ASSISTIVE TECHNOLOGY AND INCLUSIVE EDUCATION: INVESTIGATING DECISION-MAKING AND IMPLEMENTATION IN NEW JERSEY SCHOOLS THROUGH SURVEYS AND INTERVIEWS WITH DISTRICT DIRECTORS OF SPECIAL SERVICES

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ABSTRACT

Assistive technology (AT) is any device used to increase, maintain, or improve the functional capabilities of a child with a disability. By decreasing students’ dependence on others, AT can increase the likelihood of functional independence and, consequently, increase the possibility of inclusion in the general education setting. Current AT use, AT decision-making practices, and barriers and facilitators to effective AT implementation in New Jersey public schools were investigated through survey and interviews. Directors of Special Services were randomly selected and then asked to complete a survey. Quantitative analysis of data revealed trends in AT use, correlations between various aspects of AT implementation and district factors (socioeconomic status and size), and the impact of district factors on AT implementation. Eight directors were randomly selected to participate in follow-up interviews, and the collected data were qualitatively analyzed using a Grounded Theory approach. Findings indicated that a wide variety of AT is used, but often only by a small percentage of special education students, and more often in restrictive than inclusive settings. Significant relationships were identified between district size and setting of AT use, as well as between socioeconomic status and purposeful use of AT for inclusion. Major facilitators and barriers to effective AT implementation were identified. Knowledgeable personnel, funding, and teacher buy-in were all revealed to be critical to successful AT implementation. Based upon these findings, the investigator made training and practice recommendations for New Jersey school psychologists. Training recommendations focused on education in AT, its role in inclusion and how to apply data-based decision-making and consultation knowledge to the AT process. Practice recommendations emphasized the use of standard procedures
and data-based decision-making. Practice recommendations also centered on developing teacher and administrator buy-in through support, collaboration, and education. This dissertation is intended to be used for the training and practice of school psychologists, so they can effectively address students’ AT needs, enhance special education students’ functioning and improve inclusive practices.
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CHAPTER I

INTRODUCTION

Background and Rationale

In compliance with the Individuals with Disabilities Education Improvement Act (IDEIA), school personnel seek to provide special education students with the least restrictive environments. As a result, special education students are increasingly included in general education classrooms. To improve students’ functioning in such inclusive settings, special education students are provided various accommodations. School personnel consider students’ needs when planning their placements and consider what would allow them to function optimally in their placement. These considerations include extended time, the presence of an aide, seating location, and other modifications. Assistive technology is one such consideration.

Assistive technology (AT) is broadly defined and includes any item that increases, maintains or improves the abilities of an individual with disabilities. AT includes items that are both very low-tech (pencil grip) and high-tech (augmentative and alternative communication devices) (Merbler et al., 1999). In inclusive classrooms, AT has the potential to improve the functioning and performance of children with disabilities. The functioning improved by AT can allow a student to successfully function, and thus
remain, in a general education setting, rather than be removed to a more restrictive setting (Parette et al., 2006).

The 1997 re-authorization of IDEA included a federal mandate for school multi-disciplinary teams to consider the AT needs of all special education students when developing an IEP. This has led to a shift in assistive technology, as this accommodation is now more often considered for students with mild disabilities (Edyburn, 2006). However, while schools are mandated to consider AT for all special education students, this is a vague mandate. Without any specific regulated process for AT decision-making, school personnel are left to decide for themselves what suffices for “considering AT”. As a result, the use of AT among special education students, and the consideration given to AT to allow for placement in the least restrictive environment, likely varies greatly among school districts. Wide variation of AT practices in school settings has been found within and across states (Derer et al., 1996). Little is known about the current practices, challenges, and effectiveness of AT use in inclusive educational settings (Parette et al., 2006).

New Jersey is a state with over 500 school districts (New Jersey Department of Education, n.d.b). Although regional educational technology training centers offer technical assistance regarding AT to districts and families, there is no evidence of a standardized, systematic process for the evaluation and implementation of AT for special education students placed in inclusive settings (New Jersey Department of Education, n.d.a). Therefore, the AT practices within the state’s public school districts may vary tremendously and may remain largely unknown by those outside of the district. Variation in AT decision-making among districts likely depends upon various factors, such as
personnel (knowledge and experience), administrative attitude, and district philosophy. Gaining an understanding of the current state of AT decision-making, implementation, and utilization in inclusive school settings in New Jersey will allow for determination of gaps in practice and necessary next steps in improving the practice of implementing AT to increase inclusion and improve the functioning of special education students. AT is a vital component to increase and improve inclusive practices. To improve AT use, we must first understand current AT practices.

Research Questions

1) How is assistive technology assessment conducted for special education students? What is the assistive technology decision-making process in NJ public schools?  
*Operationalized:*

   a) When the Child Study Team writes a student’s IEP, what steps are taken regarding the assistive technology component?

      i) Who conducts assessments?

      ii) What types of assessment are conducted?

      iii) If assessments for AT are conducted, how are results analyzed? By whom? Are results discussed? With whom?

      iv) Is the decision based on explicit criteria? If so: Who developed/determined these criteria? What are these criteria?

      v) Is AT decided upon before, after, or in conjunction with placement decisions?

      vi) What factors impact AT decisions in regards to placement?
vii) Who is involved in the final decision?

2) What are the barriers to employing assistive technology to increase inclusion?
   a. Within local school districts, what contextual factors impact the use of AT in increasing inclusion?

   **Operationalized:**
   i. How do the following factors either facilitate or inhibit the use of AT in inclusion: Finance? Training (for support service personnel and for teachers)? School personnel knowledge of AT? Administrative support? District philosophy? Family?

3) What is the current state of assistive technology use in inclusive educational settings in New Jersey local public schools?

   **Operationalized:**
   a. What percentage of New Jersey special education students who are in inclusive settings (either part-time or full-time) have AT written into their IEP?
   b. What type of AT is most frequently utilized by these students (most frequently written into the IEP)?
   c. Does this AT use vary by special education classification or district’s socioeconomic status (as represented by District Factor Grouping)?
CHAPTER II

LITERATURE REVIEW

Assistive Technology

Defining Assistive Technology

The term ‘assistive technology device’ means 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. (U.S. Department of Education, n.d.)

Assistive technology (AT) devices include such high tech devices as voice recognition systems and such low tech devices as pencil grips. AT includes devices used by individuals with disabilities to improve functioning in any setting (education, employment, or recreation).

AT devices can address difficulties with information input. For instance, students with certain disabilities may have difficulty using computer keyboards typically found in classrooms. Such students may benefit from a variety of alternative keyboards, such as programmable keyboards (customized with an overlay for the student or the task), chording keyboards (fewer keys, combination options, and word recognition), miniature keyboards (portable and require less finger travel), and on-screen keyboards (allow use of clicking device to choose keys). For students with limited hand and/or finger mobility, AT offers alternative input devices such as switches, push buttons, and trackballs. AT input devices also include speech input and recognition technology (Merbler et al., 1999).
AT devices may also address difficulties with written expression. For instance, for students with learning disabilities and/or keyboarding difficulties, spell checkers, word prediction software, and grammar checkers can improve students’ ability in written expression (MacArthur et al., 1996; Merbler et al., 1999). Computers may further assist students with reading, writing, and learning difficulties, by providing support, training and strategies for note-taking, outlining, concept-mapping, and other study skills (Anderson-Inman, 1999). These technologies can allow students to more independently complete writing assignments.

Electronic text presents numerous opportunities to act as assistive technology and to improve students’ academic functioning. Supported eText is electronic text that has been expanded to provide more support to the reader. This is done by embedding supports (vocabulary definitions), presenting text in multiple ways (text-to-speech), and including links to additional resources. Such supportive modifications transform electronic text into an assistive technology for students. Researchers have found that assistive technology specialists and reading specialists support providing electronic text to students with reading difficulties, and frequently support this electronic text with additional resources (Anderson-Inman & Horney, 2007).

Although there is limited research on supported eText in general and its effects on students’ learning, the specific modifications found in supported eText have been validated in research. Text-to-speech technology has been found useful for students with vision impairments and for those with reading difficulties. Specifically, this technology has been found to significantly improve the reading comprehension of students with reading difficulties (Anderson-Inman & Horney, 2007). Furthermore, among students
with learning disabilities, computer-read tests have been demonstrated to result in significantly higher scores on math performance assessments when compared to standard administration (no reader) (Calhoun, Fuchs, & Hamlett, 2000).

Illustrations and graphics are another type of modification found in supported eText. When combined with electronic text, illustrations and graphics have been found to increase active engagement and promote greater understanding when compared to text alone (Anderson-Inman & Horney, 2007).

Assistive technology also comes in the form of various low tech devices, which can also help students with disabilities more fully participate in school activities. For instance, low-tech devices to address communication needs include common word lists, calendars, and picture symbol boards. These devices can allow students to communicate about everyday activities and may be used to teach language concepts. To accommodate movement needs, students may be provided positioning devices (wedges, standers) and adaptive desks and chairs. Such devices can provide stable, physical support to students when they need to sit or stand, so that they can participate in class activities. Sensory difficulties may be addressed with devices such as sensory brushes and weighted vests, which can provide sensory input and help students to concentrate on class activities. Adaptive scissors and pencil grips can assist students with motor and learning difficulties by helping students to position their fingers correctly and perform necessary classroom tasks. Such low tech AT devices address the varied needs of students with disabilities and can allow these students to be included and function successfully in the classroom (Judge, Floyd, & Jeffs, 2008).
Although the focus of assistive technology in schools is often on improving a child’s academic functioning, AT also has been found to have social and emotional benefits for students with disabilities. Self-esteem and peer interactions can impact students’ academic achievement, making these factors especially relevant for schools (Vermillion, Hannafin, & Whitescarver, 2007).

Research has indicated that students with speech disabilities tend to have more negative self-concepts than those without communication difficulties. Such students are more at risk for low self-esteem. Furthermore, research indicates that students with voice or language disabilities are perceived more negatively by peers, and students with communication disabilities tend to have fewer and less satisfying social relationships (Vermillion, Hannafin, & Whitescarver, 2007).

Augmentative or alternative communication technology (AAC) provides ways for individuals with speech difficulties to engage in expressive and receptive communication. Examples of AAC include adaptive keyboards and display monitors. When students with disabilities use such technology to communicate, research has found that their peers perceive them more positively. Peers can recognize the thoughts and ideas of the students with disabilities and, therefore, engage in more communication. Furthermore, students with disabilities have been found to have increased self-esteem when they have access to computer use in the classroom. Researchers have hypothesized that this is due to increased sense of control over the environment and greater respect from peers. Increases in self-expression and, subsequently, self-concept, have also been demonstrated when students with disabilities use computers in classrooms (Vermillion, Hannafin, & Whitescarver, 2007). The research on self-concept and self-esteem demonstrates the
social and emotional benefits to be gained by students with disabilities through the use of various forms of assistive technology.

AT can serve multiple functions for students with disabilities, helping them academically, socially and emotionally. Devices come in assorted forms, ranging in complexity from very low tech materials to high tech computer programs. All of these devices can help students more fully participate in the general education classroom and curriculum.

*Special Education, Inclusion, and Legislation*

Over the past two decades, assistive technology (AT) has received increasing attention. While the number and type of devices available have increased, awareness of the potential advantages of AT has also grown. This increase in awareness and availability has largely been the result of legislation. The Technology-Related Assistance for Individuals with Disabilities Act of 1988 was a milestone resulting in greater focus on AT’s potential for improving the functioning of individuals with disabilities. Then, in 1998, the Assistive Technology Act directly stated benefits to be gained when individuals with disabilities use AT. Broadly, this act stated that AT can more fully allow individuals to participate and perform tasks in social, educational, and employment settings.

Such devices and adaptations increase the involvement of such individuals in, and reduce expenditures associated with, programs and activities such as early intervention, education, rehabilitation and training, employment, residential living, independent living, and recreation programs and activities, and other aspects of daily living. (Alper & Raharinirina, 2006)

In the year prior to this act, another milestone in AT occurred when the 1997 re-authorization of IDEA mandated school personnel to consider assistive technology during
the planning of special education students’ individualized education programs (IEP) (Edyburn, 2006). The 2004 re-authorization, the Individuals with Disabilities Education Improvement Act (IDEIA), emphasized educating special education students in inclusive settings and re-stated the AT consideration mandate. AT may be part of a student’s special education program, a related service to special education, or a supplementary aid or service.

Today, American public schools must ensure that students have “access to the general education curriculum in the regular classroom, to the maximum extent possible” (U.S. Department of Education., n.d.). To provide students with maximum access to the regular classroom, school personnel consider a variety of accommodations that would allow the student to function effectively in the regular classroom. Due to the 1997 and 2004 IDEA re-authorizations, AT now always must be considered when determining the accommodations needed by a student. School personnel must consider how AT can help students achieve increased access to the general classroom and curriculum (Alper & Raharinirina, 2006).

Inclusion

Defining Inclusive Education

Inclusion is often thought to mean the placement of students with disabilities in a general education setting. While inclusive education under the law most directly means the participation of students with disabilities in the general education curriculum, this participation involves more than mere physical presence. Voltz, Brazil, and Ford (2001) emphasize that inclusive education involves meaningful participation and interaction between the student with disabilities and the teacher and non-disabled peers. Inclusion
also involves a climate of belonging and acceptance among all students in the classroom. Furthermore, Voltz et al. point out that another component of inclusion is shared ownership among faculty for the learning of all students, regardless of teachers’ specialization. The aim of inclusion is to increase the participation of special education students in the general education curriculum, which includes increasing the interaction of special education students with general education teachers and with students without disabilities (Voltz, Brazil, & Ford, 2001).

**Impact of Inclusion**

Downing and Peckham-Hardin (2007) investigated the impact of inclusion on students with moderate to severe disabilities. The researchers interviewed 58 stakeholders, who included teachers, parents and para-educators. The interviewees were part of three inclusive schools, pre-school through middle school. At the inclusive schools, students were grouped by chronological age, regardless of disability. The schools integrated support services in general education, and staff were trained on inclusive practices. The three schools were entirely inclusive with no self-contained classrooms. Students with disabilities were never more than 20% of the students in a class. In Downing and Peckham-Hardin’s study, interviewees reported benefits for all students in the classroom, not only for those with disabilities. The interviewees reported academic and social improvements for students with disabilities, while the benefits for non-disabled peers included awareness and tolerance of differences, increase in empathy, and acquisition of unique skills (i.e. using AT) (Downing and Peckham-Hardin, 2007).

Salend and Duhaney (1999) conducted a literature review of the impact of inclusive education on students with and without disabilities and the impact on teachers.
Studies of inclusion indicate mixed results regarding the academic and social impact of inclusion for students with disabilities. In some studies reviewed by Salend and Duhaney, students with disabilities in inclusive classrooms performed similarly to peers without disabilities and outpaced students with disabilities receiving services through more traditional delivery models. However, in other studies, students with disabilities in inclusive classrooms did not demonstrate improved academic performance. While some studies indicated that students with disabilities placed in inclusive settings demonstrated improved test scores, reading performance, IEP goal mastery, behavior, motivation, and transition to adulthood, other studies indicated that students in inclusive settings did not always receive the specialized instruction they require to meet their needs. Some studies indicated students with disabilities achieved more academically under pull-out and resource room service delivery models than in inclusive settings (Salend & Duhaney, 1999).

Social findings for students with disabilities were also mixed. Some studies reviewed by Salend and Duhaney (1999) found students with disabilities experienced increased social interactions and friendships when placed in inclusive settings. In particular, students with mild disabilities were found to develop reciprocal friendships and to have self-concepts similar to peers without disabilities when educated in inclusive settings. However, other studies indicated that students with disabilities in inclusive settings experience more rejection by peers without disabilities and have lower self-perceptions than these peers (Salend & Duhaney, 1999).

The literature review by Salend and Duhaney (1999) did indicate conclusive findings for students without disabilities. When educated in inclusive classrooms,
students without disabilities experienced positive social outcomes and did not experience any significant impact on their academic performance. Students without disabilities in inclusive classrooms demonstrated increased acceptance of differences. Studies of students without disabilities indicated that these students view inclusion positively. The studies reviewed by Salend and Duhaney found that students without disabilities were not academically impacted by inclusion.

