis to determine the underlying factors related to barriers of assistive technology.
 	
Multiple regression to determine
 	
how barriers to assistive technology use predict special education teacher knowledge.
	Q43: Which of the following assistive technology barriers to AT use do you experience in your school district? Choose all that apply.
	   • Lack of teacher training/knowledge
	   • Inconsistencies in policies and procedure
	   • Lack of funding
	   • Limited device options available at my school
	   • Student /parent resistance
	   • Lack of time for planning
	   • Lack of technical support
	
	Q44: Describe in more detail barriers that you as a special education teacher face related to assistive technology in P-12 education.

Figure 7. RQ3 descriptive statistics using percentages and frequency tables

To answer RQ4, "What factors facilitate assistive technology use by special education teachers in Alabama?" descriptive statistics using percentages and frequency tables were utilized. In addition, a factor analysis combining facilitators and barriers was conducted as well as

multiple regression models to determine how barriers and facilitators of assistive technology use predict special education teachers' knowledge of assistive technology use (see Figure 8).

Research Question 4	Question Item Content *Facilitators of Assistive Technology Use*
What factors facilitate assistive technology use by special education teachers in the State of Alabama?	Q45: How many students do you currently have on your caseload using assistive technology?
	Q46: Have you ever had formal training regarding assistive technology (i.e. college class, professional development, certification, etc.)?
Type of analysis:	Q47: If yes, what type of training? Select all that apply.
Descriptive statistics using means, percentages, frequency tables, and cross tabulations.	Q48: Estimate the number of workshops or professional development pertaining specifically to assistive technology that you have attended in the last year.
	Q49: Estimate the number of college classes you had during your preservice education that were specific to assistive technology.
Factor analysis combining barriers and facilitators to determine underlying factors.	Q50: I have access to an assistive technology specialist (or someone that focuses on assistive technology as their main role) on staff.
	Q51: I have access to written procedural guidelines related to assistive technology.
Multiple regression to determine	Q52: I have access to on-going learning opportunities about assistive technology for staff, family, and students.
how barriers and facilitators of assistive technology use predict special education teacher knowledge.	Q53: The content of assistive technology professional development and training addresses all aspects of the selection, acquisition and use of assistive technology.
	Q54: I currently have student(s) on my caseload using assistive technology.
	Q55: If yes, what devices?
	Q56: I currently have student(s) needing assistive technology but not using it.
	Q57: If yes, why not?

Figure 8. RQ4 descriptive statistics using percentages and frequency tables

Summary

Quantitative data were collected and analyzed in this study to describe patterns, as well as identify barriers and predictors, of special education teachers' assistive technology use in the State of Alabama. Participants included P-12 special education teachers working in public-school

systems in Alabama. Quantitative data were collected through a self-report online survey titled *Survey of Special Education Teachers Assistive Technology Use in P-12 Education: A statewide exploration.* The self-reported online survey consists of five sections totaling fifty-eight questions. Critical demographic data were collected including age, gender, current teaching assignments, LRE of students on participants' caseload, years of teaching experience, degree attained, and the extent of prior training in assistive technology.

CHAPTER IV:

FINDINGS

Introduction

The purpose of this study was to explore patterns of special education teachers'

knowledge of assistive technology use in Alabama. Barriers and facilitators of assistive

technology use were also identified and explored. Participants were recruited based on their role

as a special education teacher in the public-school system of Alabama. The following research

questions were addressed in this study: 1) what do special education teachers know about

assistive technology and its application in P-12 education; 2) to what extent do special education

teachers perceive the *Quality Indicators of Assistive Technology* (QIAT) use being present in

their school districts; 3) what are the barriers to assistive technology use for special education

teachers; and 4) what factors facilitate assistive technology use by special education teachers?

This exploratory research study used a self-report online survey to collect quantitative data. Data

analyses and results from the data collection of the study are provided in this chapter.

Findings

Data were analyzed using three statistical procedures described more fully in Chapter III.

First, descriptive statistics including frequencies and percentages were performed using SPSS

(2020) to understand fully the demographics of special education teachers and their knowledge

and use of assistive technology in Alabama based upon self-report data. Next, exploratory factor

analysis using principle components with varimax oblique rotation procedure extracted the

smallest number of variables that maximized the amount of common variance explained in three

of the subscales of the instrument. Lastly, multiple linear regression was conducted with independent variables being the factors that emerged from the exploratory factor analysis and other between-subject factors hypothesized to play significantly in the prediction of a specified dependent variable in each research question.

Descriptive Statistics

Based on the data capture in Qualtrics, 314 targeted participants opened or started the survey. Of that total, 258 were usable. The following demographic data were collected on the participants: age, gender, current teaching assignments, least restrictive environment (LRE) placements of students on participants' caseload, years of teaching experience, and degree attained. Table 1 provides the frequency and percentage indicating the age range of participants. The results showed that 13.1% were between the ages of 20-20, 23.2% were between 31-40, 30.5% were between 41-50, 24.7% were between 51-60, and 6.9% were 60+.

Table 1

Frequencies and Percentages for Participants' Ages

Age	Frequency	Percent
20-30	34	13.1
31-40	60	23.2
41-50	79	30.5
51-60	64	24.7
60+	18	6.9

Participants identified their gender. The results showed that 91.8% were female and 7.7% were male. More than 76% of teachers in Alabama are female, according to the National Center

for Educational Statistics, which is consistent with the large number of female participants in this study (2015). Table 2 provides frequencies and percentages of gender.

Table 2

Frequencies and Percentages of Gender

Gender	Frequency	Percent
Female	238	91.9
Male	20	7.7

Participants identified their race. The results showed that .4% were American Indian or Alaska Native, 12% were Black or African American, 84.9% were White and 1.9% identified as Other. According to the Alabama State Department of Education (2017), 19% of teachers in Alabama are Black or African American and approximately 79% are white, which is consistent with the large number of white participants in this study. The results are displayed in Table 3.

Table 3

Frequencies and Percentages of Race

Race	Frequency	Percent
American Indian or Alaska Native	1	0.4
Black or African American	31	12.0
White	220	84.9
Other	5	1.9

Participants identified the age of students that they serve. The results showed that 8.5% supported students at the PreK level, 32.2% supported students at the elementary school level, 12% supported students and the middle school level, 17.1% supported students at the high school

level, and 6.6% supported students that were transitioning or preparing to transition to post-secondary options. The results are displayed in Table 4.

Table 4

Frequencies and Percentages of Age/Grade Teachers Serve

Grade	Frequency	Percent
PreK	22	8.5
Elementary	83	32.2
Middle School	31	12.0
High School	44	17.1
Transition	17	6.6
Multiple	60	23.3

Participants identified the location that best described the school in which they taught. The results showed that 55.2% of participants taught in a rural area, 25.9% taught in a suburban area, and 18.5% taught in an urban area. Of 138 school districts in the State of Alabama, 34 school districts that participated comprising 25% of all public-school districts across the state. The results of school location are displayed in Table 5.

Table 5

Frequencies and Percentages of School Location

Location	Frequency	Percent
Rural	143	55.2
Suburban	67	25.9
Urban	48	18.5

Participants identified the services students on their caseload receive. The results showed that 65.3% supported students that spent 80%-100% of the day inside the general education classroom, 8.5% supported students that spent 40%-79% of the day inside the general education classroom, 22% supported students that spent less than 40% of the day in the general education classroom, and 3.9% supported students in an alternative setting not listed. These placement options are consistent with LRE trends in schools nationally where majority of special education students receive daily classroom instruction in the general education classroom. The results are displayed in Table 6.

Table 6

Frequencies and Percentages of Services Students on Caseload Receive

Students on Caseload	Frequency	Percent
100%-80% of the day inside the general education classroom	169	65.3
79%-40% of the day inside the general education classroom	22	8.5
Less than 40% of the day inside the general education classroom	57	22.0
Other	10	3.9

Participants identified the number of years they had been teaching. The results showed that 23.5% had been teaching 0-5 years, 16.9% had been teaching 6-10 years, 19.6% had been teaching 11-15 years, 14.1% had been teaching 16-20 years, 11.8% had been teaching 21-25 years, and 14.1% had been teaching for more than 25 years. The results are displayed in Table 7.

Table 7

Number of Years Teaching

Number of Years Teaching	Frequency	Percent
0-5	60	23.5
6-10	43	16.9
11-15	50	19.6
16-20	36	14.1
21-25	30	11.8
>25	36	14.1

Participants identified their level of educational attainment. The results showed that 2.3%

had a doctoral degree, 75.3% had a graduate degree, 21.6% had an undergraduate degree, and

.8% had obtained a degree that was not listed. The results are displayed in Table 8.

Table 8

Frequencies and Percentages of Participants' Highest Degree

Highest Degree	Frequency	Percent
Doctoral Degree	6	2.3
Graduate Degree	195	75.3
Undergraduate Degree	56	21.6
Other	2	0.8

Participants identified the teaching certificate that was earned. The results showed that

10.8% had degree in collaborative special education (6-12), 38.6% had a degree in collaborative

special education (K-12), 21.6% had a degree in collaborative special education (K-6), 5.0% had

a degree in early childhood special education, and 23.9% had a degree that in special education that was not listed. The results are displayed in Table 9.

Table 9

Frequencies and Percentages of Teaching Certificate

Teaching Certificate	Frequency	Percent
Collaborative Special Education (6-12)	28	10.8
Collaborative Special Education (K-12)	100	38.6
Collaborative Special Education (K-6)	56	21.6
Early Childhood	13	5.0
Other	62	23.9

RQ1: Knowledge of Assistive Technology Use

To answer RQ1, "What do special education teachers know about assistive technology and its application in P-12 education in the State of Alabama," first descriptive statistical analysis using percentages and frequency tables were performed.

The survey items for this section asked special education teachers to rate their level of knowledge in thirteen different areas related to assistive technology. The questions were created from the *University of Kentucky Knowledge and Skills Survey* (2002) to assess teachers' knowledge and use of assistive technology. The *Knowledge and Skills Survey* can be found in the University of Kentucky Assistive Technology (UKAT) Toolkit that was created to guide assistive technology practices for school personnel, students using assistive technology, and their parents. Participants were asked Likert scale questions that had the response option of no knowledge, little knowledge, some knowledge, extensive knowledge.

Overall, the participants had the most knowledge of concepts related the process of consideration of assistive technology during IEP development, knowledge of low-tech assistive technology tools for students with disabilities, knowledge of mid-tech assistive technology tools for students with disabilities, and knowledge of roles played by personnel (i.e., occupational therapist, physical therapist, speech language pathologist, etc.) in providing assistive technology services. For instance, 90.3% of participants reported at least some knowledge of concepts related the process of consideration of assistive technology during IEP development and 94.2% of participants reported at least some knowledge of low-tech assistive technology tools for students with disabilities. In contrast 64.6% of participants reported little to no knowledge of arranging for demonstrations and trial periods of assistive technology prior to purchase decisions and 71.7% of participants reported little to no knowledge in funding sources and processes of the acquisition of assistive technology. See Table 10 for all frequencies and percentages.