A more recent study compared the experiences of middle school students with significant disabilities in general education and in self-contained settings (Matzen et al., 2010). The students spent time each day in both settings. The researchers found that in the general education setting, the special education students experienced more instructional time, less self-injurious and self-stimulatory behaviors, and improved academic performance. The researchers note that there exist numerous differing variables between the two settings that may account for the findings. The study did not allow for causal conclusions, but the findings support positive academic and behavioral outcomes of including special education students in general education classes.

In sum, literature on the impact of inclusion is mixed for students with disabilities, though many studies support positive academic and social impacts for these students. The research largely indicates positive social impacts of inclusion for students without disabilities, and a lack of academic impact. The lack of academic impact is significant in allaying concerns that inclusion may negatively affect students without disabilities.
Implementation of Inclusion

McLeskey et al. (2001) investigated teachers’ perceptions of inclusion and the impact of teacher involvement in decision-making on teachers’ perceptions. In this study, teachers from six schools completed a survey about their perspectives of the inclusion of students with mild disabilities. Teachers from three of the six schools were in their first year of inclusion teaching, while the other teachers were not yet involved in inclusion. In the schools implementing inclusion, there was collaboration among special and general education teachers. Teams at each school developed an inclusion program to meet their school’s needs. The teams included faculty and administrators, and emphasized that the goal was not to replicate a special education program within a general education classroom, but rather to provide the student with the appropriate education services to meet his/her needs based on the available services and the general education curriculum. The teams reviewed and modified school organization and structuring to allow faculty and staff to provide students with the appropriate services and instruction (McLeskey et al., 2001).

During the first year of inclusion program implementation, the teachers were surveyed. Findings from the survey indicated that teachers involved in the inclusion program development and implementation held significantly more positive perceptions about inclusion than teachers who were not involved in the inclusion program development or implementation. The teachers not involved in inclusion indicated concerns about maintaining special education services, the impact of inclusion on non-disabled students, the skills of general education teachers to meet the needs of special education students, and the behavior of students with disabilities. Those teachers
involved in the inclusion program development and implementation had the opportunity to address these concerns during program development, and also had the opportunity to gain experience overcoming such difficulties. This likely served to alleviate such concerns, and supports the importance of involving teachers in decision-making and program development. The researchers concluded that successful inclusion largely depends upon collaboration among administrators and teachers. When teachers have a role in making decisions and developing programs, they are more likely to feel positively toward the program (McLeskey et al., 2001).

In their study of three inclusive schools, Downing and Peckham-Hardin (2007) also identified components necessary for successful inclusion. The researchers concluded that the critical components for successful inclusion are: collaboration among staff, support for students with disabilities and for staff, positive attitude among staff, and strong parent-professional collaboration. In particular, teachers noted the need for support, the need for individualized strategies for students with disabilities, and the need for collaborative, highly qualified teams.

Assistive Technology, Student Functioning, and Inclusion

Researchers have demonstrated that AT can improve the functioning of students with disabilities (Parette et al., 2006). “AT can facilitate inclusion of students with disabilities by making previously difficult or impossible tasks feasible” (Merbler et al., 1999). AT acts to scaffold students’ academic progress and provides students with ways to overcome barriers (Messinger-Willman & Marino, 2010). With AT, students can perform school tasks more quickly and accurately, thereby more actively participating in
the class (Messinger-Willman & Marino, 2010). However, research on AT effectiveness and outcomes, as well as effective planning and training, is scarce in the literature.

In 2005, AT experts (higher education, government, vendor, public school personnel) gathered at an AT Outcomes Summit to address current issues in the field of AT. A major issue addressed at the summit was the monitoring of AT effectiveness and outcomes, for which schools receive little guidance and for which there remains little literature. The participants discussed the lack of evidence of AT use and academic performance, and the impact of this lack of evidence on current state practices regarding AT (Parette et al., 2006).

Summit participants noted that problematically, when AT is considered, it is increasingly considered in relation to assessment performances, rather than in relation to classroom functioning. Participants attributed this to the increased emphasis on statewide assessments resulting from No Child Left Behind. Furthermore, misconceptions regarding the fairness of AT devices used during assessments may be impacting students’ utilization of such devices. However, also noted at the Summit, AT is likely to continue to gain increased attention, particularly due to anticipated growth in the use of the response to intervention (RTI) model. AT can minimize deficits in the classroom and increase student participation in general education curriculum, thereby functioning as an effective in-class intervention for the RTI model (Parette et al., 2006).

However, education professionals need to receive training regarding effectively providing AT services, and teachers need training on integrating AT into curricula and classrooms. National standards are lacking in practices for effective consideration of AT by IEP teams. How to effectively consider AT for special education students has yet to
be clearly determined and defined in terms of practices. Therefore, schools implement varying systems, and may rely on failure. When a student fails to perform adequately, then AT is more carefully considered and implemented (Parette et al., 2006).

In reviewing the literature on assistive technology, Alper and Raharinirina (2006) also found gaps in research on AT effectiveness. The researchers reviewed 60 articles covering 68 studies. Fifty-four of these studies investigated AT effectiveness in individuals’ skills, five examined AT development, and four were replication studies. While the most commonly examined dependent variable was skill improvement and the most common training setting among the studies was the general education classroom, the studies rarely examined skill generalization, skill maintenance or functional skills (e.g. communication). Little research was found that examined how individuals utilize AT and the skills gained via AT when individuals are in settings other than the training setting. Additional research is needed in helping individuals with disabilities to maximize AT use across settings and gain full educational benefits. Furthermore, scarce literature on collaboration and assessment pointed to the need for research on collaboration between families of individuals with disabilities, teachers, and service providers across settings.

The gaps in AT research literature leave school personnel with little guidance regarding AT consideration and decision-making. There is little evidence that all students with mild disabilities (who are often in the general education setting) receive appropriate AT (Edyburn, 2006). Without policy, school personnel are left to develop their own systems. However, Todis (1996) found that students’ needs are only met with AT if the following conditions are met: the IEP is based on the family’s goals and values,
the student’s goals and AT are connected, collaboration occurs between family, school professionals and the student, ongoing communication occurs among these people, and problems with AT are resolved as soon as they arise. Messinger-Willman and Marino (2010) delineated the numerous barriers to effective AT use. Effective AT requires effective selection, acquisition, implementation, and integration of AT into curricula. Barriers to these processes include inadequate knowledge of AT among education professionals, lack of ability among educators to integrate AT into curricula, lack of professional development opportunities, lack of specific guidelines for consideration of AT by IEP teams, lack of funding, lack of collaboration during AT selection, lack of time, lack of AT specialists, and educators’ attitudes toward AT integration. Professional development is a critical component to increasing and improving AT implementation effectiveness (Messinger-Willman & Marino, 2010). While these researchers point to the key ingredients for optimal AT effectiveness, the gaps in further research on best practices and little guidance from policy results in widespread variation of AT practices in school settings both within and across states (Derer et al., 1996).

Decision Making in Schools

Decision Making Variables and Models

Decision making in schools may involve issues as varied as an individual special education student’s education program, school-wide intervention implementations, and various accommodation considerations. In special education, decisions involve individual students’ eligibility for special education, his/her education program, accommodations, and assessment procedures. The process of decision making includes
variables such as the data sources utilized, personnel involved, collaborative process, and final decision determination. Researchers have investigated decision making in schools to better understand the process.

Education decisions are frequently based upon the outcome, rather than the methods. Walser (2009) encourages the use of systemic data-based decision making to inform methods and practices. In this approach, the data used by school systems is the work. Instead of tests, schools use work products, of students, teachers, and administrators, to make decisions. The systemic perspective requires decision-makers to consider the student within the context of the school and district. In special education, multi-disciplinary teams attempt to gather data from multiple sources to make an informed decision. Factors in the student’s learning environment, as well as cultural and linguistic factors are to be considered when determining eligibility and education programming for the student. Making decisions based upon systemic data and work products allows personnel to avoid making decisions based only upon test data. As Walser urges, education decisions impact the entire system, not only the student, therefore, input and process data, as well as output data, are important. To assess and improve schooling, education personnel need meaningful information about daily learning experiences, rather than only test performance. Walser (2009) emphasizes that schools are “complex living systems”, and require thorough consideration of various data when making decisions about both the school system and the individual student.

In Minneapolis public schools, professionals employ the problem-solving model (PSM) when making decision about general education interventions, special education referral, and special education evaluation and eligibility. PSM is a collaborative process
to address student needs. It is data-driven, as intervention decisions are based on student response to instruction. Marston, Muyskens, Lau, and Canter (2003) reviewed the problem-solving model in Minneapolis schools.

The structure of the problem-solving model is similar to what many education professionals today understand as “response to intervention” (RTI). In the problem-solving model, the first step is classroom interventions. If such interventions are not successful, then the school’s multi-disciplinary team revises these interventions and considers cultural or linguistic variables that may be relevant to the student’s performance. The multi-disciplinary team periodically reviews the student’s progress and continues to make any necessary instructional changes. Also, at this stage, the team defines concerns, documents the student’s present levels of performance, determines appropriate goals, clarifies intervention plans, and monitors results. If the student does not progress adequately with these general education interventions, then he/she is referred for a special education evaluation. The evaluation is based on multiple data sources, which include the student’s response to interventions at earlier stages, adaptive behavior information (may be gathered from formal assessment), observations of the student in his/her learning environment, and direct interaction with the student using either a norm-referenced instrument or non-standard, broad-based procedures that assess the student’s problem-solving abilities, learning rate, and ability to generalize learning. The team must also consider cultural, linguistic, and economic factors during the special education evaluation (Marston et al., 2003).

Upon reviewing the practice of PSM in the Minneapolis schools, Marston et al. (2003) concluded that the multiple data sources and team decision making required by
PSM, while valuable, also function as limitations of the model. The problem-solving model requires all personnel to be trained in order to make the implementation systematic and consistent. Yet, although PSM attempts to operationalize judgments, it is subject to inconsistencies across settings as local norms and personnel implementation can vary.

Collaboration between general and special education personnel is emphasized by the problem-solving model. However, this collaboration, as well as the high involvement of teachers in data collection and student progress-monitoring can be burdensome to teachers, and requires training and time allotment for teachers to fulfill these responsibilities (Marston et al., 2003). In sum, the problem-solving model is valuable in making informed and effective decisions, but it is costly and requires careful planning and consideration (Marston et al, 2003).

*Assistive Technology Decision Making*

While some researchers have investigated particular elements of decision making and specific models utilized by schools, others have attempted to gain insight into schools’ decision making process regarding particular issues. Tucker, Jones, and Cappa (2008) investigated assistive technology decision making at four school districts in Pennsylvania. As stated earlier, legislation mandates consideration of AT for all special education students. However, the process for considering and determining AT for students is largely left up to school personnel. The research study of Tucker et al. addressed the procedure for determining AT needs, the dynamics of decision making, the cohesiveness of general and special education programs, and issues that impact AT service delivery in four Pennsylvania school districts.
To gather data on decision making, the researchers conducted interviews with teachers, administrators, technology specialists, and AT consultants. Interviews were audio-taped, and then transcribed and coded to identify themes. With this data, Tucker et al. (2008) identified a common, general process for identifying AT needs. The overall process employed in all four districts was a team approach, but the director of special services consistently made the final decision for acquiring a device. The process began with the IEP team meeting to discuss a child’s needs. The IEP meeting included teachers, related services personnel, psychologists, parents, child (sometimes), special education director, and local school representative. At this meeting, the team would identify “features” of the device needed by the child (Tucker et al., 2008).

Identifying features rather than naming a specific device allowed the team the opportunity to change the AT recommendations in the IEP if needed. This was important in allowing the team to ensure that the child was successful with the device first. Additionally, identifying the device by features, rather than by name in the IEP, allowed the team to replace the AT with a similar device if the device became damaged. If the device was specifically named, then personnel would be mandated to replace it with the exact same device within one day. All districts investigated in this study utilized this logic and named features, rather than specific AT devices (Tucker et al., 2008).

Once the team determined the needed AT, the director of special services would acquire the device, borrowing it from a loaning library for the trial phase. Upon acquisition of the device, teachers and aides were trained on its use. The initial use of the AT by the student was considered a trial phase, during which staff kept data on the child’s use of the device. If the student demonstrated success with the AT, then the
director attempted to purchase the device. However, if the student was not successful with the device, then the IEP team re-convened to discuss alternative devices, and try the process again (Tucker et al., 2008).

All four school districts followed this general process, but they differed in execution and dynamics of the decision making process. One school district had mutual trust among staff and had a problem-solving special education director. This school was pro-active in dealing with AT issues and its staff believed they could acquire any device needed. Another school was more passive in their approach to AT. The personnel in this school had experienced rejection when acquiring AT in the past. In a third district, personnel wanted to learn more, but the director was not very involved. All staff in this district communicated that concerns about the budget influenced device acquisition. The fourth school demonstrated concerns for everyone’s input and emphasized building consensus (Tucker et al., 2008).

Tucker et al. (2008) concluded from this study that in order to have a decision making process that is pro-active, a school must have: teamwork, belief that devices needed can be acquired, a supportive and knowledgeable director, and strong on-site AT support (typically a speech therapist).

Additionally, this study led the researchers to conclude that despite major increases in inclusive practices, the infrastructure of special and general education still remain largely separate. In all four school districts of the study, general and special education operate with separate budgets and technology support.

Tucker et al. (2008) identified concerns for AT service delivery based upon the data gathered from the districts. These concerns include funding, overdependence on the
The research study conducted by Tucker et al. (2008) confirms the notion that inclusion requires increased collaboration between special and general education teachers. Inclusion also requires knowledge of interventions, services, and strategies for
collaboration. “[An] understanding of how AT decisions can or should be made is essential to the success of the inclusion model” (Tucker et al., 3).

While this research suggests some general consistencies among schools in AT decision making, there are many variables and steps involved in determining a student’s AT needs and acquiring and implementing AT for the student. Given that legislation only instructs schools to consider AT, there is room for great diversity in this process among schools. In efforts to provide clarity and structure to education professionals, some education researchers and professionals have published guidelines for AT determination. Copenhaver (2004), employed at the Mountain Plains Regional Resource Center affiliated with Utah State University, published guidelines for educators about AT for students with disabilities.

The guidelines were published in response to the re-authorization of IDEA requiring IEP teams to consider AT for all students with disabilities. These guidelines outline legal responsibilities, training issues, equipment considerations, funding issues, and a sample of technology accommodations. According to the guidelines, under IDEA, procedures to identify a student’s AT needs are no different from those used to determine special education needs and IEP development (Copenhaver, 2004).

These guidelines outline the process of AT consideration within the typical IEP process. Questions regarding AT needs should be a part of the assessment for special education eligibility and needs. These questions should be part of the assessment plan presented to parents. Upon consent, the comprehensive evaluation should determine whether further AT evaluation is needed. Following the evaluations, if the student is found eligible for special education, then the IEP is developed and includes needed AT
devices and services. A trial period and evaluation for the device and/or service is determined. Funding and AT is then acquired. Parents, student, and staff are trained on the use of the AT devices/services. Next, AT is implemented in the least restrictive environment. Lastly, the student’s IEP, including AT, is reviewed at least annually, and necessary modifications are made (Copenhaver, 2004).

Of note, the guidelines indicate that AT should, in fact, initially be considered prior to special education referral. When the building level support team (Intervention & Referral Services team) considers general education interventions for a child, they should consider two technology questions: What AT options should be tried before referral? (i.e. word processor for handwriting difficulties), If AT was used as part of earlier intervention strategy, how effective was it in helping the student adequately achieve in the class? (Copenhaver, 2004).

During special education eligibility assessment, questions regarding AT needs should be asked. However, even before assessment occurs, the planning team must consider whether the student can be accurately assessed with standard procedures without accommodations. If the student currently uses AT, should it be used during the assessment? Has the student previously had an AT evaluation? Is there need for an AT evaluation? (Copenhaver, 2004).

When assessing for AT needs, the multi-disciplinary team should consider what tasks the student is expected to perform that he/she currently cannot, what AT may assist the student in such tasks while remaining in the least restrictive environment, whether a low-tech device may meet the student’s needs, whether the device matches the student’s educational needs and abilities, and whether the device is suitable over time. Gathering
answers to these questions should lead the team to conclude the most appropriate AT for
the student (Copenhaver, 2004).