Table 10

Frequencies and Percentages of Knowledge of Assistive Technology Use

Item	No Knowledge	Little Knowledge	Some Knowledge	Extensive Knowledge
Knowledge of concepts related the process of consideration of assistive technology during IEP development.	1 (.4%)	23 (8.9%)	176 (68.2%)	57 (22.1%)
Knowledge of legislation and its implications for assistive technology in special education.	21 (8.1%)	84 (32.6%)	133 (51.6%)	18 (7.0%)
Knowledge of low-tech assistive technology tools for students with disabilities (i.e. pencil grips, slant board, highlighters, etc.).	0	13 (5%)	136 (52.7%)	107 (41.5%)
Knowledge of mid-tech assistive technology tools for students with disabilities (i.e. calculators, audio books, switch operated toys, etc.).	0	33 (12.8%)	147 (57%)	75 (29.1%)
Knowledge of high-tech assistive technology tools for students with disabilities (i.e. communication devices, screen readers, environmental control devices, etc.).	2 (.8%)	75 (29.1%)	151 (58.5%)	29 (11.2%)
Knowledge of arranging for demonstrations and trial periods of assistive technology prior to purchase decisions.	55 (21.3%)	111 (43.3%)	74 (28.7%)	15 (5.8%)
Knowledge of funding sources and processes of the acquisition of assistive technology.	68 (26.4%)	117 (45.3%)	64 (24.8%)	8 (3.1%)
Knowledge of strategies of teaching students with disabilities to operate their assistive technology devices.	8 (3.1%)	82 (31.8%)	137 (53.1%)	29 (11.2%)

Item	No Knowledge	Little Knowledge	Some Knowledge	Extensive Knowledge
Knowledge of determining whether a student needs a comprehensive evaluation for assistive technology.	15 (5.8%)	96 (37.2%)	116 (45%)	30 (11.6%)
Knowledge of examining alternative solutions prior to making assistive technology decisions.	16 (6.2%)	96 (37.2%)	115 (44.6%)	28 (6.2%)
Knowledge of equity, ethical, and legal issues related to assistive technology use in special education.	21 (8.1%)	94 (36.4%)	108 (41.9%)	31 (12%)
Knowledge of organizations and publications relevant to the field of assistive technology.	42 (16.3%)	107 (41.5%)	92 (35.7%)	15 (5.8%)
Knowledge of roles played by personnel (i.e. OT, PT, SLLP, etc.) in providing assistive technology services.	4 (1.6%)	36 (14%)	141 (54.7%)	75 (29.1%)

Exploratory factor analysis. Exploratory factor analysis using principal components analysis with a varimax rotation was conducted for data reduction and to determine the factors underlying the construct of "knowledge of assistive technology use." Initial factor analysis extracted three factors with eigen values above 1 and factor loading above .4. The underlying dimensions identified by each factor are as follows: 1) assistive technology consideration; 2) assistive technology services; and III) assistive technology tools. Initially, the item, "Knowledge of high-tech assistive technology tools for students with disabilities (i.e., communication devices, screen readers, environment control devices, etc.)" loaded with assistive technology consideration. However, because that item was related to assistive technology tools, it seemed to fit better with the factor "assistive technology tools." In addition, the item, "Knowledge of concepts related to the process of consideration of assistive technology during IEP development" loaded in assistive technology tools. However, because this item was related to assistive technology consideration, this item seemed to fit better with the factor "assistive technology consideration." These items loaded with their respective factors if you lowered the factor loading value to .4. The reliability analysis confirmed that Cronbach's alpha was similar when the items were loaded with the factors indicated. The initial Cronbach's alpha for assistive technology consideration was .877 and the new Cronbach's alpha is .868. The initial Cronbach's alpha for assistive technology services was .731 and the new Cronbach's alpha is .778. The Cronbach's alphas Table 11 shows the factor loading matrix with the loading requirement lowered to .4.

Table 11

Factor Loadings Based on Principal Components Analysis with Varimax Rotation Method

	Factor 1 – Assistive Technology Consideration	Factor 2 – Assistive Technology Services	Factor 3 – Assistive Technology Tools
Knowledge of strategies of teaching students with disabilities to operate their assistive technology devices.	.734		
Knowledge of determining whether a student needs a comprehensive evaluation for assistive technology.	.733		
Knowledge of examining alternative solutions prior to making assistive technology decisions.	.710		
Knowledge of roles played by personnel (i.e. OT, PT, SLP, etc.) in providing assistive technology services.	.693		
Knowledge of high-tech assistive technology tools for students with disabilities (i.e. communication devices, screen readers, environment control devices, etc.).			.342
Knowledge of legislation and its implications for assistive technology in special education.		.829	
Knowledge of organizations and publications relevant to the field of assistive technology.		.722	
Knowledge of funding sources and processes of the acquisition of assistive technology.		.721	
Knowledge of equity, ethical, and legal issues related to assistive technology use in special education.		.698	
Knowledge of arranging for demonstrations and trial periods of assistive technology prior to purchase decisions.		.627	
Knowledge of low-tech assistive technology tools for students with disabilities (i.e. pencil grips, slant board, highlighters, etc.).			.856
Knowledge of mid-tech assistive technology tools for students with disabilities (i.e. calculators, audio books, switch operated toys, etc.).			.796
Knowledge of concepts related to the process of consideration of assistive technology during IEP development.	.406		

RQ2: Indicators of Assistive Technology Use

To answer RQ2, "To what extent do special education teachers perceive the *Quality Indicators of Assistive Technology* being present in their school districts in Alabama," descriptive statistics using percentages, frequency tables, and cross tabulations were utilized.

The survey items for this section focus on six of the eight quality indicators: 1) consideration of assistive technology needs; 2) assessment of assistive technology needs; 3) assistive technology in the IEP; 4) assistive technology implementation; 5) effectiveness of assistive technology; and 6) assistive technology in transition. The *Quality Indicators for Assistive Technology* (QIAT) was developed to provide guidelines for the development and delivery of assistive technology services. Participants were asked to complete 19 Likert scale questions replicated from the QIAT, using the responses strongly disagree, disagree, agree, and strongly agree. These responses were based on practices of the school district where participants were currently employed.

Seventy-nine percent of participants agreed or strongly agreed that IEP teams in their school districts considered assistive technology devices and services for all students with disabilities regardless of type or severity of disability and 76% agreed that IEP team members have the collective knowledge and skills needed to make informed decisions about assistive technology and seek assistance when needed. However, 56.2% of participants disagreed or strongly disagreed that all members of IEP teams at their school had assistive technology knowledge. See Table 12 for all frequencies and percentages.

Table 12

Frequencies and Percentages of the Indicators of Assistive Technology Use

Item	Strongly Disagree	Disagree	Agree	Strongly Agree
Assistive technology devices and services are considered for all students with disabilities regardless of type or severity of disability.	6 (2.3%)	32 (12.4%)	129 (50%)	75 (29.1%)
IEP team members have the collective knowledge and skills needed to make informed decisions about assistive technology and seek assistance when needed.	7 (2.7%)	40 (15.5%)	137 (53.1%)	59 (22.9%)
Consideration of assistive technology is limited to those devices that IEP team members know or are available in the district.	24 (9.3%)	70 (27.1%)	123 (47.7%)	25 (9.7%)
During the assistive technology consideration process, data are collected to show the potential need for assistive technology.	5 (1.9%)	48(18.6%)	149 (57.8%)	40 (15.5%)
Procedures for all aspects of assistive technology assessment are clearly defined and consistently applied.	15 (5.8%)	94 (36.4%)	110 (42.6%)	23 (8.9%)
Assistive technology assessments are conducted by a knowledgeable team to determine possible assistive technology solutions.	11 (4.3%)	50 (19.4%)	141 (54.7%)	39 (15.1%)
My school district has guidelines for documenting assistive technology needs in the IEP.	8 (3.1%)	44 (17.1%)	135 (52.3%)	53 (20.5%)
All members of IEP teams at my school have assistive technology knowledge.	19 (7.4%)	126 (48.8%)	78 (30.2%)	17 (6.6%)
The IEP teams at my school use a consistent process to make decisions regarding assistive technology.	14 (5.4%)	75 (29.1%)	124 (48.1%)	26 (10.1%)
If assistive technology is not needed, IEP teams at my school keep documentation of AT consideration for the student.	14 (5.4%)	88 (34.1%)	113 (43.8%)	23 (8.9%)

Item	Strongly Disagree	Disagree	Agree	Strongly Agree
Assistive technology is integrated into the curriculum and daily activities of the student across environments.	4 (1.6%)	40 (15.5%)	150 (58.1%)	46 (17.8%)
Learning opportunities for the student, family, and staff are an integral part of implementation.	10 (3.9%)	37 (14.3%)	136 (52.7%)	56 (21.7%)
IEP team members at my school share clearly defined responsibilities to ensure that data are collected on assistive technology effectiveness once assistive technology is in place.	14 (5.4%)	75 (29.1%)	123 (47.7%)	28 (10.9%)
Effectiveness of assistive technology is evaluated across environments during actually occurring and structed activities.	12 (4.7%)	53 (20.5%)	144 (55.8%)	28 (10.9%)
Evaluation of effectiveness is an ongoing process that is reviewed periodically by IEP team members at my school.	9 (3.5%)	55 (21.3%)	147 (57%)	27 (10.5%)
Changes are made in the student's assistive technology services and educational program when evaluation data indicate that changes are needed to improve student achievement.	10 (3.9%)	32 (12.4%)	158 (61.2%)	40 (15.5%)
Transition plans address assistive technology needs of the student.	5 (1.9%)	39 (15.1%)	153 (59.3%)	35 (13.6%)

RQ3: Barriers to Assistive Technology Use

To answer RQ3, "What are the barriers to assistive technology implementation and use for special education teachers in the State of Alabama," descriptive statistics using percentages and frequency tables were utilized. In addition, exploratory factor analysis was conducted to determine the underlying factors related to barriers of assistive technology use and multiple regression models were used to determine how barriers to assistive technology use predict special education teacher knowledge.

The survey items for this section asked participants to identify current barriers from a list of seven barriers noted in research; lack of teacher training/knowledge, inconsistencies in policies and procedures, lack of funding, limiteddevice options available, student/parent resistance, lack of time for planning, lack of technical support. Participants were given the option to select all that apply.

Lack of training and knowledge (67.8%), lack of funding (52.7%), and limited device options (51.9%) were most frequently reported as barriers. Table 13 shows all frequencies and percentages for barriers to assistive technology use.

Table 13

Frequencies and Percentages Barriers to Assistive Technology Use

Barriers	Frequency	Percent
Policies and procedures	51	19.8
Student/parent resistance	59	22.9
Lack of time	94	36.4
Limited device options	134	51.9
Lack of funding	136	52.7
Lack of training and knowledge	175	67.8

In addition, exploratory factor analysis using principal components analysis with a varimax rotation was conducted. Initial factor analysis extracted three factors with eigen values above 1 and factor loading above .4. The variables that loaded into a factor were those with eigen values above 1 and factor loading above .4. The variable, lack of technical support, loaded significantly on both Factor 1 and Factor 3 (see Table 14). In examining the two factors (i.e. Factor 1 and Factor 3), although the factor loadings of this variable were significant on both factors, upon further examination, this variable aligned conceptually more closely with Factor 1, external barriers. While the Cronbach's alpha for this factor was not satisfactory, it was none the less retained (Taber, 2018). Three factors were identified as follows: 1) external barriers, 2) financial barriers, and 3) knowledge/training barriers. Cronbach's alpha for barrier 1: external barriers was .558. Cronbach's alpha for Barrier Factor 2: Financial Barriers was .628. Cronbach's alpha for Barrier Factor 3: Knowledge/Training Barrier was .386. Table14 shows the factor loading matrix.