In discussing the IEP, the guidelines assert that at least one member of the IEP
team must be knowledgeable about AT. However, no details are provided regarding the
training or qualifications of such an individual (Copenhaver, 2004).

If AT is part of the student’s educational program, then the IEP team should
consider whether AT services are needed to help the student use the device, whether the
device is to be used in the general education curriculum, if staff require training to use or
help the student use the device, if the family needs training in implementing the AT, and
whether the student will need the device at home to complete schoolwork. The
guidelines point out that the team must consider whether the AT enables the student to be
served in the least restrictive environment (Copenhaver, 2004).

In addition to the considerations regarding assessment and planning for AT, the
IEP team must also consider implementation concerns. The guidelines recommend that
the IEP indicate the individual responsible for monitoring and implementation. If
equipment fails, the IEP should provide for a contingency plan. Collaboration among
staff in all school settings must be considered, so that the student’s AT use is coordinated.
Staff training is an important consideration, so that the AT does not inhibit the student’s
inclusion in the general education setting. To ensure that the AT is not a hindrance to
inclusion, after initial implementation, staff should continually consider whether the
device/services are being utilized, whether they are functioning as expected, and whether
the student is being supported by the AT as expected (Copenhaver, 2004).
The guidelines assert that when the IEP is annually reviewed, the AT should also be reviewed. The effectiveness of the AT should be evaluated and any needed modification made at the time of IEP review. If the student is transitioning to a new setting, then considerations should include any training needs of staff at the new setting (Copenhaver, 2004).

The guidelines published by the Mountain Plains Regional Resource Center provide educational professionals with guidance in determining students’ AT needs and implementing appropriate AT (Copenhaver, 2004). It is specified in the guidelines that schools must have at least one professional with knowledge and expertise in AT. Without such an individual, many of the questions suggested by the guidelines may not be answerable, and as a result, AT decisions will be made by uninformed professionals. However, the details of the training and qualifications of this individual are not specified. The guidelines provide valuable structure to the task of considering AT. However, as Edyburn (2006) noted, students with mild disabilities may not receive AT, as their unique needs may be overlooked. The guidelines do not specify how to make AT decisions for students with mild disabilities, as the guidelines are general for all students. AT decision making for the various populations within special education is an area requiring further investigation.
A sample of school districts within New Jersey was selected using random sampling. The school districts were sampled based upon District Factor Grouping (DFG) to gain a representative sample of school districts in New Jersey. DFG is based upon data gathered in the 2000 census and is determined by socioeconomic status of the neighborhood served by the district. The six indices used to determine socioeconomic status and subsequent DFG include percent of adults with no high school diploma, percent of adults with some college education, occupational status, unemployment rate, percent of individuals in poverty, and median family income (New Jersey Department of Education, 2004).

There are eight DFG categories (A, B, CD, DE, FG, GH, I, and J). The DFG “J” indicates a community with the highest socioeconomic status based upon the DFG indices (i.e. highest median family income, highest percent of adults with college education, and lowest percent of individuals in poverty). Only 25 school districts in New Jersey are rated with a DFG “J”. DFG “A” indicates a community with the lowest socioeconomic status based upon the DFG indices (i.e. lowest median family income, highest percent of individuals in poverty). Only 39 school districts in New Jersey are
rated with a DFG “A”. The DFGs between A and J represent different levels of socioeconomic status. There are over 50 school districts in each of these remaining groupings.

Of the 549 school districts in New Jersey, 270 were sampled for this study. From each DFG, 35 school districts were randomly selected. Because DFG “J” only has 25 schools, all “J” school districts were sampled.

The participants were Directors of Special Services, or individuals in similar positions with different job titles (i.e. Supervisor of Special Services, Director of Pupil Services, Director of Student Services, and Supervisor of Child Study Team). Therefore, the population from which the sample was selected included all Directors of Special Services in all school districts in New Jersey. It was assumed that individuals in this position would have responsibility for overseeing the Child Study Team and special education services provided within the district. Therefore, it was expected that such individuals would have knowledge of the assistive technology services and procedures implemented throughout the district. Participants included Directors from districts of variable size, grade level, and geographic location.

Sample

A total of 270 Directors were selected from the population of 549. All 270 were mailed the survey at the same time. A total of 74 surveys were completed and returned. Three surveys were returned, but not completed. These surveys were returned with notes that for various reasons a Director was unavailable to complete the survey. One of the 74 returned was unable to be identified, as it was sent back in a different envelope and
missing the attached code. Therefore, a total of 73 completed surveys were able to be used in this study.

A total of 44 Directors consented to participate in a follow-up interview. From this population, a total of eight Directors were sampled randomly to be interviewed. This sample included one from each DFG. Table 1 illustrates the breakdown by DFG of completed, returned surveys and interview consent.
Sample Breakdown 1

Table 1
Surveys completed and interview consent received by DFG (N = 73)

<table>
<thead>
<tr>
<th>DFG</th>
<th>Surveys Completed</th>
<th>Interview Consent Received</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>B</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>CD</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>DE</td>
<td>13</td>
<td>6</td>
</tr>
<tr>
<td>FG</td>
<td>14</td>
<td>9</td>
</tr>
<tr>
<td>GH</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>I</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>J</td>
<td>6</td>
<td>3</td>
</tr>
</tbody>
</table>
Table 2 provides a breakdown of characteristics for the sample of districts from which Directors completed surveys. Table 2 shows how many Directors completed surveys from each type of school district (Grades 1-8, 7-12, 9-12, K-12, K-6, K-8) organized by DFG.

Sample Breakdown 2

<table>
<thead>
<tr>
<th>DFG</th>
<th>1-8</th>
<th>7-12</th>
<th>9-12</th>
<th>K-12</th>
<th>K-6</th>
<th>K-8</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>4</td>
<td>1</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>B</td>
<td>7</td>
<td></td>
<td>3</td>
<td>10</td>
<td></td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>CD</td>
<td>4</td>
<td>1</td>
<td>4</td>
<td>9</td>
<td></td>
<td></td>
<td>9</td>
</tr>
<tr>
<td>DE</td>
<td></td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>FG</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>5</td>
<td>14</td>
</tr>
<tr>
<td>GH</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I</td>
<td>1</td>
<td>4</td>
<td>4</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1</td>
<td>3</td>
<td>5</td>
<td>29</td>
<td>7</td>
<td>28</td>
<td>73</td>
</tr>
</tbody>
</table>
Table 3 illustrates how many Directors completed surveys from various sizes (enrollment) of school districts (very small = <500 students, small = 500-1000 students, medium = 1001-5000 students, large = >5000 students) for each county. Enrollment data were obtained from the National Center for Education Statistics.

*Sample Breakdown 3*

<table>
<thead>
<tr>
<th>County</th>
<th>District Size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Large</td>
</tr>
<tr>
<td>Atlantic</td>
<td></td>
</tr>
<tr>
<td>Bergen</td>
<td>1</td>
</tr>
<tr>
<td>Burlington</td>
<td>1</td>
</tr>
<tr>
<td>Camden</td>
<td></td>
</tr>
<tr>
<td>Cape May</td>
<td>1</td>
</tr>
<tr>
<td>Cumberland</td>
<td>1</td>
</tr>
<tr>
<td>Essex</td>
<td>1</td>
</tr>
<tr>
<td>Gloucester</td>
<td>4</td>
</tr>
<tr>
<td>Hunterdon</td>
<td>2</td>
</tr>
<tr>
<td>Mercer</td>
<td>1</td>
</tr>
<tr>
<td>Middlesex</td>
<td>1</td>
</tr>
<tr>
<td>Monmouth</td>
<td>2</td>
</tr>
<tr>
<td>Morris</td>
<td>1</td>
</tr>
</tbody>
</table>
Continued – Table 3

<table>
<thead>
<tr>
<th>County</th>
<th>Large</th>
<th>Medium</th>
<th>Small</th>
<th>Very Small</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ocean</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Passaic</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Salem</td>
<td>2</td>
<td></td>
<td>2</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Somerset</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>Sussex</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Union</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td></td>
<td>4</td>
</tr>
<tr>
<td>Warren</td>
<td>2</td>
<td></td>
<td></td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>10</td>
<td>33</td>
<td>14</td>
<td>16</td>
<td>73</td>
</tr>
</tbody>
</table>
Procedure

The sample of selected school districts was developed using random sampling of each DFG. Districts were organized into separate spreadsheets for each DFG. (For instance, all “A” districts were listed in one spreadsheet.) These initial lists were created from the list of all school districts in the New Jersey Department of Education district directory. Therefore, the order was based upon the NJDOE order. Once in separate spreadsheets by DFG, each district was assigned a random number using the random number function in Microsoft Excel. Districts were then ordered from smallest to largest random number. The first 35 districts in each spreadsheet were selected for the sample.

Once districts were selected for the sample, they were assigned codes based upon their district factor grouping and an assigned number. This code was placed on the survey sent to the district, so that upon return, the principal investigator was able to determine who responded. This identifiable information was used to allow the principal investigator to sample the districts that responded to then contact Directors for follow-up interviews. This information was also used to determine the types of districts that responded (size, grade levels, geographic region, and DFG).

The Director of Special Services in selected school districts was mailed a survey and letter asking him/her to complete the survey. The letter can be found in Appendix A. The letter and survey served as the informed consent form. If the Director did not wish to participate, he/she simply did not respond to the survey. Return of a completed survey was considered indicative of informed consent. Additionally, the mailing included an informed consent form for a follow-up interview. The interview informed consent form
can be found in Appendix B. If returned with a completed survey, the Director was included in the population to be sampled for interviews.

Surveys were mailed to all directors in the sample in late September 2010. Then in early November 2010, directors who had not responded were contacted via email. Only those directors whose email addresses could be found through school districts’ websites were contacted. These directors were sent an email explaining the survey and referencing the earlier mailing. The email included the survey as an attachment, providing directors with the opportunity to complete the survey electronically. One participant responded and submitted the survey via email. During this time, additional surveys were returned via mail. Survey collection was completed by December 2010.

Upon return of completed surveys, the principal investigator selected a sub-sample from within the sample of interview informed consent forms. These again were selected using random sampling. A spreadsheet was created for all participants who consented separated by DFG. Then within each DFG group, each participant was assigned a random number using the random number function in Microsoft Excel. The participants were then ordered from lowest to highest random number within each DFG group. The lowest random number (the first in each list) was selected for the interview sample. This sample was then contacted via phone and asked to participate in a phone interview. Phone interviews were scheduled at the convenience of participants. Interviews lasted between 25 and 40 minutes. Because interviews were conducted by phone, audio recordings could not be completed. Therefore, the principal investigator typed the participants’ responses as the participants spoke. During each interview, the investigator read back responses to the participant to monitor for accuracy before
proceeding to further questions. Also, although the interview protocol was used for each interview, the principal investigator asked additional follow-up questions on an individual basis when necessary to clarify responses.

Instruments

The survey was developed to gather quantitative data regarding AT use and decision-making in public schools. The survey can be found in Appendix C. To develop this survey, the principal investigator gathered feedback from two individuals presently or previously employed as supervisors of special services. These individuals provided feedback about the length of time required to complete the survey and the content and format of the survey. The feedback was used to finalize the survey. The final survey contained 21 items total. Twenty items addressed AT use and decision-making. The final item asked the respondent to indicate whether he/she would participate in a follow-up phone interview, and if so, to provide a phone number. Six items asked for yes or no responses. The remaining 14 items provided a list of choices for the respondent to check. The respondent was instructed whether to check one or all that apply. Survey questions broadly covered the following topics: (a) type, frequency, purpose and location of AT use; (b) individuals involved, factors considered, and steps in AT decision-making; (c) personnel expertise in AT; and (d) AT monitoring.

The interview protocol was developed to gather qualitative information following the survey data collection. The interview protocol can be found in Appendix D. The interview included eight open-ended questions. Interview questions covered the following topics: (a) AT decision-making processes; (b) AT monitoring; (c) use of
consultants for AT decision-making and implementation; (d) placement decisions and inclusion with regards to AT decision-making; and (e) facilitators and barriers to AT decision-making and implementation.

Research Questions

1) What is the current state of assistive technology use in New Jersey public schools?
   a. What types of assistive technology are currently used by special education students?
   b. In which educational settings do special education students use assistive technology?
   c. For what purpose is assistive technology used?
   d. Is assistive technology used to increase inclusion (i.e. increase students’ access to general education curriculum)?
   e. What percentage of students currently uses assistive technology?
   f. What are the special education classifications of students using assistive technology?
   g. Does assistive technology use vary by special education classification, by district size, or by DFG?

2) How is assistive-technology decision-making occurring in New Jersey public schools?
   a. When the Child Study Team writes a student’s IEP, what steps are taken regarding the assistive technology component?
b. Who is involved in AT decision-making?

c. Is AT decided upon before, after, or in conjunction with placement decisions?

d. Is AT use monitored? If so, how is AT use monitored?

e. What factors impact AT decision-making and implementation?

3) Within local school districts, what contextual factors impact the use of AT in increasing inclusion?

Data Analyses

Quantitative

Quantitative survey data were investigated to determine frequency in AT use, trends in AT decision-making and implementation, and correlations among DFG, district size, and AT use. Frequency data were calculated to determine response rates to survey items. The frequency data were calculated in terms of the percent of respondents who selected each choice to a given survey item. These response rates provided information about current AT practices, specifically addressing research questions 1a through 1e and 2a through 2d.

A Pearson product-moment correlation was performed to investigate the relationship between responses to survey item one and item three. This correlation addressed whether the type of AT used in inclusive settings differs from the type of AT used in general. Responses to survey items seven and eight were compared visually in a bar graph to illustrate reported differences in the percentage of students using AT in any setting versus in inclusive settings, providing further information about current AT use.
To address research question 1f, survey items 9 and 10 were analyzed. Responses to survey item nine were counted to determine if there were any choices (classification categories) that were never selected by any respondent. Once it was determined which classification categories use AT, then survey item 10 was analyzed. In survey item 10, respondents ranked up to 14 choices. The ranks selected by respondents were averaged to determine the mean rank of each classification. The mean ranks were then ordered from lowest to highest to determine the frequency of AT use by special education classification, addressing research question 1f.

Pearson correlations were performed to investigate research question 1g. Correlations investigated relationships between DFG, district size, and responses to survey items about current AT use (type of AT used, setting of AT use, purpose of AT use, and percentage of students using AT). Correlations investigated whether significant differences exist in AT use between districts of different size and different DFG.

Linear regressions were then performed for those correlations found to be statistically significant and where it was logical to investigate the percentage of variance explained by district size or DFG.

**Qualitative**

Qualitative data were investigated using the Grounded Theory approach to content analysis. The goal of the content analysis was to develop concise and broad descriptions of AT decision-making processes and implementation. Grounded Theory directs the investigator to systematically compare themes and concepts identified in the data with the aim of identifying theory that explains what has been observed. The
Grounded Theory approach was chosen for analysis of the interview data because the three coding phases (open, axial, and selective) lead the researcher to develop meaningful themes and storylines. During open and axial coding, categories are identified and a conditional relationship guide is developed. Throughout these phases, the researcher is able to return to the codes and categories and re-work the data until meaningful configurations emerge and all data has been considered. The Grounded Theory approach provides a systematic approach to analyzing qualitative data in order to identify core themes and emerging theory. The approach as described by Scott and Howell (2008) was utilized, because it provides a concrete and systematic framework for the open, axial and selective coding of Grounded Theory.

During open coding, the investigator read the transcribed interviews three times. Each time the interviews were read, the investigator made notes and headings in the margins to describe the content. The investigator wrote as many headings as were needed to describe all of the content within the interviews. The foundation of the Grounded Theory approach is comparison of concepts. Therefore, also during this first phase of coding, as all data was read and labeled, similar data were grouped and given the same conceptual label (category). The investigator reviewed the categories and organized them into higher order headings, and continued to review categories and combine similar information to reduce the number of categories by combining similar data into broader higher order categories. This was continued until the investigator had developed the smallest number of categories necessary to represent the meaning of the text in the interviews (Scott & Howell, 2008).
Then, during axial coding, the categories were organized by relationship. The questions outlined by Scott and Howell (2008) were utilized to configure the conditional relationship guide. The questions ask about the what, when, where, why, how, and with what consequence of each category. These questions led the investigator to identify the conditions and dimensions of each category and how the categories are related.

A reflective coding matrix was then developed to identify the storylines of the themes and trends identified in the conditional relationship guide. During this process, core categories or central phenomena are identified by examining the consequences of the categories in the conditional relationship guide. Core categories explain other categories and may be a hybrid of categories. The investigator considered the conditional relationship guide and identified the major actions or interactions of the categories. Then, in developing the reflective coding matrix, the processes, properties, dimensions, contexts, and modes of understanding each core category were outlined (Scott & Howell, 2008).

Lastly, during selective coding, storylines were developed from the integration of the earlier analyses (Scott & Howell, 2008). The storylines explain the emerging theory of the central phenomena identified through the analyses. Ultimately, the storylines that were identified addressed research questions 2a-2e and question 3.
CHAPTER IV

RESULTS

Survey Results

A total of 73 completed surveys were returned out of a total of 270 surveys sent to directors. However, some items were not completed by some respondents. The number of respondents is noted when not all respondents answered the item.

To analyze the survey data quantitatively, frequency counts, Pearson product-moment correlations, and linear regressions were performed. For each survey item, frequency counts were performed to determine how many respondents selected each answer choice. Frequency data on each response provides information about current practices of AT use. Pearson product-moment correlations were performed to identify statistically significant relationships between response selections and district properties (socioeconomic status and enrollment size). Correlations between responses, District Factor Grouping, and district size provide information about current trends in AT practices. When significant correlations were identified, then linear regression analyses were performed to determine the variance explained by the variable (either district size or DFG). Linear regressions provide insight into the relative importance of correlations. Data analysis results are presented in response to the research questions outlined in Chapter III, which guided the investigation.
Current Assistive Technology Use by Special Education Students

Research Question 1a: What types of assistive technology are currently used by special education students?

For survey item one, directors were asked to check all types of assistive technology devices used by special education students in their district. All 73 respondents answered this item. Responses indicated that students use a range of assistive technology. Various low-tech and high-tech devices are used to meet a range of needs. Of the 73 respondents, 86.3% reported that students use low-tech AT for student movement (i.e. adaptive desks, positioning devices). Of the 73 respondents, 94.5% reported that students use low-tech for language needs (i.e. common word lists, picture symbol boards), while 78.1% reported that students use low-tech for sensory needs (i.e. sensory brushes, weighted vests). The most frequently reported AT used (95.9%) was low-tech AT for motor difficulties (i.e. pencil grips, adaptive scissors).

In terms of high-tech AT, 68.5% of the responding directors reported that their students use high-tech information input devices (i.e. alternative keyboards, voice recognition technology), 84.9% reported students use high-tech for written expression difficulties (i.e. spelling and grammar checker, word recognition software, computer software for concept-mapping and note-taking), 79.5% reported students use high-tech for reading difficulties (i.e. electronic text, supportive eText, books on tape), and 63.0% reported that students use augmentative and alternative communication (AAC) devices. Of the 73 responding directors, 15.1% reported that students use other AT devices not listed in the survey item choices. The other items, which respondents wrote in the space
provided, included FM systems and teacher voice enhancement systems. However, of note, the majority of the “Other” reported AT devices were items that would be considered included in the listings, such as AlphaSmarts and software programs for reading. These examples were not specifically listed, but could be considered to be included under high-tech for written expression difficulties and high-tech for reading difficulties.

For survey item 3, directors were asked what type of AT is used by special education students in inclusive settings in their district. Less AT use was reported in inclusive settings for every type of AT device. The responses to item one and item three are summarized in Table 4.
Research Question 1a

Table 4
AT devices used in any setting and inclusive settings

<table>
<thead>
<tr>
<th>AT Devices</th>
<th>% Reporting use</th>
<th>% Reporting use in inclusive settings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-tech for student movement</td>
<td>86.3</td>
<td>68.5</td>
</tr>
<tr>
<td>Low-tech for language needs</td>
<td>94.5</td>
<td>78.1</td>
</tr>
<tr>
<td>Low-tech for sensory needs</td>
<td>78.1</td>
<td>53.4</td>
</tr>
<tr>
<td>Low-tech for motor difficulties</td>
<td>95.9</td>
<td>90.4</td>
</tr>
<tr>
<td>High-tech information input devices</td>
<td>68.5</td>
<td>53.4</td>
</tr>
<tr>
<td>High-tech for written expression difficulties</td>
<td>84.9</td>
<td>75.3</td>
</tr>
<tr>
<td>High-tech for reading difficulties</td>
<td>79.5</td>
<td>65.8</td>
</tr>
<tr>
<td>Augmentative &amp; alternative communication (AAC) devices</td>
<td>63.0</td>
<td>26.0</td>
</tr>
<tr>
<td>Other AT devices</td>
<td>15.1</td>
<td>9.6</td>
</tr>
</tbody>
</table>
A Pearson product-moment correlation was conducted to investigate the relationship between responses to item one and responses to item three. There is a significant and positive correlation between responses to item one and responses to item three, $r = .924, p < .01$. According to Cohen (1992), this is a large effect size. According to Cohen, to have sufficient power to detect a large effect size with an alpha level of .01, at least 41 subjects are needed in the sample. The sample exceeded 41; therefore, the sample size was adequate to provide sufficient power to detect a large effect size between responses to item one and item three. This finding indicates a significant positive correlation between the AT used in district and the AT used in inclusive settings in district, suggesting that, although less AT is reported to be used in inclusive settings, nearly the same range of AT is used in inclusive settings by special education students as is used anywhere by special education students.

Research Question 1b: In which educational settings do special education students use assistive technology?

For survey item two, directors were asked to check all educational settings in which special education students use AT. This item was completed by all 73 respondents. AT was reported to be used in all settings ranging from most to least restrictive. Of the 73 respondents, 84.9% reported that students use AT in self-contained classrooms, 90.4% reported that students use AT in resource rooms, 84.9% reported that students use AT in in-class support settings, 80.8% reported that students use AT in mainstream/general education settings, and 9.6% reported that students use AT in other
settings. The other settings, which respondents wrote in the space provided, include out of district placements, therapy settings, and home-school settings.

For survey item six, respondents were asked whether assistive technology is more frequently utilized in inclusive settings or in more restrictive settings (i.e. resource room, self-contained classrooms). Eight respondents did not answer this item. The majority of respondents (61.5%) answered that AT is more frequently utilized in more restrictive settings.

Research Question 1c: For what purpose is assistive technology used?

For survey item four, respondents were asked to indicate all of the purposes for which AT is used in their districts. The most frequently endorsed response was that AT is used “to accommodate for written expression difficulties” (90.4%). Of the 73 respondents, 82.2% responded that AT is used to increase inclusion and students’ access to general education curriculum. The responses to survey item four are summarized in Table 5.
**Research Question 1c**

<table>
<thead>
<tr>
<th>Purpose</th>
<th>% Who Endorsed Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>To increase inclusion and students’ access to general education curriculum</td>
<td>82.2</td>
</tr>
<tr>
<td>To accommodate for physical movement needs</td>
<td>80.8</td>
</tr>
<tr>
<td>To accommodate for sensory needs</td>
<td>86.3</td>
</tr>
<tr>
<td>To accommodate for motor difficulties</td>
<td>87.7</td>
</tr>
<tr>
<td>To accommodate for written expression difficulties</td>
<td>90.4</td>
</tr>
<tr>
<td>To accommodate for language/communication difficulties</td>
<td>83.6</td>
</tr>
<tr>
<td>To accommodate for reading difficulties</td>
<td>84.9</td>
</tr>
</tbody>
</table>
Research Question 1d: Is assistive technology used to increase inclusion (i.e. increase students’ access to general education curriculum)?

For survey item five, respondents were asked if, when AT is included in an IEP, the most common overall objective is to increase the amount of time students spend in inclusive settings and to increase their access to general education curriculum. Two respondents did not answer this item. Of the 71 responses, 67.6% responded yes, indicating that the majority of directors consider the primary purpose of AT to be to increase inclusion.

Research Question 1e: What percentage of students currently uses assistive technology?

The percentage of special education students within districts reported to use assistive technology in any setting varied among the respondents. For survey item seven, directors were asked to indicate what percentage of their special education students uses assistive technology in any setting, and then, in item eight, what percentage of special education students uses AT in inclusive settings. The most frequent response (31.0% of Directors) indicated that less than 10% of students use AT in any setting. Similarly, regarding use of AT in inclusive settings, the most frequent response (40%) indicated that less than 10% of students use AT in inclusive settings. Responses to survey items seven and eight are presented visually in a bar graph in Figure 1 to illustrate the reported differences in the percentage of students using AT in any setting versus in inclusive settings. Directors were asked to select one of six choices in both survey items seven and eight (<10%, 10-25%, 25-40%, 40-65%, 65-80%, and >80%). Data are presented in
Figure 1 in terms of the percentage of directors who selected the given percentage range for each setting.

![Bar chart showing the percentage of students who use AT in any setting and in an inclusive setting.](chart.png)

Figure 1 Percent of Students Who Use AT.

*Research Question 1f: What are the special education classifications of students using assistive technology?*

Students classified under a range of special education categories utilize assistive technology. Responses to survey item nine indicated that students classified under all categories except “social maladjustment” utilize AT. Of note, some respondents indicated that they never use the category of social maladjustment to classify students. For survey item 10, directors were asked to rank the special education classifications under which students more often utilize assistive technology. Respondents were asked to rank the classifications from 1 to 14, with 1 being the most frequent classification to utilize assistive technology. Of note, many respondents did not rank all 14
classifications. Respondents tended to only rank those classifications under which students in their district use AT. Therefore, some respondents ranked as few as four classifications. The ranks selected by respondents were averaged to determine the mean rank of each classification. Results of the averaged ranks are summarized in Table 6.
Research Question 1f

Table 6
AT use by special education classification

<table>
<thead>
<tr>
<th>Special Education Classification</th>
<th>Mean rank by respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auditorily impaired</td>
<td>4.9</td>
</tr>
<tr>
<td>Autistic</td>
<td>2.9</td>
</tr>
<tr>
<td>Cognitively impaired</td>
<td>5.3</td>
</tr>
<tr>
<td>Communication impaired</td>
<td>4.3</td>
</tr>
<tr>
<td>Emotionally disturbed</td>
<td>10.5</td>
</tr>
<tr>
<td>Multiply disabled</td>
<td>3.5</td>
</tr>
<tr>
<td>Deaf/blindness</td>
<td>8.1</td>
</tr>
<tr>
<td>Orthopedically impaired</td>
<td>7.7</td>
</tr>
<tr>
<td>Other health impaired</td>
<td>6.9</td>
</tr>
<tr>
<td>Preschool child with a disability</td>
<td>6.7</td>
</tr>
<tr>
<td>Social maladjustment</td>
<td>13.2</td>
</tr>
<tr>
<td>Specific learning disability</td>
<td>5.2</td>
</tr>
<tr>
<td>Traumatic brain injury</td>
<td>10.0</td>
</tr>
<tr>
<td>Visually impaired</td>
<td>7.0</td>
</tr>
</tbody>
</table>
According to the responses to survey item 10, students classified as “Autistic” most frequently utilize AT compared to other special education students. Social maladjustment is the least frequent category to use AT. However, as noted earlier, responses to item nine indicated that no students with this classification use AT, as no directors reported students with this classification to use AT and some noted on the survey that their district does not use this classification. From most to least frequent classification to use AT, the order is: Autistic, Multiply disabled, Communication impaired, Auditorily impaired, Specific learning disability, Cognitively impaired, Preschool child with a disability, Other health impaired, Visually impaired, Orthopedically impaired, Deaf/Blindness, Traumatic brain injury, Emotionally disturbed, and Social maladjustment. Of note, the survey did not ask directors how many students in their district are classified under each category. Therefore, specific relationships between classification categories and use of AT cannot be determined.

Research Question 1g: Does assistive technology use vary by special education classification, by district size, or by DFG?

Type of AT Used

Pearson product-moment correlations were calculated to investigate the relationships between types of AT used (responses to item one), District Factor Grouping (DFG), and district size. There is a significant and positive correlation between the use of high-tech information input devices and district size, \( r = .380, p < .01 \). According to Cohen (1992), this is a medium effect. A linear regression was conducted to determine the percent of variance explained. The regression model is significant with 13.3% of the
variance of using high-tech information input devices explained by assessing district size
\( R^2 = .133, F (1, 72, .01) = 12.019, p < .01. \) A regression analysis revealed that district size predicted the use of high-tech information input devices \( B = 0.180, t(72) = 1.667, p < .01. \)

The positive correlation \( (r = .380, p < .01) \) indicates that larger district size is associated with increased use of high-tech information input devices by special education students.

Pearson product-moment correlations were also calculated to investigate the relationships between types of AT used in inclusive settings (responses to item three), DFG, and district size. There is a significant and positive correlation between the use of high-tech information input devices in inclusive settings and district size, \( r = .314, p < .01. \) According to Cohen (1992), this is a medium effect. This finding indicates that as district size increases, districts more often have special education students using high-tech information input devices in inclusive settings.

No other statistically significant correlations were found between DFG, size and type of AT used in any setting or in inclusive settings. Of note, according to Cohen (1992), in order to have sufficient power to detect a medium or small effect at an alpha level of .05, a sample of 85 or greater is needed. The sample was not adequate to detect a medium or small effect.

Setting of AT Use

A Pearson product-moment correlation was calculated to investigate the relationships between each setting in which AT is used (item two), DFG, and district size. There is a significant and positive correlation between district size and the use of AT in self-contained settings, \( r = .257, p < .05. \) According to Cohen (1992), this is a small effect size. According to Cohen, to have sufficient power to detect a small effect size
with an alpha level of .05, at least 783 subjects are needed in the sample. The sample size was not adequate to provide sufficient power to detect a small effect size. However, a significant correlation was detected. Therefore, further research employing sufficient power may find additional strength in this correlation. A linear regression was conducted to determine the percent of variance explained. The regression model is significant with 5.3% of the variance of use of AT in self-contained settings explained by assessing district size $R^2 = .053, F(1, 72, .05) = 5.007, p < .05$. A regression analysis revealed that assessing district size predicted the use of AT in self-contained settings $B = 0.094, t(72) = 5.459, p < .05$. The positive correlation ($r = .257, p < .05$) indicates that larger district size is associated with increased use of AT in self-contained settings. However, of note, data was not collected about the type of settings available within districts. Larger districts may be more likely to have self-contained settings and may have more of such settings, which may skew the data.

There is also a significant and positive correlation between DFG and the use of AT in other settings, $r = .269, p < .05$. According to Cohen (1992), this is a small effect size. This finding indicates that the higher the DFG (socioeconomic status) of the respondent’s district, the more likely the respondent selected “Other” and wrote in a setting in which AT is used. The responses that were written in for “Other” were either “out of district placement”, “therapy,” or “home school”.

A Pearson product-moment correlation was calculated to investigate the relationships between responses to item six (whether AT is more frequently utilized in more restrictive or inclusive settings), DFG, and district size. Responses were dummy-coded so that the response “inclusive settings” was coded “1” and the response “more
restrictive settings” was coded “0”. There is a significant and negative relationship between district size and the type of setting in which AT is more frequently utilized, \( r = -0.313, p < .05 \). This finding indicates that as district size increases, AT is more likely to be used in more restrictive settings. Of note, as previously mentioned, districts did not report the types or numbers of settings that they provide to special education students. Therefore, it cannot be determined whether or how the available settings impact the settings in which AT is used. However, it could be speculated that larger districts are more likely to have more settings, in particular more restrictive settings. Therefore, larger districts may be more likely to report having students use AT in more restrictive settings.