Table 14

Factor Loadings Based on Principal Components Analysis with Varimax Rotation Method

	Factor 1 – External Barriers	Factor 2 – Financial Barriers	Factor 3 – Knowledge/Training Barriers
Lack of Time	.760		
Student/Parent Resistance	.693		
Policies and Procedures	.561		
Lack of Technical Support	.491		.441
Limited Device Options		.842	
Lack of Funding		.838	
Lack of Training/Knowledge			.868

Note. Rotation converged in 4 iterations

A deeper reexamination of Factors 1 and 2 (i.e., external barriers and financial barriers) revealed that these two factors, while defined by different variables, were related. External barriers and financial barriers are structural in nature compared to Factor 3 which is more of a teacher level factor. This distinction, therefore, shows that assistive technology consideration and implementation is driven by both structural and teacher level factors.

A multiple linear regression was then calculated to determine how barriers to assistive technology use predict special education teacher knowledge. A significant regression equation was found (F (3,230) = 3.064, p < .029, with an R^2 of .026). Barrier Factor 3, lack of knowledge and training, was the only barrier that contributed to the model. 2.6% of the variation in the total mean knowledge score is explained by barriers. Table 15 shows results of the regression model predicting special education teacher knowledge.

Table 15

Regression Analysis Summary for Predicting Teacher Knowledge

Variable	B	95% CI	β	t	p
(Constant)	35.318	34.462, 36.175		81.259	.000
Barrier Factor 1 – External Barriers	.447	-.410, 1.304	.066	1.028	.305
Barrier Factor 2 – Financial Barriers	.321	-1.180, .538	-.048	-.737	.462
Barrier Factor 3 – Lack of Training Barriers	-1.593	-2.446, -741	-.238	-3.682	.000

Note. Dependent Variable: Mean Total Knowledge Score.

RQ4: Facilitators of Assistive Technology Use

To answer RQ4, "What factors facilitate assistive technology use by special education teachers in the State of Alabama," descriptive statistics using percentages, frequency tables, and

cross tabulations were utilized. In addition, a series of multiple regression models were used to determine how facilitators of assistive technology use predict special education teachers' knowledge of assistive technology use.

For the question, "How many students do you currently have on your caseload using assistive technology," 21% reported none, 13.5% reported 1 student, 12.4% reported 2 students, 12% reported 3 students, and 34.7% reported 4 or more. The results are displayed in Table 16.

Table 16

Students Using Assistive Technology

Student Using AT	Frequency	Percent
None	53	20.5
1	35	13.5
2	32	12.4
3	31	12.0
4 or more	90	34.7

Furthermore, to get a better understanding of what special education teachers in Alabama identified as facilitators of assistive technology use, analyses were conducted for each of the items in this subscale. For the question, "Have you ever had training regarding assistive technology (i.e., college class, professional development, certification, etc.)," 24.8% reported no training and 68.2% reported having training. The results are displayed in Table 17 and the breakdown of training (i.e., preservice education, professional development, certification program, and self-exploration is displayed in Table 18.

Table17

Training

Training	Frequency	Percent
Yes	176	68.2
No	64	24.8

Table18

Types of Training

Types of Training	Frequency	Percent
Preservice Education	85	32.9
Professional Development	134	51.9
Certification Program	18	7.0
Self-Exploration	94	36.4

For the question, "Estimate the number of workshops or professional development pertaining specifically to assistive technology that you have attended in the last year," 71.7% of participants reported having no more than one training related to assistive technology in the previous year, and 50.8% of participants reported no training at all. The results are displayed in Table 19.

Table 19

Workshops in the Last Year

Workshops in the Last Year	Frequency	Percent
None	131	50.8
1	54	20.9
2	34	13.2
3	5	1.9
4 or more	14	5.4

For the question, "Estimate the number of college classes you had during your preservice education that were specific to assistive technology," 69.5% reported have no more than one assistive technology course during their preservice education. The results are displayed in Table 20.

Table 20

Assistive Technology Courses

AT Course (Preservice)	Frequency	Percent
None	89	34.4
1	91	35.1
2	36	13.9
3	13	5.0
4 or more	8	3.1

For the statement, "I have access to an assistive technology specialist (or someone that focuses on assistive technology as their main role) in my school district," 57.2% reported either

having no access to an assistive technology specialist or not knowing if an assistive technology specialist was available to them in their district. The results are displayed in Table 21.

Table 21

Access to Assistive Technology Specialist

Access to AT Specialist	Frequency	Percent
No	74	28.6
Not Sure	74	28.6
Yes	90	34.7

For the statement, "I have access to written procedural guidelines related to assistive technology," 61.8% reported either having no access to written procedural guidelines or not knowing if they were available to them in their district. The results are displayed in Table 22.

Table 22

Access to Written Procedural Guidelines

Access to Written Procedural Guidelines	Frequency	Percent
No	56	21.6
Not Sure	104	40.2
Yes	77	29.7

For the statement, "I have access to on-going learning opportunities about assistive technology for staff, family, and students." 65.6% reported either having no access to learning opportunities or not knowing if they were available in their district. The results are displayed in Table 23.

Table 23

Access to Learning Opportunities

Access to Learning Opportunities	Frequency	Percent
No	68	26.3
Not Sure	103	39.3
Yes	67	25.9

For the statement, "The content of assistive technology professional development and training I receive addresses all aspects of the selection, acquisition and use of assistive technology," 70.2% reported that the professional development that they receive does not address all aspects of assistive technology or that they were not sure if all aspects were addressed. The results are displayed in Table 24.

Table 24

Professional Development (PD) Addresses All Aspects of Assistive Technology (AT)

PD Addresses All Aspects of AT	Frequency	Percent
No	113	43.6
Not Sure	69	26.6
Yes	55	21.2

For the statement, "I currently have student(s) on my caseload using assistive technology," 69.1% reported having students using assistive technology. The results are displayed in Table 25.

Table 25

Students Using Assistive Technology (AT)

Student(s) on caseload using Assistive Technology	Frequency	Percent
No	59	22.8
Yes	179	69.1

For the statement, "I currently have a student(s) needing assistive technology but does not have any," 73% reported not having students needed assistive technology but not getting it and 15.4% reported having students that needed assistive technology but not getting it. The results are displayed in Table 26.

Table 26

Student(s) Needing Assistive Technology (AT)

Student(s) Needing Assistive Technology	Frequency	Percent
No	189	73.0
Yes	40	15.4

Exploratory factor analysis using principal components analysis with a varimax rotation was conducted. Facilitators and barriers were combined in this analysis. Initial factor analysis extracted three factors with eigen values above 1 and factor loading above .4. The variables comprising the measures of facilitators and barriers loaded significantly into three factors identified as follows: 1) facilitators, ii) external barriers, and iii) financial barriers. Lack of knowledge and training loaded negatively so it was not a barrier, but a facilitator. Cronbach's alpha for Factor 1: facilitators was .581. Cronbach's alpha for Factor 2: external barriers was

.562. Cronbach's alpha for Factor 3: financial barriers was .628. Table 27 shows the results of the principal components analysis with a varimax rotation.

Table 27

Principal Components Analysis with Varimax Rotation

	Factor 1 – Facilitators	Factor 2 – External Barriers	Factor 3 – Financial Barriers
Access to learning opportunities	.778		
PD addresses all aspects of the selection, acquisition, and use of AT	.737		
Access to written procedural guidelines	.622		
Workshops in the last year	.553		
Training and Knowledge	-.530		
Access to AT specialist	.524		
Course for AT (preservice ed)	.400		
Planning		.712	
Policies		.616	
Tech Support	-.355	.553	
Student/Parent Resistance		.506	
Funding			.837
Device Options			.820

Note. Rotation converged in 5 iterations.

In addition, a multiple linear regression was calculated to determine how barriers and facilitators combined predict special education teacher knowledge. A significant regression equation was found (F $(3,226) = 17.783$, p $< .000$, with an R^2 of .191). Eighteen percent of

variance in the total knowledge score is explained by facilitators and barriers. Table 28 shows

results of the regression model.

Table 14

Regression Analysis Summary for Predicting Teacher Knowledge

Variable	B	95% CI	β	t	p
(Constant)	2.734	2.672, 2.795		87.204	.000
Factor 1 – Facilitators	.210	.149, .272	.401	6.699	.000
Factor 2 – External Barriers	.089	.027, .151	.170	2.833	.005
Factor 3 – Financial Barriers	-.021	-.083, .041	-.040	-.664	.507

Note. Dependent Variable: Mean Total Knowledge Score.

Summary

This chapter presented the analyses and results from data collection regarding assistive

technology knowledge and use patterns of special education teachers in Alabama. Statistical

analyses of the survey data were presented. In the next chapter, a discussion of these results as

they relate to the study's research questions will be provided. Implications and limitations of the

study will be identified and discussed as well as suggestions for future research.

CHAPTER V:

DISCUSSION

Introduction

This chapter discusses the findings reported in Chapter IV and how they relate to

literature and the conceptual framework guiding this study. The results will be fragmented based

on the research questions guiding this study: 1) what do special education teachers know about

assistive technology and its application in P-12 education; 2) to what extent do special education

teachers perceive the *Quality Indicators of Assistive Technology* (QIAT) use being present in

their school districts; 3) what are the barriers to assistive technology use for special education

teachers; and 4) what factors facilitate assistive technology use by special education teachers? In

addition, implications and recommendations for future research and practice will be discussed.

Discussion

Research Question 1

To answer RQ1, "What do special education teachers know about assistive technology

and its application in P-12 education in Alabama," descriptive statistics using percentages and

frequency tables were utilized. In addition, a factor analysis was done to determine the

underlying factors of perceived knowledge of assistive technology use.

The survey items for this section asked special education teachers to rate their level of

knowledge in thirteen different areas related to assistive technology using a Likert-type scale

response option ranging from no knowledge, little knowledge, some knowledge, to extensive

knowledge. Exploratory factor analysis using principal components analysis with a varimax rotation was conducted to determine underlying factors that related to assistive technology knowledge and three underlying dimensions were identified: 1) assistive technology consideration, 2) assistive technology services, and 3) assistive technology tools. This is in line with the three parts of the IDEA 2004 definition of assistive technology discussed in the following sections.

     Assistive technology consideration. Consideration of assistive technology is a mandate for all students with a disability receiving Free and Appropriate Public Education (FAPE) services (IDEA, 2004). IDEA (2004) defines assistive technology consideration as

> the requirement to consider the need for assistive technology devices and services and to bring up the issue of assistive technology to every IEP team. For IEP teams to effectively address assistive technology devices and services, teams must use a collaborative decision-making process to determine whether an individual student requires assistive technology. (IDEA, 2004)

Therefore, IEP team members, including special education teachers, must have the knowledge to adequately consider assistive technology for every student with an IEP.