**Purpose of AT Use**

A Pearson product-moment correlation was calculated to investigate the relationships between the purpose of AT use (survey item four), DFG, and district size. There is a significant and positive correlation between DFG and using AT to increase inclusion and access to the general education curriculum, \( r = .235, p < .05 \). According to Cohen (1992), this is a small effect size. A linear regression was conducted to determine the percent of variance explained. The regression model is significant with 4.2% of the variance of using AT to increase inclusion explained by assessing DFG, \( R^2 = .042, F(1, 72, .05) = 4.158, p < .05 \). A regression analysis revealed that assessing DFG predicted the use of AT to increase inclusion \( B = 0.045, t(72) = 5.779, p < .05 \). The positive correlation \( r = .235, p < .05 \) indicates that higher socioeconomic status (represented by DFG) is associated with using AT purposefully to increase inclusion.
A Pearson product-moment correlation was calculated to investigate the relationships between whether the overall objective of AT is to increase inclusion (survey item five), DFG, and district size. No statistically significant relationships were found.

*Percentage of Students Using AT*

Pearson product-moment correlations were calculated to investigate the relationships between percent of students using AT in any settings, percent of students using AT in inclusive settings, DFG, and district size. No significant relationships were found between DFG or district size and the percent of students using AT in any setting or in inclusive settings.

**Assistive Technology Decision Making**

*Research Question 2a: When the Child Study Team writes a student’s IEP, what steps are taken regarding the assistive technology component?*

According to responses to survey item 11, the majority (75.3%) of districts do not have written procedural guidelines related to assistive technology. However, the majority (65.4%) of respondents who do not have written procedural guidelines responded that they do have a standard procedure for determining students’ AT needs. Approximately half of the districts (48.6%) reported using standard evaluation formats or data collection systems to determine students’ assistive technology needs.

In determining whether a student needs AT and what type of AT the student should receive (survey item 13), districts utilize a range of assessments and input sources. The two most frequently utilized sources of information are speech/language assessment and occupational therapy assessment, as 95.9% of directors indicated using these sources.
Physical therapy assessment is the next most frequently reported (89.0%) assessment used to determine AT needs. Responses to survey item 13 are summarized in Table 7.
### Research Question 2a

#### Table 7
Information used to determine AT

<table>
<thead>
<tr>
<th>Source of information</th>
<th>% Who Reported Using this Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speech/language assessment</td>
<td>95.9</td>
</tr>
<tr>
<td>Occupational therapy assessment</td>
<td>95.9</td>
</tr>
<tr>
<td>Physical therapy assessment</td>
<td>89.0</td>
</tr>
<tr>
<td>Device trial data analysis</td>
<td>42.5</td>
</tr>
<tr>
<td>Student preferences</td>
<td>43.8</td>
</tr>
<tr>
<td>Student achievement with and without device</td>
<td>67.1</td>
</tr>
<tr>
<td>Teacher observations</td>
<td>72.6</td>
</tr>
<tr>
<td>Family preferences</td>
<td>49.3</td>
</tr>
</tbody>
</table>
For survey item 19, directors were asked which steps are involved in their districts’ AT decision-making process. Nearly all respondents (98.6%) indicated that their district discusses AT needs at IEP meetings. The next most common step (endorsed by 94.4%) is “brainstorming possible interventions”. Of the 72 respondents to this item, 65.3% reported that their districts try an AT device/service as part of the decision-making process. Only 44.4% of the districts chart progress of AT device/service as a step of AT decision-making, while 55.6% of directors reported that part of their AT decision-making progress includes brainstorming and trying a new device if trials are unsuccessful.

Once a device is decided upon, the majority of districts (52.1%) purchase the item. Fewer districts (32.4%) reported that devices are initially borrowed, rather than bought. However, 15.5% noted that items are both borrowed and bought, depending on the particular item. Five respondents noted that they would prefer to borrow items for initial trials, but often do not have access to do so.

Research Question 2b: Who is involved in AT decision-making?

For survey item 18, directors were asked whether there are school personnel in their district with assistive technology expertise who are involved in assistive technology decision-making. The majority (73.6%) of the 72 respondents who answered this item responded yes. For survey item 18a, directors who responded yes to item 18 (53 respondents) were asked to indicate what positions in the school are held by these individuals with AT expertise. The responses to survey item 18a are summarized in Table 8.
Research Question 2b

Table 8
AT experts in district

<table>
<thead>
<tr>
<th>School personnel position</th>
<th>% of districts with AT experts who hold this position</th>
</tr>
</thead>
<tbody>
<tr>
<td>OT/PT</td>
<td>84.9</td>
</tr>
<tr>
<td>Speech/language pathologist</td>
<td>83.0</td>
</tr>
<tr>
<td>School psychologist</td>
<td>34.0</td>
</tr>
<tr>
<td>Social worker</td>
<td>22.6</td>
</tr>
<tr>
<td>Director of special services</td>
<td>34.0</td>
</tr>
<tr>
<td>Special education teacher</td>
<td>41.5</td>
</tr>
<tr>
<td>Other</td>
<td>32.1</td>
</tr>
</tbody>
</table>
For survey item 14, directors were asked to indicate who makes the decision of whether and what assistive technology device/service to provide. A total of 72 respondents completed this item. The most common response (44.4%) was to select other. The majority of directors who selected other wrote in “IEP team” to answer who makes the decision of whether and what AT to provide. Responses to item 14 are summarized in Table 9.
**Research Question 2b**

Table 9
AT decision-makers

<table>
<thead>
<tr>
<th>Decision-Maker</th>
<th>% of Districts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Director of special services</td>
<td>12.5</td>
</tr>
<tr>
<td>Child study team</td>
<td>36.1</td>
</tr>
<tr>
<td>OT/PT</td>
<td>29.2</td>
</tr>
<tr>
<td>Speech/language pathologist</td>
<td>33.3</td>
</tr>
<tr>
<td>Other</td>
<td>44.4</td>
</tr>
<tr>
<td>Other: IEP team</td>
<td>29.2</td>
</tr>
<tr>
<td>Other: AT consultants/specialists</td>
<td>6.9</td>
</tr>
</tbody>
</table>
Research Question 2c: Is AT decided upon before, after, or in conjunction with placement decisions?

The majority of directors (62.5%) reported on survey item 15 that assistive technology needs are considered when determining student placement. Survey item 16 then asked when AT is determined. A total of 71 respondents answered this item. The most frequent response (35.2%) was that AT is determined while a student’s placement is being determined, suggesting that the decisions are made in conjunction with one another. Of the 71 respondents, 28.2% reported that AT decisions are made before a student’s placement is determined, while only 7.0% reported that AT decisions are made after a student’s placement decision is made. Many respondents endorsed more than one of three choices (before, during, after placement decision). Of the total 71 respondents, 23.9% reported that AT is determined before, during, and after a student’s placement is determined, suggesting that it is made in conjunction with the placement decision.

Research Question 2d: Is AT use monitored? If so, how is AT use monitored?

Nearly all directors (95.8%) answered yes to item 20, indicating that AT use is monitored once a student begins to use an AT device or service. For survey item 20a, respondents who said yes to item 20 were asked to indicate who monitors AT use. Responses indicated that a range of school personnel may be involved in monitoring AT use. The most common response (82.6%) was that the speech/language pathologist monitors AT use. The next most common responses were that AT use is monitored by the special education teacher (79.7%) or by OT/PT (76.8%). Other personnel involved in monitoring AT use were reported to include the school psychologist (39.1%), social
worker (37.7%), and the director of special services (24.6%). Of note, 20.3% of directors selected “other” and wrote in “case manager” as the person responsible for monitoring AT use.

Those directors who answered that AT use is monitored were then asked in survey item 20b to indicate the duration of AT monitoring. The most common response (26.1%) indicated that the monitoring of AT use is on-going. Directors wrote in various responses such as “continually”, “on-going”, and “continuous process”. These responses were all considered to indicate on-going monitoring of AT use. The next most common response (23.2%) was that AT use is typically monitored for 1-3 months. The responses to survey item 20b are summarized in Table 10.
Research Question 2d

Table 10
Timeframe of AT monitoring

<table>
<thead>
<tr>
<th>Timeframe of AT Monitoring</th>
<th>% of Districts</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-2 weeks</td>
<td>5.8</td>
</tr>
<tr>
<td>3-5 weeks</td>
<td>14.5</td>
</tr>
<tr>
<td>1-3 months</td>
<td>23.2</td>
</tr>
<tr>
<td>On-going</td>
<td>26.1</td>
</tr>
<tr>
<td>As long as needed</td>
<td>10.1</td>
</tr>
</tbody>
</table>
Interview Results I: Factors of AT Decision-making, Factors of Inclusion and AT, and Factors of Effective AT Implementation: Coding Phase 1

The following results reflect factors identified by Directors of Special Services that impact AT decision-making, factors in the relationship between AT and inclusion, and factors contributing to the effectiveness of AT implementation. Directors’ responses to open-ended interview questions were analyzed using a Grounded Theory approach (Scott & Howell, 2008). Responses were coded using open, axial and selective coding. The three phases of coding initially resulted in a broad categorization of responses. These broad categories were then narrowed and refined in the second and third phases of data coding. Interview response coding focused on three categories: AT decision-making, the role of AT in inclusive practices, and effective AT implementation. During the first phase of data coding, transcribed interviews were read and conceptual labels (categories) were developed to summarize the data. Then, following the Grounded Theory approach, a conditional relationship guide was developed to organize and analyze the categories (Scott & Howell, 2008).

Factors of AT Decision-Making

During data analysis, multiple themes (factors) within AT decision-making emerged. Directors identified factors influencing AT decision-making in their district. The recurring factors identified included the significance of individuals, the use of data, the relevance of the IEP, and informal determinations.
Significance of Individuals

Sixty-two point five percent of the directors remarked on the significance of individuals in the AT decision-making process. Directors often referred to district employees, such as a particular teacher, related service provider, or Child Study Team member who was pro-active in the AT process. One director said, “We have a fabulous OT, who has really taken the lead in thinking about AT…So a lot of our AT decisions are because of practitioners and their knowledge and experience.” Another director explained, “We’re a small district – 4 schools, 1 PT. And she’s very resourceful, knowing where to get equipment.”

Other directors, in districts without any in-district AT expertise, spoke of specific outside consultants who played a major role in AT decision-making. Of note, when directors emphasized the major role that the outside consultant plays in AT decisions, some directors expressed frustration and discontent with their reliance on the outside consultant and the significant role the non-district employee has in decisions for in district students. Some directors described the use outside consultants as a necessary dependency due to the lack of expertise in district. One director said, “…we are at the mercy of whoever is doing the evaluation, because we don’t have that expertise.” Another director, remarking on the downsides of the outside evaluator, said, “...the evaluations when they come back seem so disconnected from what we do, that it’s really hard to implement.” In one district, two Child Study Team members possessed certificates in AT, and were considered the in-district experts. In other districts, related service providers were considered experts in the AT relating to their field of practice (i.e. the PT was considered the expert for mobility devices). One director referred to a part-
time AT coordinator, but explained that this position was eliminated five years ago. Since then, the director explained, similar to other interviewees’ responses, individuals in district with AT knowledge are unofficially responsible for various aspects of AT decision-making (evaluating, collecting data, trialing devices, and monitoring use). In terms of how the significant individuals were identified, interviewees described either hiring individuals with AT knowledge, encouraging personnel to pursue AT training, or contracting with outside experts.

**Use of Data**

Five of the eight interviewees, 62.5%, described using data to make decisions relating to AT. Data was reported to be collected through formal AT evaluations and the trialing of devices. Formal evaluations were conducted by outside experts unless the district had personnel possessing AT expertise. Many directors noted that the IEP team typically followed the recommendations of the AT evaluations. A director explained, “The IEP team makes the decision based on the results of the evaluation.” Another director said, “…9 out of 10 times we follow their recommendations.” Regarding device trials, one director explained, “…we try different devices to see what works for the student.” Another director explained how a contracted outside consultant trials devices with students, “…[they] bring in devices so they can be trialed with the child. Data is collected for a couple of months. If we see success, then we order the device for the student.”

**IEP Relevance**

Thirty-seven point five percent of the interviewees noted that AT must be considered for all students during the IEP process. As one director stated, “Well, it’s
always considered for all students’ IEPs.” One director explained how AT is considered in relation to IEP goals and objectives. This director said, “AT is a derivative of the goals and objectives for a particular kid…AT really is included in the IEP in the part of the IEP where we discuss how will the student meet his or her goals and what resources can we use to help the student meet the goals.” Seven of the eight interviewees identified the IEP team and case manager as decision-makers about a student’s AT. However, only 37.5% noted that AT must always be considered and only one discussed how AT is considered in regards to specific IEP components (goals and objectives).

Informal Determinations

All interviewees (100%) identified informal processes within the AT decision-making process. Directors explained that AT decisions are made on a case by case basis. Often simple devices (i.e. pencil grips) are implemented without evaluations or data collections. As one director explained, “Some of the more informal things that have been generated in district tend to have worked immediately and not needed data collection.” Faculty (teachers, CST members, related service providers) communicate informally about AT. One interviewee echoed the comments of many directors, “…conversations go on between case managers, teachers, and therapists.” AT use is often monitored informally by faculty. Specifically, 25% of interviewees said that related service providers monitor AT use. Fifty percent of interviewees identified teachers as AT monitors. Case managers were identified as responsible for monitoring AT by 62.5% of interviewees. One director said, “Once a month the case managers meet with the teachers of the students on their caseload, so they monitor or review how the AT is going at that time.”
Inclusive Practices and AT

When asked about AT and its role in inclusion, the majority of interviewees commented about how AT could increase inclusion. However, responses differed about how much AT impacts inclusion, and some interviewees revealed that they had not seen any relationship between AT and inclusion in their district. Common themes were identified among interviewees’ responses about how AT and placement decisions relate to one another and how AT may or may not lead to increased inclusion.

Addressing Needs Before Determining Placement

Sixty-two point five percent of interviewees explained that AT was considered when a student’s needs were considered, which occurred before the student’s placement was decided upon. As one director explained, “…placement decisions are – you know – you don’t pick placement first. We determine needs and then program and placement are determined once we know the students’ needs.” Multiple interviewees emphasized that AT does not prohibit placement in inclusive settings, as they stated that AT can be used in any setting. Another director explained the importance of maintaining a student in general education and the role that AT may play in maintaining that inclusive placement, “Placement is secondary to AT device. If a child can be maintained in a general education class and just needs a device to help them, then we’ll get it and keep them in general education.” The director continued to explain, “…needs drive placement and AT is part of a students’ needs – what they need to meet their IEP goals. The needs are what can aid this child to stay in the classroom, and so AT is part of that.”
**AT Leads to Increased Inclusion**

Sixty-two point five percent of interviewees revealed that they had seen AT increase inclusion in their district. Directors shared various ways AT may allow students to access the general education curriculum and function more independently in the general education classroom. One director explained, “…students definitely become more independent. For instance, with AAC devices, students become independent as they have the ability to communicate. So now they can go in this class and bring the device with them so they can communicate.” Another director simply stated, “We give devices needed so students can be in the general ed setting.” Another director emphasized how AT and technology in general has increased teachers’ abilities to modify materials. The director said, “AT has just enabled the special education teacher to do a better match and make the child more successful with the same materials that the other children are using.” This director went on to identify improvements in technology as the major factor behind increases in inclusion, “I think it’s more that as technology is better, children can access more of the curriculum and be more included. We always had the philosophy [of inclusion] – just the technology wasn’t always so sophisticated.”

**No Relationship Between Inclusion and AT**

Of note, twenty-five percent of the interviewees revealed that they had not seen any relationship between AT and inclusion. One director commented that with little knowledge and access to AT, it is rarely utilized, except for the most severely disabled students. This director went on to explain that the students utilizing AT have such significant needs that they cannot be in the general education setting. She explained, “No, I have not seen using AT as a giant leap for students, because those students
primarily using AT are not in district to begin with.” Another director identified the relationship between AT and inclusion as unlikely in New Jersey, explaining, “I don’t think you’ll see much of that [AT increasing inclusion] when New Jersey still has a lot of self-contained and separate educational placements and less inclusion than other states.”

Effective AT Implementation

During interviews, directors were asked to identify facilitators and barriers to AT implementation in their districts. In addition to responses to this question, directors’ responses to other questions revealed factors that helped or hindered the AT process in the district. During coding, numerous themes emerged as factors identified by directors that either resulted in effective AT implementation or were expected to result in effective AT implementation. These factors included training and knowledge of personnel, teacher buy-in, funding, district philosophy, and time.