     In this study, gaps were reported in the knowledge of assistive technology consideration. Forty percent of teachers reported that they had little to no knowledge of strategies of teaching students with disabilities to operate their assistive technology devices and 43% had little to no knowledge determining whether a student needed a comprehensive evaluation for assistive technology. In addition, 43.4% reported that they had little to no knowledge examining alternative solutions prior to making assistive technology decisions. These findings suggest that, although assistive technology consideration is a critical component to the IEP process, many special education teachers still do not have the knowledge necessary to carry out consideration effectively. There are many frameworks in place to guide teachers and school systems through

the assistive technology consideration process. These include the *WATI Assistive Technology Consideration Guide*, *Assistive Technology Consideration Checklist of the Georgia Project for Assistive Technology*, the *Texas 4-Step Model*, and the *Quality Indicators for Assistive Technology Consideration*. However, each school system and/or state is responsible for deciding their model for assistive technology consideration. The findings in this section support research reporting IEP team members often being undertrained in assistive technology consideration (Maich, Rhijn, Woods, & Brochu, 2017; Okolo & Diedrich, 2014).

Assistive technology services. IDEA 2004 defines assistive technology services as, "acquiring AT devices; customizing, and maintaining AT devices; coordinating other therapies with AT devices; training for the student and family; and training for professionals involved with students" (IDEA, 2004). In this study, knowledge of assistive technology services was a weakness for special education teachers. Sixty-five percent reported they had little to no knowledge of arranging for demonstrations and trial periods of assistive technology prior to purchase decisions, and 71.7% felt they had little to no knowledge of funding sources and processes of the acquisition of assistive technology. This is in line with previous research that reported lack of funding as a barrier to assistive technology (Alper & Raharinirina, 2006; Flanagan, Bouck, Richardson, 2013; Desch & Gaebler-Spira, 2013). In addition, 44.5% had little to no knowledge of equity, ethical, and legal issues related to assistive technology use in special education, and 40.7% felt they had little to no knowledge of legislation and its implications for assistive technology in special education. This is consistent with research that reports the understanding of policies and procedures related to assistive technology to be a barrier to assistive technology use (Mavrou, 2011).

Assistive technology tools (devices). IDEA 2004 defines an assistive technology device as, "any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve the functional capabilities of a student with a disability" (IDEA, 2004). Assistive technology encompasses an extensive range of tools (devices) that are typically categorized as low-tech, mid-tech, and high tech (Dell, Newton, & Petroff, 2017). Overall, participants in this study reported that they had knowledge of assistive technology tools. Ninety-two percent felt they had some knowledge to extensive knowledge of low-tech tools, and 86.7% felt they had some knowledge to extensive knowledge of mid-tech tools. Although fewer teachers reported having knowledge of high-tech devices, 69.7% still reported having at least some knowledge. This is consistent with research that shows teachers are less familiar with high-tech devices, opposed to mid-tech and/or low-tech devices, but still perceive them to be of great benefit (Chukwuemeka & Samaila, 2020). While this study did not reveal why this was the case, it could be speculated that limited device options available to trial and lack of funding, both noted as barriers in this study, could have impacted special education teachers knowledge of high-tech devices.

Research Question 2

To answer RQ2, "To what extent do special education teachers perceive the *Quality Indicators of Assistive Technology* (QIAT) use being present in their school districts in Alabama," descriptive statistics using percentages and frequency tables were utilized. In this section of the survey, special education teachers were asked to complete seventeen Likert scale questions replicated from the QIAT. The response mode was strongly disagree, disagree, agree, and strongly agree. These responses were based on practices of the school districts where the participants were currently employed. Items in this section focused on six of the eight quality

indicators: consideration of assistive technology needs, assessment of assistive technology needs, assistive technology in the IEP, assistive technology implementation, effectiveness of assistive technology, and assistive technology in transition (QIAT Consortium Leadership Team, 2012). The results will be discussed accordingly. Although the quality indicators are research based, there seems to be no research showing the extent to which teachers perceive the quality indicators to be present in their school districts, therefore, all of these findings are novel.

Overall, special education teachers reported their school districts were appropriately considering assistive technology for their students. However, there were weaknesses noted. Fifteen percent disagreed or strongly disagreed that assistive technology devices and services were considered for all students with disabilities regardless of type or severity of disability, and 18.2% disagreed or strongly disagreed that IEP team members had the collective knowledge and skills needed to make informed decisions about assistive technology and seek assistance when needed. In addition, 20.5% disagreed or strongly disagreed that during the assistive technology consideration process, data were collected to show the potential need for assistive technology, and 57.4% reported consideration being limited to those devices that IEP team members know or are available in the district. The consideration process is a critical component to the IEP process; therefore, it is positive that teachers perceive their school districts to be considering assistive technology appropirately. However, this isn't consistent with participants perceived personal knowledge of the consideration process in this study which showed more significant gaps in this area.

As spelled out in the *definition of terms* section in Chapter I, assessment of assistive technology needs refers to the process used to identify strategies and tools to address student needs (QIAT 2012). Results of assessment of need revealed that 42.2% disagreed or strongly

disagreed that procedures for all aspects of assistive technology assessment were clearly defined and consistently applied and 23.7% disagreed or strongly disagreed that assistive technology assessments were conducted by a knowledgeable team to determine possible assistive technology solutions. Thus, assessment of assistive technology needs was understood to be a relative weakness by participants in their school districts. This is consistent with a previous study that found that ongoing assessment to be one of the biggest barriers for members of a collaborative team assessing assistive technology needs (Mavrou, 2011). In fact, a faulty assessment process can often lead to device abandonment due to a mismatch of user needs and device selection.

The IEP drives the provision of special education services for students with disabilities (Dell, Newton, & Petroff, 2017). Integration of assistive technology is, therefore, critical. Over half (57%) of teachers disagreed or strongly disagreed that IEP team members at their school had assistive technology knowledge. In addition, 20.2% disagreed or strongly disagreed that their school district had guidelines for documenting assistive technology needs in the IEP and 34.5% disagreed or strongly disagreed that IEP teams at their school used a consistent process to make decisions regarding assistive technology. Findings in this section point to an increased need for policy development within the IEP process. Each state creates their own policies and procedures for IEP development, including assistive technology, which could lead to inconsistencies.

Participants reported that their school systems were implementing assistive technology well, overall. Of the participants, 75.9% agreed or strongly agreed that assistive technology was integrated into the curriculum and daily activities of students across environments, and 74.4% agreed or strongly agreed that learning opportunities for the student, family, and staff were an integral part of implementation in their district. Implementation pertains to how assistive technology services are delivered (QIAT, 2012). Although teachers perceived their school

systems to be implementing assistive technology well, this is not consistent with their perceived knowledge of AT services in this study. Teachers perceived their school systems to be performing at a much higher level than what they perceived their own knowledge to be in this area.

Overall, teachers reported that the effectiveness of assistive technology was happening at some level in their district. Evaluation of effectiveness of assistive technology includes data collection, documentation, and analysis to monitor student performance (QIAT, 2012). Of the participants, 58.6% felt that IEP team members at their school shared clearly defined responsibilities to ensure that data were collected on assistive technology effectiveness once assistive technology was in place, and 66.7% felt that effectiveness of assistive technology was evaluated across environments during actually occurring and structed activities. Also, 58.5% of participants felt that evaluation of effectiveness was an ongoing process that was reviewed periodically by IEP team members at their school.

In this study, 72.9% of participants felt that transition plans addressed assistive technology needs of the student which is not consistent with research. A similar study showed low rates of self-reported and teacher reported access for students with disabilities to assistive technology (Boauck, 2016). Young adults with disabilities rely on their assistive technology to participate in extracurricular activities and employment (Ripat & Woodgate, 2017) and the findings in this study show a considerable strength in this area.

Research Question 3

To answer RQ3, "What are the barriers to assistive technology implementation and use for special education teachers in the State of Alabama?" descriptive statistics using percentages and frequency tables were utilized. In addition, a factor analysis was done to determine the

underlying factors related to barriers to assistive technology use and multiple regression models were used to determine how barriers to assistive technology use predict special education teacher knowledge.

In this section, participants were asked to identify current barriers from a list of seven barriers noted in research; lack of teacher training/knowledge, inconsistencies in policies and procedures, lack of funding, limited device options available, student/parent resistance, lack of time for planning, and lack of technical support. In this study, lack of training and knowledge (68%), lack of funding (52.7%), and limited devices options (52.9%) were most frequently reported as barriers. This is consistent with another study that found lack of training (84.4%), lack of funding (56.3%), and limited device options (53.1%) to be barriers to assistive technology use (Maich, Rhijn, Woods, & Brochu, 2017).

An exploratory factor analysis was done extracting three factors. The underlying dimensions were as follows: I) external barriers, II) financial barriers, and III) knowledge/training barriers. Factor I, external barriers, included lack of time, student/parent resistance, policies and procedures, and lack of technical support. Factor II, financial barriers, included limited device options and lack of funding. A high percentage of participants noted this as a barrier which was consistent with the participants perceived knowledge related to funding sources and processes of the acquisition of assistive technology. In this study, 27.9% of participants felt they had at least some knowledge of funding sources. In a similar study, participants found funding to be a major barrier that often prevents students from having access to assistive technology (Ahmed, 2018). Factor III, knowledge and training barriers included lack of training and knowledge. Lack of training and knowledge was reported as a barrier by 68% of participants in this study which is consistent with a similar study identifying lack of training and

knowledge to be a barrier (Alkahtani, 2013). External barriers and financial barriers being more structural in nature, are impacted most by administration and policy makers, while knowledge and training barriers are more teacher focused.

In addition, a multiple linear regression was calculated to determine how barriers to assistive technology use predict special education teacher knowledge. Lack of training and knowledge was the only barrier that contributed to the model. 2.6% of the variation in the total mean knowledge score was explained by barriers. Although this is a low percentage, barriers to assistive technology can impact a special education teachers' knowledge of assistive technology. This could be indicative of a need for additional training; preservice education, professional development, certification programs, or self-exploration.

Research Question 4

To answer RQ4, "What factors facilitate assistive technology use by special education teachers in the State of Alabama," descriptive statistics using percentages and frequency tables were utilized. In addition, a factor analysis was done to determine underlying factors related to facilitators of assistive technology use. A series of multiple regression models were also used to determine how facilitators of assistive technology use predict special education teachers' knowledge of assistive technology use.

This section asked participants twelve multiple choice questions related to prior training, access to assistive technology, and access to assistive technology resources. 68% of participants reported having some type of assistive technology training (i.e., college class, professional development, certification, etc.). Of those participants, 32.9% reported having preservice education, 51.9% reported having professional development, 7% reported participating in a certification program, and 36.4% reported self-exploration. In addition, 71.7% of participants

reported having no more than one workshop/professional development opportunity related to assistive technology the previous year and 70.2% reported that the professional development they received did not address all aspects of assistive technology. Studies have supported the need for increased training and instruction through professional development and preservice education (Zhao & Cziko, 2001; Crider, Johnston, Rutledge, Doolittle & Beard, 2014; Dell, Newton, & Petroff, 2016) and often link knowledge of special education teachers or IEP team members to the success of students with disabilities using assistive technology (Judge & Sims, 2009).

In a study done in 2013, 98% of respondents report never taking a college or graduate level course related to assistive technology (Alkahtani, 2013). Although the findings in this study show an improvement, there is still a gap in educational opportunities related to assistive technology at the preservice level. The actual number of assistive technology courses currently offered in colleges of education nationwide is unknown, but we can assume that these numbers continue to be low. In fact, studies have shown that adequate training from teacher education programs is not common practice (Lee & Vega, 2005; Ajuwon & Chitiyo, 2016) and mandatory courses or even class sessions on assistive technology are not always seen in educator preparation programs (Abner & Lahm, 2002; Lee & Vega, 2005; Edyburn, 2005; Judge & Sims, 2009).