Training and Knowledge of Personnel

Seventy-five percent of interviewees identified personnel knowledge and training opportunities as facilitators to effective AT implementation. Directors identified trainings by outside experts (public agencies, private consultants, and AT vendors) and training in district by personnel with AT expertise. One director stated, “…ETTC (county Educational Technology Training Centers) trainings are very good, short to the point…They are definitely a facilitator, along with our knowledgeable personnel.” Another said, “…the regional professional development…seminars and trainings are offered throughout the year.” Identifying in-district trainings, one director said, “We have an in-district technology person assigned to the district who we can request to help with professional development on technology.” Other directors emphasized personnel’s
existing knowledge as a factor to effective AT. “The MD classroom teacher’s background is a major facilitator.” Thirty-seven point five percent of interviewees revealed that a lack of knowledge about AT can act as a barrier to effective AT. “We use what we know, but we don’t know about what’s all out there.”

**Teacher Buy-In**

Sixty-two point five percent of interviewees identified teacher support or buy-in as a facilitator to effective AT implementation. Interviewees often remarked about the efforts made to increase teacher buy-in. “Teachers in our district – we need to hold their hands and show them…We are very hands on and then they are more accepting.” Another director said, “Our teachers are phenomenal.” This director went on to describe collaborative efforts to ensure teacher buy-in, “We try to help them by preparing as much as possible. We meet with the teachers before the school year starts to discuss each student and their needs and modifications. We do so much prep work that we don’t get resistance.” This director continued and identified supportive resources as another reason for teacher buy-in, “A lot of it goes to the preparation that we give teachers and families, and what resources we have if they have issues with the device – because if someone is prepared, then they are less anxious.” Of note, 62.5% of interviewees revealed that teacher resistance can impede effective AT implementation. The interviewees noted that resistance can occur when teachers fear technology, perceive AT as providing an unfair advantage, or lack the time or support to implement AT correctly.

**Funding**

Sixty-two point five percent of interviewees identified finances as a factor in effective AT implementation. Numerous directors revealed that this year the ARRA
grant has provided funding for AT (in addition to other educational needs). One director responded to a question about the facilitators to effective AT, “Money! This year, the ARRA grant…I was able to purchase a lot of things that we wouldn’t otherwise have had.” This response was echoed throughout many of the interviews. However, some directors, while emphasizing the important role of funding, also noted that, regardless of funding, the law requires that AT be provided if it is needed, and therefore, funding should not impact AT implementation.

District Philosophy

Thirty-seven point five percent of interviewees identified district philosophy supporting inclusion and technology as a factor to effective AT implementation. Explaining the inclusive philosophy, one director simply stated, “We try to include as many students as possible.” Another director clearly identified the connection, “We are able to facilitate AT because of our district philosophy.” Twenty-five percent of interviewees identified philosophy as a potential barrier to effective implementation. One director noted that without a philosophy or understanding of AT and inclusion, AT implementation and inclusion is hindered. “Is it fair to have children be assessed in different ways? So if we can get past that, we can come to terms with that – then I think the curriculum will open up to a lot of students.”

Time

Thirty-seven point five percent of interviewees identified time as a factor in effective AT implementation. “The time it takes to evaluate and get it all to come together – evaluate, get device, program it, and train everybody – takes so much time.” This interviewee went on to explain, “It’s really hard to fit it in when no one person in
district is dedicated to it. Districts really need one person focused on it. Especially since it’s a growing field…” Similarly, another interviewee explained, “…say tomorrow we are starting a unit on rocks in science, then someone needs to put the vocabulary for that unit in the device. But who and when?”

**Family Support**

Twenty-five percent of interviewees identified family support as a factor of effective AT implementation. One director explained how family buy-in is achieved, “And the families are on-board because they are a part of the IEP process, so they feel like they are a part of the decision.” Of note, 37.5% of interviewees identified parental expectations as a barrier to effective AT implementation. As one interviewee explained, “The difficulty with parents is that sometimes they don’t understand that the AT is not a magic band-aid…Parents think it’s a magic pill, but it’s not.”

**Administrative Support**

Twenty-five percent of interviewees identified administrative support as a factor in effective AT implementation. One director explained how administrators need to understand the cost-effectiveness of AT to support AT. “When people know about these things [AT devices], they can realize that providing AT is much more economical than providing human resources.”

**Other Factors of Effective AT Implementation**

Additional factors not identified by more than one interviewee included maintaining AT devices and accessibility to AT devices. One interviewee explained that maintaining and updating AT devices is a factor that increased the effectiveness of AT implementation. Another interviewee expressed that having more access to devices
would lead to more effective AT implementation. This director explained, “…a lending library or depository for AT devices would allow for more access to things.”
Interview Results II: Factors of AT Decision-making, Factors of Inclusion and AT, and Factors of Effective AT Implementation: Coding Phases 2-3

The Reflective Coding Matrix was utilized to refine the themes identified in the first phase of coding. During the second phase of coding, the categories’ consequences identified in the Conditional Relationship Guide (during phase one) were analyzed to lead the investigator to theoretical saturation. Through selective coding, recurrent consequences were identified as “core categories”. From the core categories, storylines were established in phase three of coding (Scott & Howell, 2008).

Within each core category identified, processes (actions and interactions) were analyzed. Properties, dimensions, contexts, and modes of understanding each core category were also analyzed. These analyses led the investigator to identify storylines of each core category. The storylines allow for a more complete understanding of the interview data.

Core Category Analysis: AT Decision-Making

Recurrent consequences, core categories, were identified within the category of AT decision-making to develop core category storylines. Core categories identified included: dependence on individuals and making informal AT decisions.

Dependence on Individuals

Dependence on individuals was identified as a consequence to AT decision-making in the first phase of coding. A natural storyline emerged when the process domain of this core category was analyzed. Multiple interviewees explained that particular individuals (contracted experts or in-district experts) were relied upon to make decisions regarding AT. Responses from various interviews suggest that due to financial
constraints, the responsibility for AT is either placed on outside experts or unofficially placed on district employees with other title roles (i.e. related service providers, case managers). Directors of special services valued the expertise of those with AT knowledge and depended on these individuals to provide AT insight so the IEP team could make both informed and credible AT decisions. If no one in district possessed AT expertise, then outside experts were contracted. However, many interviewees mentioned cultivating AT capacity within district. One district had encouraged two Child Study team members to pursue AT certification, another district had a special education teacher pursuing a master’s degree in assistive technology, while two other directors noted the value they placed on the AT knowledge of recently-hired special education teachers.

None of the interviewees currently employed anyone in a position primarily dedicated to AT. However, numerous interviewees noted that within the district a particular employee was expected to address AT issues (i.e. a particular related service provider or special education teacher). While many interviewees identified one particular individual’s role in AT decision-making, in explaining this, the directors noted the lack of time and personnel to address AT needs. This lack of time and personnel is theorized to lead directors to rely more heavily on the few individuals with AT expertise.

Making Informal AT Decisions

Making informal AT decisions was identified as a recurring consequence to AT decision-making in the first phase of coding. The processes (actions and interactions) captured in the Reflective Coding Matrix point to a storyline of informal decision-making. All interviewees reported that informal determinations were made regarding AT. These determinations resulted from informal communication among faculty
(teachers, case managers, and related service providers). Similarly, all interviewees remarked that at times AT was addressed on an as needed basis without the use of any standardized procedures or expectations. Informal communication is theorized to result in a sense of shared responsibility and to depend upon a context of collaborative relationships. Faculty share knowledge about students and AT, value each other’s insights, discuss observations, and communicate about student progress. Furthermore, based upon interview narrative, it is theorized that to deal with AT on a case by case basis, the context must value individualization and individuals must think flexibly. These individual and contextual factors lead faculty to make conclusions about AT, including students’ AT needs and students’ progress with particular AT, ultimately resulting in AT decision-making without formal data collection.

**Core Category Analysis: Inclusion and AT**

Recurrent consequences, core categories, were identified within the category of inclusion and AT to develop core category storylines. Core categories identified included: Considering AT before determining placement and Increasing inclusion due to AT.

**Considering AT Before Determining Placement**

Considering AT before determining placement was identified as a recurring consequence to inclusive practices in the first phase of coding. The processes captured in the Reflective Coding Matrix reveal a storyline of considering AT during the IEP process and using a problem-solving approach. Although not all interviewees specified that AT must be considered as part of the IEP process, all interviewees referred to the IEP team, IEP process, or Child Study Team when discussing AT. Several interviewees stated that
AT is discussed by the IEP team, student needs are evaluated, and informal communication occurs among faculty. AT is typically considered among the other needs of the student. Before a student’s placement is determined, the student’s needs are considered and addressed. To address AT needs, a problem-solving approach is often utilized. AT devices are trialed, devices available in district are considered, and AT effectiveness is monitored. Once it is determined how AT needs will be addressed, then this is documented in the IEP along with how the student’s other needs will be addressed (other supports and modifications). Once needs are addressed, then the most appropriate and least restrictive educational placement is determined. For such a series of steps to occur, based on interview narrative, it is theorized that contextual factors should include a mindful IEP team, thorough IEP process and shared goals among IEP team members. Considering AT as one of a student’s needs prior to placement decisions results in the following of special education code, documentation of AT in the IEP, and collaboration among faculty.

*Increasing Inclusion Due to AT*

Increasing inclusion was identified as a recurring consequence to inclusive efforts in the first phase of coding. The processes captured in the Reflective Coding Matrix indicate a storyline of increasing independence and accessibility for special education students. Based on interview responses, it is theorized that, in a context of open-minded teachers and a supportive environment for teachers and students, students utilize AT to communicate with peers, to complete tasks more independently and, ultimately, to be more successful in the general education setting. One interviewee noted that students may not use AT in general education settings because they do not want to be identified as
different. However, this was not reported by any other interviewees, suggesting that different contextual factors may impact students’ comfort with AT use. One interviewee noted that AT allows teachers to modify materials and generally make the curriculum more accessible. With AT, materials may be modified to provide content in accessible formats (i.e. larger font), students’ skills may be assessed through alternative means, students can communicate with peers and teachers, and curriculum content may be presented in multiple ways. Based on interview narrative, it is theorized that, in a context of dedicated and supportive teachers, AT can result in increased accessibility of general education curriculum for special education students.

Core Category Analysis: Effective AT Implementation

Within the category of effective AT implementation, core categories (recurrent consequences) were identified to reveal storylines. Core categories identified included: funding, knowledgeable personnel, and teacher buy-in.

Funding

Funding was identified as a natural consequence to factors of effective AT implementation during the first phase of coding. The majority of interviewees identified funding as a key factor to implementing AT effectively, as funding was considered critical for all stages of the AT process. Interviewee responses reveal funding is necessary to hire personnel with AT expertise, to provide personnel with time to dedicate to AT, to garner administrative support for AT, to access new AT and maintain current AT equipment, and to train current employees on AT. When personnel positions are designated to address AT, then AT becomes a more visible and accepted priority. With funding, administrative support can be gained, which can result in more supportive
attitudes among the school community. Adequate funding can increase the accessibility of AT to students in district and result in the maintenance or increase in value of the AT in district. Lastly, funding can support staff trainings, which can lead to increased buy-in among faculty and an overall increase in the salience of AT and the support for AT throughout the district.

Knowledgeable Personnel

Another natural consequence to factors of effective AT implementation identified was knowledgeable personnel. Interview narratives reveal that training personnel, hiring personnel with AT expertise, and collaboration and consultation among faculty are major factors to effective AT implementation. Knowledgeable personnel may be utilized to educate other staff in district about AT, to consult with faculty on AT issues, and to monitor AT implementation. Based on interview narratives, it is theorized that increasing AT knowledge among staff results in increased capacity for AT implementation, increased buy-in among staff, and ultimately, an increase in collaboration toward shared goals regarding AT use.

Teacher Buy-In

Teacher buy-in, which was previously mentioned in the storylines of other core categories, was identified as a major natural consequence to components of effective AT implementation. Teacher training, teacher involvement in decision-making, teacher preparation, and teachers' perceptions emerged as processes in teacher buy-in. Based on interview narrative, it is theorized that when teachers are educated about AT, feel ownership of AT decisions, feel supported by colleagues, and are understanding of special education accommodations and AT, then they buy-in, or support, AT
implementation. Teacher support was identified by numerous interviewees as a major factor in effective AT implementation. Interview responses revealed a variety of ways teacher buy-in is developed. Teacher support was developed by providing professional development relating to AT, including teachers in the AT decision-making process for their students, and providing teachers with on-going support (i.e. to troubleshoot the use of an AT device). One interviewee noted that an emerging district philosophy of individualization for all students was increasing the acceptance of various accommodations and modifications. This interviewee expected this would also increase teacher support of AT.
CHAPTER V

DISCUSSION

Interpretation of Findings

This dissertation aimed to gain an understanding of current assistive technology (AT) use, current AT decision-making practices, and barriers and facilitators to effective AT implementation in New Jersey public schools. Data collected in a survey of current Directors of Special Services were analyzed quantitatively to identify trends in AT use, correlations between various aspects of AT implementation and district factors (District Factor Grouping and district enrollment size), and the impact of district factors on different aspects of AT implementation. Additionally, interviews were conducted with Directors of Special Services, and the collected data were qualitatively analyzed using The Grounded Theory approach. Through open, axial and selective coding of the interviews, the investigator identified categories and storylines reflecting factors of AT decision-making, factors of inclusive practices and AT, and factors of effective AT implementation.

Current AT Practices and Inclusive Education

Survey results indicated that a wide range of AT, both high- and low-tech, are currently used by special education students in New Jersey. Over 90% of directors reported that students use low-tech AT for motor and language difficulties. The most frequently reported high-tech use was for written expression difficulties. However, AT
(of all types) is used less frequently in inclusive settings than in more restrictive settings. Although less AT was reported to be used in inclusive settings, a significant correlation indicates that the same range of AT is used in inclusive settings as is used in any setting. This suggests that, currently in New Jersey schools, the same range of AT can be utilized in both inclusive and more restrictive settings; however, less AT is being used in inclusive settings. One possible reason for this difference in AT use may be that fewer special education students spend time in inclusive settings. A different explanation may be that AT cannot be implemented as readily in inclusive settings. Factors inhibiting AT use will be further explored later in this chapter.

AT is used for a range of purposes. The majority of directors, but not all directors, reported that the primary purpose of AT use in their district is to increase inclusion. This suggests that in many school districts AT is viewed as a tool to increase inclusion; however, not all districts in New Jersey view AT in this way. Before considering other, more logistical barriers to AT implementation, district personnel, particularly administrators, must recognize and endorse the notion that AT is a tool to increase inclusion. Survey findings suggest that this notion is not yet fully accepted by all directors. This will be discussed further in a later section of this chapter addressing implications for practice.

Of note, an inconsistency appeared between directors’ reported use of AT for inclusion and the reported settings of AT use. Interestingly, although the majority of directors reported using AT primarily to increase inclusion, directors reported that AT is used less frequently in inclusive settings than in more restrictive settings. This discrepancy may indicate a barrier between philosophy and implementation. The barrier
may be any of the variety of factors found to impact AT implementation (i.e. knowledgeable personnel, teacher buy-in, funding, or other logistical issues). Further research is needed to understand this discrepancy. More detailed information is needed to clarify the directors’ answers to first determine if the discrepancy between reported purpose and actual practice truly exists. If it is found to exist, then additional research should investigate the barriers between intention and practice.

Although special education students in New Jersey use a wide variety of AT, only a small percentage of special education students reportedly use AT. Directors most often reported that fewer than 10% of special education students utilize AT, both in any setting or inclusive settings. This suggests that in many districts AT is not used by the majority of special education students. However, some directors reported that more than 65% of special education students in their district utilize AT, indicating that in a minority of school districts, the majority of special education students use AT. This indicates wide variation in use of AT by special education students in New Jersey. Further research is needed to better understand the specific differences in AT use and potential explanations for such differences. Numerous factors outside the scope of this study, such as the type of special education programs in district and the personnel available, may impact how many students in district use AT.

Students classified as autistic are reported to be the most frequent AT users. However, this study did not gather data about how many students in each district are classified under each category. Therefore, more detailed conclusions cannot be drawn about AT use and classification. The five most common classifications to use AT are:
autistic, multiply disabled, communication impaired, auditorily impaired, and specific learning disability.

Correlations between district size and AT use were examined. According to Cohen (1992), a larger sample size (85 or greater) is needed to detect any small or medium effect. Therefore, effects may not have been detected due to sample size. A significant correlation was detected between the use of high-tech information input devices and district size, indicating that larger districts are more likely to have special education students using high-tech information input devices, in any setting and in inclusive settings.

Larger districts are also associated with increased use of AT in self-contained settings versus inclusive settings. Similarly, another correlation indicated that larger districts are more likely to have students using AT in more restrictive settings. However, it is important to note that factors other than district size may be at play. For instance, larger districts may have more self-contained settings, while smaller districts may be more likely to send students to out of district placements. These factors, which were beyond the scope of this dissertation, likely impact how many students are reported to use AT in various settings.

Districts of a higher District Factor Grouping (DFG), which is representative of socioeconomic status, were more likely to report other places where AT is used (i.e. home school, therapy settings, out of district placements). Again, multiple explanations are possible. For instance, with more financial resources, these districts may have more varied settings available to students, resulting in more places where AT may be used.
However, this cannot be concluded because data was not gathered about the types of special education settings in each district.

Higher DFG was also found to be associated with the use of AT purposefully to increase inclusion. It is posited that districts of higher DFG have more resources available to address the various ways to increase inclusion. These districts are more likely to have resources in district (i.e. AT expertise) or to have the capabilities to seek outside expertise and support toward the goal of using AT to increase inclusion. With fewer resources, lower DFG districts must focus first on addressing basic needs, such as providing AT to assist students’ functioning, before addressing increasing inclusion.

Mixed responses were found among interviewees regarding whether AT results in increases in inclusive practices. When AT was reported to increase inclusion, then it seems to occur in the context of open-minded teachers and a supportive environment for both teachers and students. AT can increase student communication and independence, resulting in increased success in general education. Additionally, when teachers are dedicated to implementing AT, then AT can increase students’ access to curriculum.

*AT Decision-Making*

Based on survey results, the majority of school districts do not have written, procedural guidelines for AT decision-making. Approximately half of the directors reported the use of systematic evaluation formats or data collection to determine students’ AT needs. When formal assessments are utilized, nearly all districts use assessments performed by related services providers (i.e. speech/language pathologists, occupational therapists, and physical therapists) in determining students’ AT needs. Teacher
observations and student achievement with and without the device are also used by a majority of districts in determining students’ AT needs.

However, device trial data analysis is used by less than half of districts. According to the guidelines for educators about AT for students with disabilities, published by the Mountain Plains Regional Resource Center affiliated with Utah State University, once it is decided that a student may need AT, then a trial period and evaluation for the device and/or service should be determined (Copenhaver, 2004). This process involves implementing an AT device on a trial basis, collecting data during the trial period, and then using that data to determine whether the device effectively meets the student’s needs. Based on survey responses, it is assumed that AT devices are selected based upon related service providers’ assessments and teacher observations, and that, once the device is selected, the student uses it until, or unless, someone reports a problem. Device trial data analysis, which is used only in a minority of districts, provides for systematic monitoring of the implementation of the device to determine if it is appropriate.

Based upon analysis of the interviews, informal determinations are commonly utilized for AT decisions. All directors reported taking case by case approaches. AT is typically considered on an as-needed basis. Monitoring, communication and determination regarding AT are often informal and non-systematic. Fewer than half of the surveyed districts reported that their personnel chart progress as a step in AT decision-making. In the survey, most directors reported that AT is continually monitored, which suggests the lack of a specific timeline or framework. From the interview narratives, it is theorized that informal communication leads to a sense of
shared responsibility and likely is dependent upon a context of collaborative relationships. However, the lack of formal, systematic processes and the dependence upon informal determinations raises concerns. Guidelines recommend that the IEP indicate the individual responsible for monitoring and implementation. Also, to ensure that the AT is not a hindrance to inclusion, after initial implementation, staff should continually consider whether the device/services are being utilized, whether they are functioning as expected, and whether the student is being supported by the AT as expected (Copenhaver, 2004). Without systematic data collections and processes, personnel are left to make subjective determinations about the appropriate AT device to meet a student’s needs, and then similarly to assess the effectiveness or impact of AT on a student’s functioning. Wide variations are likely to result both within and between districts. However, despite these shortcomings, districts likely rely upon informal determinations, because without personnel resources, formal and systematic processes cannot be adequately and consistently performed.

The majority of districts reported that the personnel in district with AT expertise are related service providers. Related service providers and special education teachers are most likely responsible for monitoring AT use. There are numerous implications to the dual role and dependence upon such individuals. Interviews revealed that budgetary constraints result in a lack of time and personnel to address AT needs. Therefore, directors rely upon individuals in district with AT expertise but who are working under another role (i.e. related service provider). Otherwise, directors must contract with outside experts on an as-needed basis. This dependence on individuals without resources of time and without specific expertise results in non-uniform, case-by-case approaches.
and less formalized evaluation and monitoring processes. The less time personnel have
to dedicate to the AT process, then the more likely personnel are to eliminate steps from
the process, such as trialing devices and charting progress. Numerous interviewees
expressed creative ways of addressing budget constraints, most commonly by seeking to
build capacity within district (by encouraging personnel to pursue certifications in
assistive technology, by providing personnel with professional development
opportunities, and by intentionally hiring special education teachers, related service
providers, and Child Study Team members who have AT knowledge). However,
cultivating such capacity in district does not address the constraints of time and
responsibilities of in-district personnel.

Surveys and interviews indicated that AT decisions are typically made before and
during placement decisions. AT is considered during the IEP process and the IEP team
acts as the decision-maker regarding AT. Directors reported that AT is often considered
among a student’s needs. The IEP team considers how a student’s needs, including AT,
will be addressed before placement is determined. In order to consider AT before
determining placement, interview narratives revealed the need for a thorough and mindful
IEP team and shared goals among IEP team members. These contextual factors are less
likely to be in place when budgetary constraints are more severe. Given the lack of time
and personnel reported by many directors, it seems that it would be difficult and unlikely
that district personnel would be able to consistently engage in the thoughtful and
thorough steps to considering a student’s AT needs before determining placement and
during placement determinations.
**Effective AT Implementation**

Through this dissertation, key factors of effective AT implementation were identified. Knowledgeable personnel were revealed to be a major factor in effective AT processes. Interview narratives indicated that training personnel in district, hiring personnel with AT knowledge, and consultation and collaboration among personnel are critical to effective implementation. Storylines identified in interviews indicated that building personnel’s AT knowledge leads to increased capacity in district for AT implementation. This results in increased staff buy-in and increased collaboration toward shared AT goals.

Another critical factor to successful AT implementation is teacher buy-in. District administrators develop teacher buy-in by training teachers, involving teachers in AT decision-making, preparing teachers for students with AT needs, and encouraging positive perceptions and philosophies toward AT. Teachers buy in when they are educated about AT, understanding of special education accommodations generally and AT specifically, feel supported by colleagues, and feel ownership of AT decisions.

As mentioned earlier in regards to AT decision-making, funding is a vital factor to effective AT implementation. All directors emphasized that funding is critical to all stages of the AT process. To hire personnel with AT expertise and provide personnel with time to dedicate to AT, funding is needed. Funding also allows directors to garner administrative support for AT and, subsequently, increase support among the school community. With financial resources, district personnel can obtain new AT and to maintain and update current AT devices. With funding, directors can provide training for
current personnel, resulting in increased staff buy-in, increased visibility and priority of AT, and increased overall AT salience and support for AT.

In addition to knowledgeable personnel, teacher buy-in, and funding, other major factors in effective AT implementation were identified through interviews. Other key components include district philosophy, time, family support, and administrative support.

In a study of AT in Pennsylvania public schools, Tucker et al. (2008) identified concerns for AT service delivery. These concerns included funding, overdependence on the regional support consultant, use of aides, and lack of standard procedures for assessment and monitoring. Interestingly, these concerns are highly similar to those identified in this study. Although the school systems are structured differently in New Jersey and Pennsylvania, the critical factors of funding and in-district knowledge were identified in both. Additionally, the lack of standard procedures identified in Tucker’s study was similarly identified in this dissertation. Furthermore, the reliance on outside experts, who do not have sufficient time to provide needed services, was found in 2008 by Tucker and was loudly echoed in the findings of this dissertation.

Limitations of the Study

Sample Size

Seventy-three completed surveys were able to be used for this dissertation. A total of 270 directors were mailed surveys out of a population of 549. The 73 completed and useable surveys provided an adequate sample for statistically significant findings. However, according to Cohen (1992), a larger sample size (85 or greater) is needed to
detect a small or medium effect in correlations. Although significant correlations were found, some effects may not have been detected due to the sample size.

Participants

The sample of 270 was randomly selected to provide for a representative sample of directors from New Jersey school districts. However, only 73 of the 270 directors in the sample provided useable surveys. There may be factors unique to these 73 directors and districts that prompted them to provide completed surveys. To complete the surveys, the directors needed to have knowledge about the assistive technology and inclusive practices in their district and needed to dedicate time to the survey. Similarly, there may have been unique, unidentified factors shared by those directors who consented to participate in the follow-up interview. If there are shared characteristics among the participants that made them willing to participate, then they may differ from those who did not respond. The differences may be in the participants or in their districts’ practices. The possibility of such differences suggests caution in generalizing this study’s findings to all public school districts in New Jersey.

This study gathered information from directors of special services within New Jersey school districts. Directors were selected as the survey and interview participants because it was assumed that due to their position, they would likely have knowledge of the assistive technology practices occurring throughout their district. However, there may be other individuals in school systems with insight into assistive technology and inclusive practices. For instance, Child Study Team members and special education teachers can provide information about these practices. The directors provide a
perspective that differs from others in their districts. This study is limited in its insight as it only gathered information from directors.

Methodology

The survey and interview broadly covered all AT when investigating AT practices and decision-making. While this wide scope allowed for the gathering of information about AT and inclusive practices, there may exist variations with regard to specific AT types that were not discovered by this study. For instance, a more narrowly focused study on augmentative communication devices may reveal that New Jersey school districts have different procedures for determinations about these devices than they have for AT in general. The broad scope of this dissertation limited the specificity of the findings.

Additionally, because this dissertation was an investigation into current practices, rather than an investigation of hypotheses through the manipulation of variables, conclusions regarding cause and effect cannot be drawn. Only conclusions about the current state of AT practices can be determined.

Lastly, interviews were conducted by phone to accommodate participants and increase the ease with which the investigator could complete the interviews. However, by completing interviews by phone, information may have been missed. During in-person interviews, information is communicated both verbally and non-verbally, which can provide deeper meaning or lead to further questions to clarify meaning. Phone interviews limited communication to verbal communication. This may have limited the information collected by the investigator.
Implications for Practice

The findings of this dissertation provide insight into current AT practices in New Jersey public schools. Current AT use, decision-making and implementation indicate that there is much to be done to increase AT as a tool for inclusion, to improve AT decision-making and to facilitate effective AT implementation. This dissertation has implications for school personnel in general and for school psychologists in particular.

First of all, the survey findings about current practices indicated that not all directors have accepted the notion that AT is a tool for inclusion. Within districts, school psychologists and other special services personnel with knowledge of AT and inclusion should work to increase awareness among district personnel about the role of AT in inclusion.

Survey results also indicated that device trial data analysis is only used in a minority of districts. This process provides for systematic monitoring and data-based decision-making. Especially in times of budgetary constraints, data-based decision-making is championed by many in the education field. Such systematic processes are critical to effectively and efficiently implementing AT as a tool for inclusion of special education students. School psychologists are uniquely trained in data-based decision-making and can provide leadership in developing and implementing data-based AT procedures in school districts.

However, personnel and time are necessary to consistently engage in formal and systematic processes of AT decision-making and implementation. Directors of special services must recognize and value the role of school psychologists and other personnel
knowledgeable in data analysis and AT. Directors must provide time and resources to personnel so they can utilize systematic AT procedures.

This raises an additional practice issue. Survey and interview results suggested a dependence on outside experts and a lack of in-district expertise. If district personnel do not have AT knowledge and districts contract with outside experts on an as-needed basis, then the quality and effectiveness of their identification of AT needs and monitoring of AT use is likely limited. As mentioned earlier, school psychologists can serve as in-district experts on data collection and analysis. As Tucker et al. (2008) suggested after finding similar issues with AT use in Pennsylvania schools, if school districts utilize standard procedures to monitor AT use and effectiveness and then log their data into a larger database, then school personnel between districts could share information and more efficiently plan for special education students’ AT needs. School psychologists can serve as leaders in developing such standard data collection procedures. Additionally, school psychologists, due to their training in data analysis, can lead discussions at IEP meetings about AT, explaining data and data collection procedures. These discussions are critical to effective collaboration among IEP team members to make informed decisions about AT for students.

Implications for Training

The findings of this dissertation indicated that New Jersey school districts typically do not have a designated AT employee. Instead, school districts rely upon the AT knowledge of individuals employed in other positions (i.e. related service providers, Child Study Team members, and special education teachers). This presents numerous
difficulties, most significantly, the lack of time that such individuals have available to
dedicate to AT issues. However, given the budgetary constraints faced by public schools,
it is not anticipated that many districts will soon be developing positions solely dedicated
to AT. Without dedicated AT personnel, it is imperative that all special education
personnel be prepared to address AT issues. In particular, case managers need to be
knowledgeable about AT, so that they can adequately address AT needs when developing
students’ individual education programs (IEP).

School psychology students need to be prepared to work as case managers and
develop students’ IEPs. To do this, school psychologists need training in how to use data
to determine students’ special education classification and subsequently develop the IEP.
To address AT in an IEP, school psychologists need to know how to gather data for AT
decisions, how to consult with related service providers and teachers, and how to lead the
IEP team to make data-based decisions. Since the school psychologist role already
involves data collection and analysis, data-based decision-making, and consultation,
school psychologists likely have the requisite skills, and may only lack specific AT
knowledge. Therefore, school psychology training likely only requires additional
training focused on assistive technology – what it is, how it can increase inclusion, and
how to apply school psychologists’ knowledge about consultation and data-based
decision-making to the AT process.

The survey findings indicating the lack of systematic procedures and the frequent
absence of key steps in AT decision-making (i.e. device trials and charting progress)
point to the need for school psychologists to be trained on general guidelines to AT
consideration and decision-making, the range of AT devices and purposes, and student benefits derived from various AT devices.

Copenhaver’s AT Guidelines assert that at least one member of the IEP team must possess knowledge about AT (2004). While the school psychologist should be prepared to fill that role, it is important that school psychologists receive training in AT simply so they can meaningfully participate in IEP team discussions about AT. Even if other school personnel possess AT expertise, the school psychologist needs to have basic knowledge about AT to collaborate with others.

School psychologists should also be aware of the facilitators and barriers to effective AT implementation. As graduate programs prepare school psychology students to navigate systems, course content should include AT. School psychology students should learn about developing teacher buy-in, engaging in consultation and collaboration, and building administrative support in broader terms when learning about systems and organizations. These learning experiences should include consideration of how AT implementation and inclusive practices are impacted by such factors in a school system.

Summary and Future Directions

The objective of this dissertation was to gain an understanding of current practices regarding assistive technology and inclusion in New Jersey public schools and then to use this information to make training and practice recommendations for New Jersey school psychologists.

The findings of this dissertation indicate that a wide variety of assistive technology is used in New Jersey school districts. However, this AT is typically used
only by a small percentage of special education students and more often in restrictive rather than inclusive settings. Findings further indicate that there is variation in AT use between school districts. Further research is needed to better understand the specific differences in AT use between districts. To better understand district differences in AT use, future research should investigate districts’ special education programs and settings, personnel available and involved with special education and AT, and district philosophy and efforts toward inclusion and technology.

Correlational findings in this study point to significant relationships between district size and setting of AT use, as well as between DFG and purposeful use of AT for inclusion. Such relationships demand further attention, as a number of factors may be at play. As stated earlier, future research should consider the settings available in district. Additionally, a more specific investigation into the number of students classified under each category and those using AT would provide deeper insight into AT differences and factors potentially impacting AT use.