Access to other assistive technology resources was limited for participants in this study. 61.8% of participants reported having no access to written procedural guidelines or not knowing if they were available in their district and 57.2% reported not have access to an assistive technology specialist or not knowing if one was available. In Alabama, access to assistive technology resources vary from district to district and there are inconsistencies across districts to what policies and procedures are put into place.

To learn more about how barriers and facilitators combined impact special education teacher knowledge and use, an exploratory factor analysis was done. The underlying dimensions identified by each factor are as follows: I) facilitators, II) external barriers, and II) financial barriers. Factor I, facilitators, included access to learning opportunities, professional development, to address all aspects of the selection of assistive technology, access to written procedural guidelines, workshops, training and knowledge, access to assistive technology specialist, and preservice education. Factor II, external barriers, included planning, policies, tech support, and student/parent resistance. Factor III, financial barriers, included funding and lack of device options.

A multiple liner regression was then calculated to determine how barriers and facilitators combined predict special education teacher knowledge. A significant regression equation was found. 18% of variance of the total knowledge score is explained by facilitators and barriers. Facilitators contributed most to this model. Therefore, barriers and facilitators directly impact special education teacher knowledge, which in turn, impacts student outcomes. This is in line with the conceptual framework used for the basis of this study and research that reports positive student outcomes being directly related to the knowledge of special education teachers (Judge & Sims, 2009).

Implications

There are several implications from the findings in this study for the Alabama State Department of Education, Special Education Services, school districts, special education teachers, and higher education institutions. IDEA (2004) gives clear mandates related to assistive technology in P-12 education. Assistive technology consideration, assistive technology services, and assistive technology tools are all critical pieces to assistive technology success for students

with disabilities. In this study, there were knowledge disparities across the board. In addition, lack of knowledge, lack of funding, and limited device options was noted as the most reported barriers to assistive technology use.

Due to the impact assistive technology can have on the success of students with disabilities, it is important to level the knowledge gap. The Alabama State Department of Education could create online training opportunities specific to the three areas defined through IDEA (2004) and explored in the knowledge section of this study: assistive technology consideration, assistive technology services, assistive technology tools. Because there is such a discrepancy in perceived knowledge level, it would be beneficial for all special education teachers, and conceivably all IEP team members, to first receive the same training or professional development opportunities. General education teachers and other members of the IEP team are an integral part of the process and need collective knowledge to make appropriate decisions during the consideration process as well (Karlsson, Johnston, & Barker, 2018). After initial training is received, each school district could be given a recommended training plan geared more towards the needs of that district including opportunities for hand-on learning within each school building. Teachers have reported that hands on experience is the most effective way to gaining knowledge of assistive technology (Van Laarhoven & Conderman, 2011; Schaaf, 2018). In fact, having repeated exposure to professional development and hands on learning can impact perceptions of assistive technology in P-12 education (Laarhoven, Munk, Chandler, Zurita, & Lynch, 2012).

Training of some kind (i.e. professional development, preservice education, certification program, self-exploration) was reported by many of the participants; however, a large number of participants still reported lack of training as barrier. A number of participants reported either

having no access to learning opportunities or not knowing if they were available in their district. It was also reported that professional development did not always address all aspects of assistive technology. The Alabama State Department of Education and school districts could collaborate to develop a training schedule based on assistive technology consideration, assistive technology services and assistive technology tools and require schools to provide a specific number of mandatory learning opportunities for all special education teacher. In addition, the Alabama State Department of Education's Special Education Services could collaborate with higher education institutions on curriculum development to ensure that learning opportunities are available and current at the preservice level. It has been reported that preservice education in assistive technology is not adequately addressed and typically involves only a basic overview of assistive technology (Judge & Sims, 2009; Cider, Johnston, Rutledge, Doolittle, Beard, 2014). Having exposure through preservice education can increase the comfort and knowledge level of special education teachers when they enter the field (Jones, Rudinger, Williams, & Witcher, 2019).

Participants also reported they did not have access to or were unsure if they had access to written procedural guidelines related to assistive technology. This is more structural in nature and requires administration and policy makers involvement. The Alabama State Department of Education's Special Education Services could further explore state policies and procedures and work with the LEAs of each district to ensure the written procedural guidelines are available and understood by all special education teachers and IEP team members. Having a team or committee to review and update policies and procedures for the State of Alabama could be beneficial.

Funding for assistive technology devices was noted as a barrier by over half of the participants in this study. Participants perceived their knowledge level to be low in this area as

well. In addition, over half of the participants noted limited access to assistive technology devices to explore and consider for their students. These are both structural in nature and are characteristically impacted by administration and policy makers. However, there are things at the teacher level that teachers can do to secure funding such as grant writing and building relationships with outside vendors. Creating a state-wide lending library through the State Department of Education or an outside agency would give teachers an option to borrow tools to trial with their students, which could increase access to assistive technology for students with disabilities. This would allow all IEP teams access to assistive technology devices and tools to trail with students, based on their needs, during the consideration process. Because assistive technology is inherently expensive, collaborating with outside vendors and service providers is critical (King & Allen, 2018). Assistive technology vendors, as well as outside agencies, are capable of providing additional trainings, loaning demo equipment, and offering software trials to ensure current, up to date, technology is available.

Recommendations for Future Research

There are numerous research opportunities that emerged for the findings in the study that could expand research within the field of assistive technology in P-12 education. The following suggestions are recommended for future research.

Data generated from this study was specific to special education teachers. Although special education teachers are often the primary case manager, there are other IEP team members that need assistive technology knowledge to collaboratively consider assistive technology for students with disabilities. Therefore, expanding the study to include other members of the IEP team (i.e., general education teachers, other service providers, administrators, etc.) would

provide insight to patterns of assistive technology knowledge and use as well as barriers that exist for those team members.

Lack of training and knowledge was noted in this study as the most reported barrier to assistive technology use. This study explored four types of training: preservice education, professional development, certification programs, and self-exploration. It is recommended to explore these types of training in more depth, especially preservice education and professional development, and how those types of trainings impact IEP team members ability to consider assistive technology.

It is recommended to perform a qualitative analysis with IEP team members to explore patterns of assistive technology use as well as barriers and facilitators that impact assistive technology use. Expanding this to IEP team members other than special education teachers could give valuable insight.

Financial barriers including lack of funding and limited device options were noted in this study. It is recommended to explore why these barriers are present and what each state can do to alleviate the financial barriers and provide equal assistive technology to service providers and students.

It is recommended to conduct a study with higher education institutions to explore the curriculum that is being taught in assistive technology courses. Assistive technology is not always a mandated course in a preservice program; therefore, inconsistencies could be present in the curriculum.

Limitations

There were several limitations to this study. First, the response rate was low considering the number of special education teachers that could have had access to the survey. Only 258

teachers participated which is 10.3% of the total special education teacher population in the

Alabama. However, the 10.3% of special education teachers that did participate were spread

throughout thirty-eight different school systems across Alabama giving a very diverse sample. A

low response rate could decrease the statistical influence of the data collected, potentially

affecting the researcher's ability to generalize the results to other settings.

The Covid-19 pandemic could have been a limitation and potential cause of the low

response rate. The Covid-19 pandemic started shortly before the survey was to be distributed.

Schools closed or started remote learning options. Therefore, the researcher chose to wait until

school was out for summer to distribute the survey in hopes that the pandemic would be over.

However, that was not the case. The pandemic continued and the researcher distributed the

survey during the summer months when school was not in session. Most of the schools started

back while the survey was still open, but again, the response rate remained low.

Interviewer fatigue could have also been a limitation in the study. With five sections, 58

questions, the survey took approximately 25 min. or less. It is possible that the participants chose

not to continue the survey due to its length. In addition, demographic variability was another

limitation of this study. Majority of the participants were white (84.9%) female (91.9%).

Although these percentages are high, this is in line with the teacher percentages in the State of

Alabama.

Conclusion

Assistive technology can make curriculum more accessible, increase independence, boost

engagement, and contribute in many other positive ways to increase educational experiences for

students with disabilities, and in turn, quality of life (Alper & Raharinirina, 2006; Chmiliar &

Cheung, 2007; MacLachlan, Banes, Bell et al, 2018). It is mandated that assistive technology be

considered for all students with disabilities who are receiving special education services (IDEA, 2004). Special education teachers, who are key members of an IEP team, need to have knowledge of assistive technology consideration, assistive technology services, and assistive technology devices. This study showed the disparity in knowledge related to assistive technology along with barriers and facilitators impacting assistive technology use in Alabama. The implications and future research recommendations addressed in this chapter could help improve knowledge and use of assistive technology in this state and beyond, creating opportunities for increased success of students with disabilities, not only in the P-12 environment, but throughout life.

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APPENDIX A:

IRB APPROVAL

THE UNIVERSITY OF **ALABAMA**® | *Office of the Vice President for* **Research & Economic Development** **Office for Research Compliance**

June 10, 2020

Elizabeth Stewart
Department of Special Education & Multiple Abilities
The University of Alabama
Box 870232

Re: IRB # 20-04-3474: "Patterns of Special Education Teachers' Assistive Technology Knowledge & Use in P-12 Education"

Dear Ms. Stewart,

The University of Alabama Institutional Review Board has granted approval for your proposed research. Your application has been given exempt approval according to 45 CFR part 46. Approval has been given under exempt review category 2 as outlined below:

(2) Research that only includes interactions involving educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures, or observation of public behavior (including visual or auditory recording) if at least one of the following criteria is met:

(i) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects

The approval for your application will lapse on June 9, 2021. If your research will continue beyond this date, please submit the annual report to the IRB as required by University policy before the lapse. Please note, any modifications made in research design, methodology, or procedures must be submitted to and approved by the IRB before implementation. Please submit a final report form when the study is complete.

Please use reproductions of the IRB approved informed consent form to obtain consent from your participants.

Sincerely,

Carpantato T. Myles, MSM, CIM, CIP
Director & Research Compliance Officer

Informed Consent

Please read this informed consent carefully before you decide to participate in the study.

Consent Form Key Information:

- Participate in a study related to assistive technology in P-12 education
- Take a self-report online survey
- No identifying information will be collected
- Estimated time to complete is 15 min or less

Purpose of the research study: The purpose of this research is to explore patterns of special education teachers' knowledge and use of assistive technology in the State of Alabama. Barriers and facilitators of assistive technology use will also be identified and explored, establishing a basis for a statewide professional development agenda for the Alabama Department of Education, Special Education Services.

What you will do in the study: Participants will answer survey questions in a self-report online survey. The instrument consists of five sections totaling fifty-eight questions. The five survey sections are as follows: 1) Demographics; 2) Knowledge of AT use; 3) Indicators of AT Use; 4 Barriers of AT Use; 5) Facilitators of AT use.

Time required: The estimated competition time is 15 minutes or less.

Risks: There are no risks associated with this study. Your confidentiality will be protected by not collecting your name or any other identifiable information.

Benefits: There are no direct benefits to the participants. However, the findings in this study could help establish a basis for a statewide professional development agenda for the Alabama Department of Education, Special Education Services. In addition, the findings in this study could guide educator preparation programs in curriculum development in this area as well as provide critical data that could prompt future research related to assistive technology.

Confidentiality: The information that you give in the study will be handled confidentially. Your name and other information that could be used to identify you will not be collected or linked to the data.

Voluntary participation: Your participation in the study is completely voluntary

Right to withdraw from the study: You have the right to withdraw from the study at any time without penalty.

How to withdraw from the study: You may refuse to take part in the research or exit the survey at any time without penalty and you are free to decline to answer any question you do not wish to answer. If you want to withdraw from the study.

Compensation/Reimbursement: You will receive no payment for participating in the study.

If you have questions about the study or need to report a study related issue please contact, contact:

UNIVERSITY OF ALABAMA IRB
CONSENT FORM APPROVED: 6-10-20
EXPIRATION DATE: 6-9-21

Project Title: Patterns of Special Education Teacher's Assistive Technology Knowledge and Use in P-12 Education

Principal Investigator: Elizabeth Stewart
Title: PhD Candidate
Department Name: Special Education & Multiple Abilities
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Faculty Advisor: Kagendo Mutua, PhD
Department Name: Special Education & Multiple Abilities
Email address: kmutua@ua.edu

If you have questions about your rights as a participant in a research study, would like to make suggestions or file complaints and concerns about the research study, please contact:

Ms. Tanta Myles, the University of Alabama Research Compliance Officer at (205)-348-8461 or toll-free at 1-877-820-3066. You may also ask questions, make suggestions, or file complaints and concerns through the IRB Outreach Website at http://ovpred.ua.edu/research-compliance/prco/. You may email the Office for Research Compliance at rscompliance@research.ua.edu.

Agreement:

☐ I agree to participate in the research study described above.

☐ I do not agree to participate in the research study described above.

APPENDIX B:

QUALTRICS SURVEY

THE UNIVERSITY OF ALABAMA®

Informed Consent

Please read this informed consent carefully before you decide to participate in the study.

Consent Form Key Information:

- Assistive technology in P-12 education
- Self-report online survey
- No identifying information collected
- Estimated time to complete - 15 min or less

Purpose of the research study: The purpose of this research is to explore patterns of special education teachers' knowledge and use of assistive technology in the State of Alabama. Barriers and facilitators of assistive technology use will also be identified and explored, establishing a basis for a statewide professional development agenda for the Alabama Department of Education, Special Education Services.

What you will do in the study: Participants will answer survey questions in a self-report online survey. The instrument consists of five sections totaling fifty-eight questions. The five survey sections are as follows: 1) Demographics; 2) Knowledge of AT use; 3) Indicators of AT Use; 4 Barriers of AT Use; 5) Facilitators of AT use.

Time required: The estimated competition time is 15 minutes or less.

Risks: There are no risks associated with this study. Your confidentiality will be protected by not collecting your name or any other identifiable information.

Benefits: There are no direct benefits to the participants. However, the findings in this study could help establish a basis for a statewide professional development agenda for the Alabama Department of Education, Special Education Services. In addition, the findings in this study could guide educator preparation programs in curriculum

development in this area as well as provide critical data that could prompt future research related to assistive technology.

Confidentiality: The information that you give in the study will be handled confidentially. Your name and other information that could be used to identify you will not be collected or linked to the data.

Voluntary participation: Your participation in the study is completely voluntary.

Right to withdraw from the study: You have the right to withdraw from the study at any time without penalty.

How to withdraw from the study: You may refuse to take part in the research or exit the survey at any time without penalty and you are free to decline to answer any question you do not wish to answer. If you want to withdraw from the study.

Compensation/Reimbursement: You will receive no payment for participating in the study.

If you have questions about the study or need to report a study related issue please contact, contact:

Principal Investigator: Elizabeth Stewart
Title: PhD Candidate
Department Name: Special Education & Multiple Abilities
Telephone: 205-541-9926
Email address: ewstewart1@crimson.ua.edu

Faculty Advisor: Kagendo Mutua, PhD
Department Name: Special Education & Multiple Abilities
Email address: kmutua@ua.edu

If you have questions about your rights as a participant in a research study, would like to make suggestions or file complaints and concerns about the research study, please contact:

Ms. Tanta Myles, the University of Alabama Research Compliance Officer at (205)-348-8461 or toll-free at 1-877-820-3066. You may also ask questions, make suggestions, or file complaints and concerns through the IRB Outreach Website at http://ovpred.ua.edu/research-compliance/prco/. You may email the Office for Research Compliance at rscompliance@research.ua.edu.

○ I agree to participate in the research study described above.
○ I do not agree to participate in the research study described above.

Demographics

Gender:

○ Male
○ Female
○ Other

Age:

[   ]

Race:

○ White
○ Black or African American
○ American Indian or Alaska Native
○ Asian
○ Native Hawaiian or Pacific Islander
○ Other

What is the highest level of education you have completed?

○ Undergraduate Degree
○ Graduate Degree
○ Doctoral Degree

○ Other

Which teaching certificate do you hold?

○ Early Childhood Special Education

○ Collaborative Special Education (K-6)

○ Collaborative Special Education (6-12)

○ Collaborative Special Education (K-12)

○ Other

How long have you been a special education teacher?

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[                                                    ]
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Which of the following best describes the location of the school in which you teach?

○ Rural

○ Suburban

○ Urban

What is the name of the school district in which you are a special education teacher?
OPTIONAL

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[                                                    ]
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As a current special education teacher, what age students do you serve? SELECT ALL
THAT APPLY

□ Preschool

□ K-5

□ 6-8

□ 9-12

□ 12+/Transition

As a current special education teacher, which of the following best describes the services
students on your caseload receive?

○ 100%-80% of the day inside the general education classroom

○ 79%-40% of the day inside the general education classroom

○ Less than 40% of the day inside the general education classroom

○ Other

What disability areas are represented on your caseload? SELECT ALL THAT APPLY

☐ Autism

☐ Deaf/Blindness

☐ Developmental Delay

☐ Emotional Disablity

☐ Hearing Impairment

☐ Intellectual Disability

☐ Multiple Disabilities

☐ Orthopedic Impairment

☐ Other Health Impairment

☐ Specific Learning Disabilities

☐ Speech or language Impairment

☐ Traumatic Brain Injury

☐ Visual Impairment

Knowledge of Assistive Technology Use

Please rate your level of knowledge in each of the following areas.

	No Knowledge	Little Knowledge	Some Knowledge	Extensive Knowledge
Knowledge of concepts related to the process of consideration of assistive technology during the IEP.	○	○	○	○
Knowledge of legislation and its implications for assistive technology in special education.	○	○	○	○

	No Knowledge	Little Knowledge	Some Knowledge	Extensive Knowledge
Knowledge of low-tech assistive technology tools for students with disabilities (i.e. pencil grips, slant board, highlighters, etc.).	○	○	○	○
Knowledge of mid-tech assistive technology tools for students with disabilities (i.e. calculators, audio books, switch operated toys, etc.).	○	○	○	○
Knowledge of high-tech assistive technology tools for students with disabilities (i.e. communication devices, screen readers, environmental control devices, etc.).	○	○	○	○
Knowledge of arranging for demonstrations and trial periods of assistive technology prior to purchase decisions.	○	○	○	○
Knowledge of funding sources and processes of the acquisition of assistive technology.	○	○	○	○
Knowledge of strategies of teaching students with disabilities to operate their assistive technology devices.	○	○	○	○
Knowledge of determining whether a student needs a comprehensive evaluation for assistive technology.	○	○	○	○

	No Knowledge	Little Knowledge	Some Knowledge	Extensive Knowledge
Knowledge of examining alternative solutions prior to making assistive technology decisions.	○	○	○	○
Knowledge of equity, ethical, and legal issues related to assistive technology use in special education.	○	○	○	○
Knowledge of organizations and publications relevant to the field of assistive technology.	○	○	○	○
Knowledge of roles played by personnel (i.e. OT, PT, SLP, etc.) in providing assistive technology services.	○	○	○	○

Indicators of Assistive Technology Use

Please respond to the following statements by selecting the number that indicates your degree of agreement. Base responses on the practices of your school district where you are currently employed.

	Strongly Disagree	Disagree	Agree	Strongly Agree
Assistive technology devices and services are considered for all students with disabilities regardless of type or severity of disability.	○	○	○	○
IEP team members have the collective knowledge and skills needed to make informed decisions about assistive technology and seek assistance when needed.	○	○	○	○

	Strongly Disagree	Disagree	Agree	Strongly Agree
Consideration of assisitve technology is limited to those devices that IEP team members know or are available in the district.	○	○	○	○
During the assistive technology consideration process, data are collected to show the potential need for assistive technology.	○	○	○	○
Procedures for all aspects of assistive technology assessment are clearly defined and consistently applied.	○	○	○	○
Assistive technology assessments are conducted by a knowledgeable team to determine possible assistive technology solutions.	○	○	○	○
My school district has guidelines for documenting assistive technology needs in the IEP.	○	○	○	○
All members of IEP teams at my school have assistive technology knowledge.	○	○	○	○
The IEP teams at my school use a consistent process to make decisions regarding assistive technology.	○	○	○	○
If assistive technology is not needed, IEP teams at my school keep documentation of AT consideration for the student.	○	○	○	○

	Strongly Disagree	Disagree	Agree	Strongly Agree
Assistive technology is integrated into the curriculum and daily activities of the student across environments.	O	O	O	O
Learning opportunities for the student, family, and staff are an integral part of implementation.	O	O	O	O
IEP team members at my school share clearly defined responsibilities to ensure that data are collected on assistive technology effectiveness once assistive technology is in place.	O	O	O	O
Effectiveness of assistive technology is evaluated across environments during naturally occurring and structured activities.	O	O	O	O
Evaluation of effectiveness is an ongoing process that is reviewed periodically by IEP team members at my school.	O	O	O	O
Changes are made in the student's assistive technology services and educational program when evaluation data indicate that changes are needed to improve student achievement.	O	O	O	O
Transition plans address assistive technology needs of the student.	O	O	O	O
Students' assistive technology needs are addressed in transition plans.	O	O	O	O

Barriers of Assistive Technology Use

Which of the following barriers to assistive technology use do you experience in your school district? SELECT ALL THAT APPLY.

☐ Lack of teacher training/knowledge

☐ Inconsistencies in policies and procedures

☐ Lack of funding

☐ Limited device options available at my school

☐ Student/parent resistance

☐ Lack of time for planning

☐ Lack of technical support

☐ [_____] Other

Describe in more detail barriers that you as a special education teacher face related to assistive technology in P-12 education.

[_____]

Facilitators of Assistive Technology Use

How many students do you currently have on your caseload using assistive technology?

○ None

○ 1

○ 2

○ 3

○ 4 or more

Have you ever had training regarding assistive technology (i.e. college class, professional development, certification, etc.)?

○ Yes, I have had training regarding assistive technology.

○ No, I've never had any training regarding assistive technology.

What type training regarding assistive technology was received? SELECT ALL THAT APPLY

☐ Preservice Education (college class)

☐ Professional Development

☐ Certification Program

☐ Self-exploration

Estimate the number of workshops or professional development pertaining specifically to assistive technology that you have attended in the last year.

○ None

○ 1

○ 2

○ 3

○ 4 or more

Estimate the number of college classes you had during your preservice education that were specific to assistive technology.