The dissertation findings also indicate that many districts are not using standard AT procedures and are not engaging in recommended steps of AT decision-making (evaluation, device trials, charting progress). Major facilitators and barriers to effective AT implementation were identified in this study. Knowledgeable personnel, funding, and teacher buy-in were all revealed to be critical to successful AT implementation and, simultaneously, capable of significantly hindering AT implementation.

From these findings, the principal investigator made recommendations for New Jersey school psychologists. For school psychologists to effectively engage in the AT process in schools, they need knowledge in AT. Due to school psychologists’ roles in
data-based decision-making, they are natural leaders in developing and implementing standard procedures for AT data collection and analysis. For school psychologists to take on such a role, however, they need knowledge in assistive technology. School psychologists’ training and experience in consultation makes them additionally well-prepared to develop critical teacher buy-in through collaborative consultation.

Based upon the findings, practice recommendations emphasize the use of standard procedures and data-based decision-making. Practice recommendations also center on developing teacher and administrator buy-in through support, collaboration, and education. Building in-district capacity in order to have personnel knowledgeable about AT is also recommended to improve AT practices.

This dissertation provides insight into the current state of assistive technology use, assistive technology decision-making, and the role of assistive technology in inclusive practices within the state of New Jersey. The findings indicate areas of successful practices as well as major areas in need of improvement. The practice recommendations can guide school districts, and school psychologists in particular, to more effectively address students’ assistive technology needs and utilize assistive technology to increase students’ inclusion and access to general education curriculum and peers. The training recommendations are intended to provide school psychology graduate program directors insight into the knowledge that school psychologists need in the area of AT. This dissertation is intended to be used to improve the training and practice of school psychologists in order to ultimately improve AT decision-making and implementation to enhance special education students’ functioning and inclusion.
REFERENCES


May 26, 2010

NAME
Director of Special Services
NAME OF School District
ADDRESS

Enclosed please find a survey regarding assistive technology practices in your school district. Additionally, you will find a stamped and addressed return envelope for this survey.

I am a doctoral candidate in the school psychology program at the Graduate School of Applied and Professional Psychology at Rutgers University. In completion of my dissertation, I am investigating assistive technology practices and inclusion across the state of New Jersey. Assistive technology is one of many accommodations which can increase the amount of time students spend in general education settings. Although schools are mandated to consider assistive technology for all special education students, the absence of specific guidelines has resulted in differences in assistive technology decision-making and implementation across school districts in New Jersey. I am gathering information about current practices to determine necessary next steps to improve the practice of implementing assistive technology to increase inclusion and improve the functioning of special education students. I am sending this survey to Directors of Special Services in public school districts across New Jersey.

By completing and returning this survey, you are contributing to the understanding and improvement of assistive technology practices and inclusive education in New Jersey. Additionally, if you are interested, you can be provided with the results of this study, which may assist inclusion improvement efforts in your district. If you would like to receive the results of this study, please complete the enclosed card. This card (which will include your name) will be separated from the survey immediately upon receipt. It is anticipated that this survey will take you approximately 5-10 minutes to complete. There are no foreseeable risks to participation in this study.

Please note that no identifying information regarding you or your school district will be published. Each survey has been given a random code number. The random code number is assigned to your district and is listed only on one document. I will keep this information confidential by limiting individuals' access to the research data and keeping it in a secure
location. This list will only be used in order to allow me to sample the districts that respond for follow-up interviews. My faculty advisor and the Institutional Review Board at Rutgers University are the only parties that will be allowed to see the data, except as may be required by law. The written report of the study’s findings will not include any identifying information. If a report of this study is published, or the results are presented at a professional conference, only group results will be stated, unless you have agreed otherwise.

Participation in this study is voluntary. You may choose not to participate. In addition, you may choose not to answer any questions with which you are not comfortable.

If you are willing, please complete the survey and return it in the enclosed envelope. Your returned survey will serve as acknowledgement of your consent to participate in this study. If you do not respond, then it will be assumed that you are not interested in participating in this study.

Additionally, if you are willing to participate in a follow-up telephone interview, please complete the enclosed Interview Informed Consent Form and return it with your completed survey. Interview Informed Consent Forms (which will include your name) will be separated from the survey immediately upon receipt.

If you have any questions regarding this study, please contact me at amanda.urdang@gmail.com or (201) 759-5336. If you have any questions about your rights as a research subject, you may contact the Sponsored Programs Administrator at Rutgers University at:

Rutgers University Institutional Review Board for the Protection of Human Subjects
Office of Research and Sponsored Programs
3 Rutgers Plaza
New Brunswick, NJ 08901-8559
Tel: 732-932-0150 ext. 2104
Email: humansubjects@orsp.rutgers.edu

You may also contact my faculty advisor, Dr. Kenneth Schneider, at:

Graduate School of Applied and Professional Psychology
Rutgers, The State University of New Jersey
152 Frelinghuysen Road
Piscataway, NJ 08854
Tel: 732-445-2000 x107
Email: schneid@rci.rutgers.edu

Please keep this for your records.

Thank you for your time and consideration.

Sincerely,

Amanda Urdang, Principal Investigator
July 6, 2010

NAME
Director of Special Services
NAME OF School District
ADDRESS

NAME:

You are invited to participate in a follow-up interview that will be conducted by Amanda Urdang, a doctoral candidate in the school psychology program at the Graduate School of Applied and Professional Psychology at Rutgers University. Interviews will be conducted by telephone following survey collection. The purpose of this interview is to gather more detailed information about assistive technology practices in New Jersey public schools.

Approximately 10 Directors of Special Services will be randomly selected to participate from the pool of Directors who agree to participate. Each individual’s participation will last approximately 30 minutes. The interview includes a series of questions about assistive technology decision-making in your school district.

If you agree to take part in the interview, then please sign this form and return it with your completed survey.

By participating in the interview, you are further contributing to the understanding and improvement of assistive technology practices and inclusive education in New Jersey. There are no foreseeable risks to participation in this study.

Participation in the interview is voluntary. You may choose not to participate, and you may withdraw at any time during the interview without any penalty to you. In addition, you may choose not to answer any questions with which you are not comfortable.

This interview is confidential. Confidential means that the research records will include some information about your district, such as your responses regarding your district’s assistive technology practices. I will keep this information confidential by limiting individual’s access to the research data and keeping it in a secure location. My faculty advisor and the Institutional Review Board at Rutgers University are the only parties that will be allowed to see the data, except as may be required by law. If a report of this study is
published, or the results are presented at a professional conference, only group results will be stated, unless you have agreed otherwise.

If you have any questions regarding this study, please contact me at amanda.urdang@gmail.com or (201) 759-5336. If you have any questions about your rights as a research subject, you may contact the Sponsored Programs Administrator at Rutgers University at:

Rutgers University Institutional Review Board for the Protection of Human Subjects
Office of Research and Sponsored Programs
3 Rutgers Plaza
New Brunswick, NJ 08901-8559
Tel: 732-932-0150 ext. 2104
Email: humansubjects@orsp.rutgers.edu

You may also contact my faculty advisor, Dr. Kenneth Schneider, at:

Graduate School of Applied and Professional Psychology
Rutgers, The State University of New Jersey
152 Frelinghuysen Road
Piscataway, NJ 08854
Tel: 732-445-2000 x107
Email: schneid@rci.rutgers.edu

Please keep one copy of this consent form for your records.

Sign below if you agree to participate in the follow-up interview and return one copy of this form with your completed survey:

Subject ________________________________________ Date ______________________
Principal Investigator ______________________________ Date ______________________

Thank you for your time and consideration.

Sincerely,

Amanda Urdang
Principal Investigator
APPENDIX C

Survey to be completed by the Director of Special Services

The Individual with Disabilities Education Improvement Act (IDEIA) re-authorized in 2004 defines assistive technology devices as follows:

(A) In general.--The term ‘assistive technology device’ means 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.

(B) Exception.--The term does not include a medical device that is surgically implanted, or the replacement of such device.

Please answer the following questions about assistive technology based upon this IDEIA definition. **Please note that assistive technology is a broad term. Assistive technology includes items that may not typically be considered “technology” (i.e. pencil grips and word lists), and also includes high-tech items (i.e. alternative communication devices).**

1) **Which types of assistive technology are used by special education students in your district?** (Check all that apply.) (Examples are in parentheses and are not exhaustive)
   - ______ “low-tech” for student movement (adaptive desks, positioning devices)
   - ______ “low-tech” for language needs (common word lists, picture symbol boards)
   - ______ “low-tech” for sensory needs (sensory brushes, weighted vests)
   - ______ “low-tech” for motor difficulties (pencil grips, adaptive scissors)
   - ______ “high-tech” information input devices (alternative keyboards, voice recognition technology)
   - ______ “high-tech” for written expression difficulties (spelling and grammar checker, word recognition software, computer software for concept-mapping and note-taking)
   - ______ “high-tech” for reading difficulties (electronic text, supportive eText, books on tape)
   - ______ augmentative and alternative communication (AAC) devices
   - ______ Other. Please specify:
     - ____________________________________________________________
     - ____________________________________________________________
     - ____________________________________________________________

2) **In which educational settings do special education students use assistive technology?**
   (Check all that apply.)
3) Which types of assistive technology are used by special education students in inclusive settings? (Check all that apply.)

- “low-tech” for physical movement (adaptive desks, positioning devices)
- “low-tech” for language needs (common word lists, picture symbol boards)
- “low-tech” for sensory needs (sensory brushes, weighted vests)
- “low-tech” for motor difficulties (pencil grips, adaptive scissors)
- “high-tech” information input devices (alternative keyboards, voice recognition technology)
- “high-tech” for written expression difficulties (spelling and grammar checker, word recognition software, computer software for concept-mapping and note-taking)
- “high-tech” for reading difficulties (electronic text, supportive eText, books on tape)
- augmentative and alternative communication (AAC) devices
- Other. Please specify:

4) For what purpose(s) is assistive technology used? (Check all that apply.)

- To increase inclusion and students’ access to general education curriculum
- To accommodate for physical movement needs
- To accommodate for sensory needs
- To accommodate for motor difficulties
- To accommodate for written expression difficulties
- To accommodate for language/communication difficulties
- To accommodate for reading difficulties

5) When your district includes assistive technology in a student’s IEP, is the most common overall objective to increase the amount of time students spend in inclusive settings and increase their access to general education curriculum?

- Yes
- No

6) In which setting is assistive technology more frequently utilized? (Choose one.)

- Self-contained classrooms
- Resource room
- In-class support model
- Mainstream/General education settings
- Other. Please specify:
Inclusive settings (i.e. general education classrooms)
OR
More restrictive settings (i.e. resource room, self-contained classes)

7) In your district, approximately what percentage of special education students utilize assistive technology (in any setting)?
   ____ 10% or less
   ____ 10-25%
   ____ 25-40%
   ____ 40-65%
   ____ 65-80%
   ____ 80% or more

8) In your district, approximately what percentage of special education students utilize assistive technology in inclusive settings?
   ____ 10% or less
   ____ 10-25%
   ____ 25-40%
   ____ 40-65%
   ____ 65-80%
   ____ 80% or more

9) What are the classifications of the special education students utilizing assistive technology? (Check all that apply.)
   ____ Auditorily impaired
   ____ Autistic
   ____ Cognitively impaired
   ____ Communication impaired
   ____ Emotionally disturbed
   ____ Multiply disabled
   ____ Deaf/blindness
   ____ Orthopedically impaired
   ____ Other health impaired
   ____ Preschool child with a disability
   ____ Social maladjustment
   ____ Specific learning disability
   ____ Traumatic brain injury
   ____ Visually impaired

10) Please rank the classifications under which students more often utilize assistive technology. (Please rank 1-14, with 1 being the most frequent classification to utilize assistive technology.)
  ____ Auditorily impaired
  ____ Autistic
  ____ Cognitively impaired
  ____ Communication impaired
11) Does your district have written procedural guidelines related to assistive technology devices/services?
   _____ Yes
   _____ No

   a. If no to question 11, does your district have a standard procedure for determining students’ assistive technology needs?
      _____ Yes
      _____ No

12) Does your district use standard evaluation formats or data collection systems to determine students’ assistive technology needs?
    _____ Yes
    _____ No

13) Which of the following are considered in determining whether a student needs assistive technology and what type of device a student should receive? (Check all that apply.)
    _____ Speech/language assessment
    _____ Occupational therapy assessment
    _____ Physical therapy assessment
    _____ Device trial data analysis
    _____ Student preferences
    _____ Student achievement with and without device
    _____ Teacher observations
    _____ Family preferences

14) Who makes the decision of whether and what assistive technology device/service to provide?
    _____ Director of special services
    _____ Child study team
    _____ OT/PT
    _____ Speech/language pathologist
    _____ Other. Please specify:

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15) Are assistive technology needs considered when determining student placement?
   _____ Yes
   _____ No

16) When are students’ assistive technology services/devices determined?
   _____ Before student’s placement decision is made
   _____ During student’s placement decision is made
   _____ After student’s placement decision is made

17) When a device is decided upon, is it borrowed or bought initially?
   _____ Borrowed
   _____ Bought

18) Are there school personnel in your district with assistive technology expertise who are involved in assistive technology decision-making?
   _____ Yes
   _____ No

   a. If yes to Question 18, what position do these individuals hold in the school?
      _____ OT/PT
      _____ Speech/language pathologist
      _____ School psychologist
      _____ Social worker
      _____ Director of special services
      _____ Special education teacher
      _____ Other. Please specify:

19) Which (if any) of the following steps are involved in your district’s assistive technology decision-making process? (Check all that apply.)
   _____ Discussing AT needs at IEP meeting
   _____ Brainstorming possible interventions with input from:
         _____ Therapists (OT/PT/Speech)
         _____ School psychologist
         _____ Social worker
         _____ Student
         _____ Family
         _____ Teachers
   _____ Choosing a type of device or service
   _____ Trying device/service
   _____ Charting progress of device/service
   _____ If unsuccessful trials, brainstorm and try new device.
20) Once a student begins to use a device or service, is use monitored?
   _____ Yes
   _____ No

   a. If yes to Question 20, who monitors assistive technology use?
      _____ OT/PT
      _____ Speech/language pathologist
      _____ School psychologist
      _____ Social worker
      _____ Director of special services
      _____ Special education teacher
      _____ Other. Please specify:

   b. If yes to Question 20, for how long is use typically monitored?
      _____ 1-2 weeks
      _____ 3-5 weeks
      _____ 1-3 months
      _____ Other. Please specify:

21) A sample of survey respondents will be contacted to participate in a follow-up telephone interview. If selected, may I contact you to participate in this interview?
   _____ Yes. If yes, please provide your telephone number:

   _____ No.

   Thank you for completing this survey.
APPENDIX D

Interview Protocol for Directors of Special Services (follow-up to survey)

1) Please describe how your district makes decisions regarding including assistive technology in a student’s Individualized Education Program.
   a. Who is involved in the decision-making?
   b. What steps are involved? (i.e. assessment, family input, trials with devices)
   c. Who makes the final decision?
   d. What are the major criteria considered in the final decision?

2) In your district, who is responsible for monitoring assistive technology use once a device has been chosen for a student?

3) Does your district use outside consultants in the assistive technology decision-making and/or implementation process?
   a. If so, how often are consultants used?

4) How are Child Study Team members and teachers trained on assistive technology?

5) In what ways are assistive technology decisions and educational placement decisions related?
   a. Are placement and AT decisions made together or does one decision typically precede the other?
   b. Does a student’s assistive technology needs influence the student’s educational placement? Does a student’s placement influence the assistive technology decisions regarding that student? If so, please explain.

6) How does your district try to increase inclusion?
   a. In seeking to increase inclusive education in your district, have you identified assistive technology as a means to increase inclusion?

7) What do you perceive to be facilitators and barriers to effective assistive technology decision-making and implementation in your district?
   a. How do the following factors either facilitate or inhibit the use of assistive technology in inclusion: Finance? Training (for support service personnel and for teachers)? School personnel knowledge of AT? Administrative support? District philosophy? Attitudes and perceptions of school personnel and family?

8) Is there anything else that you would like to share about assistive technology, inclusion, or decision-making in your school district?