○ None

○ 1

○ 2

○ 3

○ 4 or more

I have access to an assistive technology specialist (or someone that focuses on assistive technology as their main role) in my school district.

○ Yes

○ No

○ Not sure

I have access to written procedural guidelines related to assistive technology.

○ Yes

○ No

○ Not sure

I have access to on-going learning opportunities about assistive technology for staff, family, and students.

○ Yes

○ No

○ Not sure

The content of assistive technology professional development and training I receive addresses all aspects of the selection, acquisition and use of assistive technology.

○ Yes

○ No

○ Not sure

I currently have student(s) on my caseload using asisstive technology.

○ Yes

○ No

What devices are students on your caseload using?

[   ]

I currently have a student(s) needing assistive technology but doesn't have any.

○ Yes

○ No

What is the reason for not having assistive technology?

[   ]

APPENDIX C:

INITIAL EMAIL TO SPECIAL EDUCATION COORDINATORS

Dear Special Education Coordinators,

My name is Elizabeth Stewart and I am a PhD candidate in Department of Special Education and Multiple Abilities at The University of Alabama. I am working on a research study to understand the knowledge and use of assistive technology by special education teachers in the State of Alabama. This study is approved by the Institutional Review Board (IRB) at The University of Alabama. I hope the knowledge gained will help to establish a basis for a statewide assistive technology professional development agenda for the Alabama Department of Education, Special Education Services.

I am sending this email to you as director/coordinators of special education in your district. I would like to request that you please forward the message below that provides the survey information and link to ALL SPECIAL EDUCATION TEACHERS in your school district.

I appreciate your time and assistance.

Sincerely,

Elizabeth Stewart

Department of Special Education and Multiple Abilities

The University of Alabama

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Special Education Teachers in the State of Alabama -

You are invited to participate in a survey titled, "Patterns of Special Education Teachers' Assistive Technology Use in P-12 Education: A statewide exploration." This is a research project conducted by Elizabeth Stewart, a PhD candidate in Special Education at The University of Alabama. The purpose of this research is to understand the knowledge and use of assistive technology by special education teachers in the State of Alabama. Barriers and facilitators of assistive technology use will also be identified and explored, establishing a basis for a statewide assistive technology professional development agenda for the Alabama Department of Education, Special Education Services.

The estimated completion time is **20 minutes or less** and no identifying information will be collected.

CLICK HERE TO START SURVEY

Or copy and paste the URL below into your internet browser:
https://universityofalabama.az1.qualtrics.com/jfe/form/SV_3xClsZVgaIYwkV7

If you have questions about this survey, please feel free to contact Elizabeth Stewart at ewstewart1@crimson.ua.edu or Dr. Kagendo Mutua at kmutua@ua.edu   If you have questions, concerns, or complaints about your rights as a research participant, you may e-mail the Research Compliance Office at rscompliance@research.ua.edu.

Thank you for your participation and feedback.

APPENDIX D:

FOLLOW UP EMAIL TO SPECIAL EDUCATION COORDINATORS

Hi, Special Education Coordinators!

This is just a reminder that the below Assistive Technology Survey is open for all special education teachers in your district. I would like to request that you please forward the message below that provides the survey information and link to **ALL SPECIAL EDUCATION TEACHERS** in your school district.

CLICK HERE TO START SURVEY

Thanks so much for your help.

Have a great week,

Elizabeth Stewart

PhD Candidate

The University of Alabama

APPENDIX E:

QUALITY INDICATORS OF ASSISTIVE TECHNOLOGY IN THE IEP

1. **The education agency has <u>guidelines for documenting</u> assistive technology needs in the IEP and requires their consistent application.**

    <u>Intent</u>: The education agency provides guidance to IEP teams about how to effectively document assistive technology needs, devices, and services as a part of specially designed instruction. related services, or supplementary aids and services

2. **All <u>services</u> that the IEP team determines are needed to support the selection, acquisition, and use of assistive technology devices are designated in the IEP.**

    <u>Intent:</u> The provision of assistive technology services is critical to the effective use of assistive technology devices. It is important that the IEP describes the assistive technology services that are needed for student success. Such services may include evaluation, customization or maintenance of devices, coordination of services, and training for the student and family and professionals, among others.

3. **The IEP illustrates that assistive technology is a <u>tool to support achievement of goals</u> and progress in the general curriculum by establishing a clear relationship between student needs, assistive technology devices and services, and the student's goals and objectives.**

    <u>Intent</u>: Most goals are developed before decisions about assistive technology are made. However, this does not preclude the development of additional goals, especially those related specifically to the appropriate use of assistive technology.

4. **IEP content regarding assistive technology use is written in language that describes how assistive technology contributes to achievement of <u>measurable and observable outcomes</u>.**

    <u>Intent</u>: Content which describes measurable and observable outcomes for assistive technology use enables the IEP team to review the student's progress and determine whether the assistive technology has had the expected impact on student participation and achievement.

5. **Assistive technology is included in the IEP in a manner that provides a <u>clear and complete description</u> of the devices and services to be provided and used to address student needs and achieve expected results.**

Intent: IEPs are written so that participants in the IEP meeting and others who use the information to implement the student's program understand what technology is to be available, how it is to be used, and under what circumstances. "Jargon" should be avoided.

APPENDIX F:

QUALITY INDICATORS OF THE CONSIDERATION OF

ASSISTIVE TECHNOLOGY NEEDS

1. **Assistive technology devices and services are <u>considered for all students with disabilities</u> regardless of type or severity of disability.**

    Intent: Consideration of assistive technology need is required by IDEA and is based on the unique educational needs of the student. Students are not excluded from consideration of AT for any reason. (e.g., type of disability, age, administrative concerns)
    .

2. **During the development of an individualized educational program, every IEP team consistently uses a <u>collaborative decision-making process</u> that supports systematic consideration of each student's possible need for assistive technology devices and services.**

    Intent: A collaborative process that ensures that all IEP teams effectively consider the assistive technology of students is defined, communicated, and consistently used throughout the agency. Processes may vary from agency to agency to most effectively address student needs under local conditions.

3. **IEP team members have the <u>collective knowledge and skills</u> needed to make informed assistive technology decisions and seek assistance when needed.**

    Intent: IEP team members combine their knowledge and skills to determine if assistive technology devices and services are needed to remove barriers to student performance. When the assistive technology needs are beyond the knowledge and scope of the IEP team, additional resources and support are sought.

4. **Decisions regarding the need for assistive technology devices and services are <u>based on the student's IEP goals and objectives, access to curricular and extracurricular activities, and progress in the general education curriculum.</u>**

    Intent: As the IEP team determines the tasks the student needs to complete and develops the goals and objectives, the team considers whether assistive technology is required to accomplish those tasks.

5. **The IEP team <u>gathers and analyzes data</u> about the student, customary environments, educational goals, and tasks when considering a student's need for assistive technology devices and services.**

   Intent: The IEP team shares and discusses information about the student's present levels of achievement in relationship to the environments, and tasks to determine if the student requires assistive technology devices and services to participate actively, work on expected tasks, and make progress toward mastery of educational goals
   .
6. **When assistive technology is needed, the IEP team <u>explores a range</u> of assistive technology devices, services, and other supports that address identified needs.**

   Intent: The IEP team considers various supports and services that address the educational needs of the student and may include no tech, low tech, mid-tech and/or high-tech solutions and devices. IEP team members do not limit their thinking to only those devices and services currently available within the district.

7. **The assistive technology consideration process and <u>results are documented in the IEP</u> and include a rationale for the decision and supporting evidence.**

   Intent: Even though IEP documentation may include a checkbox verifying that assistive technology has been considered, the reasons for the decisions and recommendations should be clearly stated. Supporting evidence may include the results of assistive technology assessments, data from device trials, differences in achievement with and without assistive technology, student preferences for competing devices, and teacher observations, among others.

APPENDIX G:

QUALITY INDICATORS OF ASSESSMENT OF ASSISTIVE TECHNOLOGY NEEDS

1. **<u>Procedures</u> for all aspects of assistive technology assessment are clearly defined and consistently applied.**

    <u>Intent</u>: Throughout the educational agency, personnel are well-informed and trained about assessment procedures and how to initiate them. There is consistency throughout the agency in the conducting of assistive technology assessments. Procedures may include–but are not limited to–initiating an assessment, planning and conducting an assessment, conducting trials, reporting results, and resolving conflicts.

2. **Assistive technology assessments are conducted by a<u> team with the collective knowledge and skills needed</u> to determine possible assistive technology solutions that address the needs and abilities of the student, demands of the customary environments, educational goals, and related activities.**

    <u>Intent</u>: Team membership is flexible and varies according to the knowledge and skills needed to address student needs. The student and family are active team members. Various team members bring different information and strengths to the assessment process.

3. **All assistive technology assessments include a functional assessment in the student's <u>customary environments</u>, such as the classroom, lunchroom, playground, home, community setting, or workplace.**

    <u>Intent</u>: The assessment process includes activities that occur in the student's current or anticipated environments because characteristics and demands in each may vary. Team members work together to gather specific data and relevant information in identified environments to contribute to assessment decisions.

4. **Assistive technology assessments, including needed trials, are completed within <u>reasonable timelines</u>.**

    <u>Intent</u>: Assessments are initiated in a timely fashion and proceed according to a timeline that the IEP team determines to be reasonable based on the complexity of student needs and assessment questions. Timelines comply with applicable state and agency requirements.

5. **Recommendations from assistive technology assessments are <u>based on data</u> about the student, environments and tasks.**

Intent: The assessment includes information about the student's needs and abilities, demands of various environments, educational tasks, and objectives. Data may be gathered from sources such as student performance records, results of experimental trials, direct observation, interviews with students or significant others, and anecdotal records.

6. **The assessment provides the IEP team with clearly <u>documented recommendations</u> that guide decisions about the selection, acquisition, and use of assistive technology devices and services.**

    Intent: A written rationale is provided for any recommendations that are made. Recommendations may include assessment activities and results, suggested devices and alternative ways of addressing needs, services required by the student and others, and suggested strategies for implementation and use.

7. **Assistive technology needs are <u>reassessed</u> any time changes in the student, the environments and/or the tasks result in the student's needs not being met with current devices and/or services.**

    Intent: An assistive technology assessment is available any time it is needed due to changes that have affected the student. The assessment can be requested by the parent or any other member of the IEP team.

APPENDIX H:

QUALITY INDICATORS OF ASSISITVE TECHNOLOGY IMPLEMENTATION

1. **Assistive technology implementation proceeds according to a <u>collaboratively developed plan</u>.**

   <u>Intent:</u> Following IEP development, all those involved in implementation work together to develop a written action plan that provides detailed information about how the AT will be used in specific educational settings, what will be done and who will do it.

2. **Assistive technology is <u>integrated</u> into the curriculum and daily activities of the student across environments.**

   <u>Intent:</u> Assistive technology is used when and where it is needed to facilitate the student's access to, and mastery of, the curriculum. Assistive technology may facilitate active participation in educational activities, assessments, extracurricular activities, and typical routines.

3. **Persons supporting the student across all environments in which the assistive technology is expected to be used <u>share responsibility</u> for implementation of the plan.**

   <u>Intent:</u> All persons who work with the student know their roles and responsibilities, are able to support the student using assistive technology, and are expected to do so.

4. **Persons supporting the student provide opportunities for the student to use a <u>variety of strategies–including assistive technology</u>– and to learn which strategies are most effective for particular circumstances and tasks.**

   <u>Intent:</u> When and where appropriate, students are encouraged to consider and use alternative strategies to remove barriers to participation or performance. Strategies may include the student's natural abilities, use of assistive technology, other supports, or modifications to the curriculum, task or environment.

5. **<u>Learning opportunities</u> for the student, family and staff are an integral part of implementation.**

   <u>Intent:</u> Learning opportunities needed by the student, staff, and family are based on how the assistive technology will be used in each unique environment. Training and technical

assistance are planned and implemented as ongoing processes based on current and changing needs.

6. **Assistive technology implementation is initially based on assessment <u>data</u> and is adjusted based on performance data.**

   Intent: Formal and informal assessment data guide initial decision-making and planning for AT implementation. As the plan is carried out, student performance is monitored, and implementation is adjusted in a timely manner to support student progress.

7. **Assistive technology implementation includes <u>management and maintenance of equipment</u> and materials.**

   Intent: For technology to be useful it is important that equipment management responsibilities are clearly defined and assigned. Though specifics may differ based on the technology, some general areas may include organization of equipment and materials; responsibility for acquisition, set-up, repair, and replacement in a timely fashion; and assurance that equipment is operational.

APPENDIX I:

QUALITY INDICATORS OF EVALUATION OF

ASSISTIVE TECHNOLOGY EFFECTIVENESS

1. **Team members share <u>clearly defined responsibilities</u> to ensure that data are collected, evaluated, and interpreted by capable and credible team members.**

    <u>Intent:</u> Each team member is accountable for ensuring that the data collection process determined by the team is implemented. Individual roles in the collection and review of the data are assigned by the team. Data collection, evaluation, and interpretation are led by persons with relevant training and knowledge. It can be appropriate for different individual team members to conduct these tasks.

2. **Data are collected on specific student achievement that has been identified by the team and is <u>related to one or more goals</u>.**

    <u>Intent</u>: In order to evaluate the success of assistive technology use, data are collected on various aspects of student performance and achievement. Targets for data collection include the student's use of assistive technology to progress toward mastery of relevant IEP and curricular goals and to enhance participation in extracurricular activities at school and in other environments.

3. **Evaluation of effectiveness includes the <u>quantitative and qualitative measurement of changes</u> in the student's performance and achievement.**

    <u>Intent</u>: Changes targeted for data collection are observable and measurable, so that data are as objective as possible. Changes identified by the IEP team for evaluation may include accomplishment of relevant tasks, how assistive technology is used, student preferences, productivity, participation, and independence, quality of work, speed and accuracy of performance, and student satisfaction, among others.

4. **Effectiveness is evaluated <u>across environments</u> during naturally occurring and structured activities.**

    <u>Intent:</u> Relevant tasks within each environment where the assistive technology is to be used are identified. Data needed and procedures for collecting those data in each environment are determined.

5. **Data are collected to provide teams with a means for <u>analyzing student achievement</u>**

and identifying supports and barriers **that influence assistive technology use to determine what changes, if any, are needed.**

Intent: Teams regularly analyze data on multiple factors that may influence success or lead to errors in order to guide decision-making. Such factors include not only the student's understanding of expected tasks and ability to use assistive technology but also student preferences, intervention strategies, training, and opportunities to gain proficiency.

6. **Changes are made** **in the student's assistive technology services and educational program when evaluation data indicate that such changes are needed to improve student achievement.**

Intent: During the process of reviewing evaluation data, the team decides whether changes or modifications need to be made in the assistive technology, expected tasks, or factors within the environment. The team acts on those decisions and supports their implementation.

7. **Evaluation of effectiveness is a dynamic, responsive, ongoing process that is reviewed periodically.**

Intent: Scheduled data collection occurs over time and changes in response to both expected and unexpected results. Data collection reflects measurement strategies appropriate to the individual student's needs. Team members evaluate and interpret data during periodic progress reviews.

APPENDIX J:

QUALITY INDICATORS OF ASSISTIVE TECHNOLOGY IN TRANSITION

1. **<u>Transition plans address assistive technology needs</u> of the student, including roles and training needs of team members, subsequent steps in assistive technology use, and follow-up after transition takes place.**

   <u>Intent</u>: The comprehensive transition plan required by IDEA assists the receiving agency/team to successfully provide needed supports for the AT user. This involves the assignment of responsibilities and the establishment of accountability.

2. **Transition <u>planning empowers the student</u> using assistive technology <u>to participate</u> in the transition planning at a level appropriate to age and ability.**

   Intent: Specific self-determination skills are taught that enable the student to gradually assume responsibility for participation and leadership in AT transition planning as capacity develops. AT tools are provided, as needed, to support the student's participation.

3. **<u>Advocacy related to assistive technology use is recognized as critical</u> and planned for by the teams involved in transition.**

   <u>Intent</u>: Everyone involved in transition advocates for the student's progress, including the student's use of AT. Specific advocacy tasks related to AT use are addressed and may be carried out by the student, the family, staff members or a representative.

4. **<u>AT requirements in the receiving environment</u> are identified during the transition planning process.**

   <u>Intent</u>: Environmental requirements, skill demands and needed AT support are determined in order to plan appropriately. This determination is made collaboratively and with active participation by representatives from sending and receiving environments.

5. **Transition planning for students using assistive technology proceeds according to an <u>individualized timeline</u>.**

   <u>Intent</u>: Transition planning timelines are adjusted based on specific needs of the student and differences in environments. Timelines address well mapped action steps with specific target dates and ongoing opportunities for reassessment.

6. **Transition plans address specific <u>equipment, training and funding issues</u> such as transfer or acquisition of assistive technology, manuals and support documents.**
   <u>Intent</u>: A plan is developed to ensure that the AT equipment, hardware, and/or software arrives in working condition accompanied by any needed manuals. Provisions for ongoing maintenance and technical support are included in the plan.

APPENDIX K:

QUALITY INDICATORS FOR PROFESSIONAL DEVELOPMENT AND TRAINING IN

ASSISTIVE TECHNOLOGY

1. **Comprehensive assistive technology professional development and training <u>support the</u> <u>understanding that assistive technology devices and services enable students to accomplish IEP</u> <u>goals and objectives and make progress in the general curriculum</u>.**

   <u>Intent</u>: The Individuals with Disabilities Education Act (IDEA) requires the provision of a free and appropriate public education (FAPE) for all children with disabilities. The Individualized Education Program (IEP) defines FAPE for each student. The use of AT enables students to participate in and benefit from FAPE. The focus of all AT Professional Development and training activities is to increase the student's ability to make progress in the general curriculum and accomplish IEP goals and objectives.

2. **The education agency has an AT professional development and training <u>plan that identifies the</u> <u>audiences, the purposes, the activities, the expected results, evaluation measures and funding</u> for assistive technology professional development and training.**

   <u>Intent</u>: The opportunity to learn the appropriate techniques and strategies is provided for each person involved in the delivery of assistive technology services. Professional development and training are offered at a variety of levels of expertise and are pertinent to individual roles.

3. **The content of comprehensive AT professional development and training <u>addresses all aspects</u> <u>of the selection, acquisition and use</u> of assistive technology.**

   <u>Intent</u>: AT professional development and training address the development of a wide range of assessment, collaboration and implementation skills that enable educators to provide effective AT interventions for students. The AT professional development and training plan includes but is not limited to: collaborative processes; the continuum of tools, strategies and services; resources; legal issues; action planning; and data collection.

4. **AT professional development and training address and are <u>aligned with other local, state and</u> <u>national professional development initiatives</u>.**

   <u>Intent</u>: For many students with disabilities, assistive technology is required for active participation in local, state and national educational initiatives. Content of the professional development and training

includes information about how the use of assistive technology supports the participation of students with disabilities in these initiatives.

5. **Assistive technology professional development and training include <u>ongoing learning opportunities that utilize local, regional, and/or national resources</u>.**

    Intent: Professional development and training opportunities enable individuals to meet present needs and increase their knowledge of AT for use in future. Training in AT occurs frequently enough to address new and emerging technologies and practices and is available on a repetitive and continuous schedule. A variety of AT professional development and training resources are used.

6. **Professional Development and Training in assistive technology follow <u>research-based models for adult learning</u> that include multiple formats and are delivered at multiple skill levels.**

    Intent: The design of professional development and training for AT recognizes adults as diverse learners who bring various levels of prior knowledge and experience to the training and can benefit from differentiated instruction using a variety of formats and diverse timeframes (e.g., workshops, distance learning, follow-up assistance, ongoing technical support).

7. **The effectiveness of assistive technology professional development and training is <u>evaluated by measuring changes in practice that result in improved student performance</u>.**

    Intent: Evidence is collected regarding the results of AT professional development and training. The professional development and training plan are modified based on these data in order to ensure changes educational practice that result in improved student performance.

APPENDIX L:

QUALITY INDICATORS FOR ADMINISTRATIVE SUPPORT

FOR ASSISTIVE TECHNOLOGY SERVICES

1. **The education agency has <u>written procedural guidelines</u> that ensure equitable access to assistive technology devices and services for students with disabilities, if required for a free, appropriate, public education (FAPE).**

    Intent: Clearly written procedural guidelines help ensure that students with disabilities have the assistive technology devices and services they require for educational participation and benefit. Access to assistive technology is ensured regardless of severity of disability, educational placement, geographic location, or economic status.

2. **The education agency <u>broadly disseminates</u> clearly defined procedures for accessing and providing assistive technology services and supports the implementation of those guidelines.**

    Intent: Procedures are readily available in multiple formats to families and school personnel in special and general education. All are aware of how to locate the procedures and are expected to follow procedures whenever appropriate.

3. **The education agency includes appropriate assistive technology responsibilities in <u>written descriptions of job requirements</u> for each position in which activities impact assistive technology services.**

    Intent: Appropriate responsibilities and the knowledge, skills, and actions required to fulfill them are specified for positions from the classroom through the central office. These descriptions will vary depending upon the position and may be reflected in a position description, assignment of duty statement, or some other written description.

4. **The education agency employs <u>personnel with the competencies</u> needed to support quality assistive technology services within their primary areas of responsibility at all levels of the organization.**

    Intent: Although different knowledge, skills, and levels of understanding are required for various jobs, all understand and are able to fulfill their parts in developing and maintaining a collaborative system of effective assistive technology services to students.

5. **The education agency includes <u>assistive technology in the technology planning and budgeting process.</u>**

Intent: A comprehensive, collaboratively developed technology plan provides for the technology needs of all students in general education and special education.

6. **The education agency provides access to <u>on-going learning opportunities about assistive technology</u> for staff, family, and students.**

   Intent: Learning opportunities are based on the needs of the student, the family, and the staff and are readily available to all. Training and technical assistance include any topic pertinent to the selection, acquisition, or use of assistive technology or any other aspect of assistive technology service delivery.

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7. **The education agency uses a <u>systematic process to evaluate</u> all components of the agency-wide assistive technology program.**

   Intent: The components of the evaluation process include, but are not limited to, planning, budgeting, decision-making, delivering AT services to students, and evaluating the impact of AT services on student achievement. There are clear, systematic evaluation procedures that all administrators know about and use on a regular basis at central office and building levels.