Going beyond Assistive Technology Devices: Are Assistive Technology Services Being

Considered?

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Abstract

While efforts have been made in the last two decades to educate professionals about the nature of assistive technology (AT) devices, successful implementation of technology is impossible without the support and provision of appropriate AT services. The current investigation examined the current status of AT services delivery for students with disabilities across the nation. The survey study was designed and conducted by the National Assistive Technology Research Institute. Professionals serving students who used AT were asked to report the AT services received by their students. Survey responses collected from 14 states and 60 school districts revealed that the reported responses constituted three categories: AT services that fit federal definitions (40.2%), AT services that did not fit federal definitions (19.6%), and services that were not AT services (40.2%). Data were also gathered on the professionals providing AT services, the top three services provided by each professional, and the degree to which school systems were seeking AT services provision by contracted professionals from outside the school system. Findings suggest the necessity of adequate training and increased awareness of AT services among teachers and other professionals working with students with disabilities. Limitations and suggestions for further research are discussed.

Current Status of Assistive Technology Services Delivery

Over the last two decades a substantial body of literature has accumulated to support effective outcomes of assistive technology (AT) use for people with disabilities. The federal initiatives that created AT definitions of devices and services first appeared in the Technology-Related Assistance for Individual with Disabilities Act (Tech Act) of 1988 (P.L. No. 100-407). They were based upon observations that technology improved the quality of life, academic achievements, access to general education, and independence of people with various disabilities (Behrmann, 1984; Beukelman & Mirenda, 1998; Blackhurst & Edyburn, 2000; Church & Glennen, 1992; Sheer, 1993).

The definitions of AT devices and AT services mandated by the Individuals with Disabilities Education Improvement Act (IDEA, 2004) were changed slightly from the original definitions in the Tech Act (1988) to reflect the population of school-aged children with disabilities served under this law (Blackhurst, 2005; Parette, 1997). As defined in IDEA (2004), an assistive technology device is "any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve the functional capabilities of a child with a disability. The term does not include a medical device that is surgically implanted, or the replacement of that device" (§ 1401 (1)). IDEA (2004) defines assistive technology service as

> any service that directly assists a child with a disability in the selection, acquisition, or use of an assistive technology device. Such term includes-
> (a) The evaluation of the needs of a child with a disability, including a functional evaluation of the child in the child's customary environment; (b) Purchasing, leasing, or otherwise providing for the acquisition of assistive technology devices by such child; (c) Selecting, designing, fitting, customizing, adapting, applying, maintaining, repairing, or

replacing assistive technology devices; (d) Coordinating and using other therapies, interventions, or services with assistive technology devices, such as those associated with existing education and rehabilitation plans and programs; (e) Training or technical assistance for a child with a disability or, if appropriate, that child's family; and (f) Training or technical assistance for professionals (including individuals providing education or rehabilitation services), employers, or other individuals who provide services to, employ, or are otherwise substantially involved in the major life functions of that child (§1401(2)).

Recent studies demonstrate encouraging results, revealing the increased access to and use of AT devices among teachers working with students with disabilities (Temple, 2006). However, No Child Left Behind (NCLB, 2001) and IDEA (2004) emphasize a greater goal to empirically prove the effectiveness of educational interventions. While the effectiveness of some assistive technologies is immediately apparent, such as a child who is properly positioned as a result of using AT, other AT requires planned and systematic implementation in order to maximize its effectiveness (Bausch, Ault, & Hasselbring, 2006). This implementation involves, as a critical component, the use of AT support services. Without this component, these AT interventions will not prove successful as mandated by federal law.

IDEA (1997, 2004) states that each Individualized Education Program (IEP) team must consider whether a child needs AT devices and services in order to receive a free and appropriate public education (FAPE). AT devices and services must be documented in a child's IEP as a part of special education, related services, and/or supplementary aids or services (§ 1414 (d) (3) (B) (v)). Since the passage of the IDEA in 1997, the main AT focus has been on policies and procedures for determining students' needs for AT devices and services (Barkin, Marek, & Huffman, 1997; Zabala et. al., 2000). Recent research studies reveal that while there is still much

potential and room for improvement, many school districts across the country have provided at least general guidelines for addressing AT in the IEP (Bausch, Stegall, et al., 2006).

Substantial progress has been made in supporting teachers and other professionals in complying with the law. After determining the environment in which the student must function and the demands placed on the student, or the tasks that must be completed, the AT needs of the student should be considered (Blackhurst, 2005; Zabala, et al. 2005) However, in order to consider AT during an IEP meeting it is critical for the team members to understand what AT is and what devices are available. Technology consideration and documentation are based on the team members having an adequate level of expertise in AT in order to appropriately select devices and services to meet students' needs (Parette, 1997; Reed & Bowser, 2005). Over the last 20 years improvement has been observed in this area. The US Department of Education has allocated federal funds to endorse state technology-related assistance projects that "promote public awareness about the use of AT equipment and services." (Bailey, Meudenbauer, Fein, & Mollica, 2005, p. 32). Research on effective development and implementation of assistive and instructional technologies has been funded by the Steppingstones for Technology Innovations grants over the last 8 years with funding directed to specific technology innovations. Federal funding has been available through the Assistive Technology Act of 1998 (P.L. No. 105-395) to establish and support statewide programs, alternative financing programs, and research projects in order to ensure awareness and access to AT devices and services (Bailey et al., 2005). Among other initiatives, Special Education Instructional Materials Centers (SEIMC) Network and the National Center for Technology Innovation were organized to offer information and resources as well as to promote technology innovations that can improve functioning and performance of students with disabilities (Blackhurst, 2005; National Center for Technology Innovation, 2006). Additionally, the National Assistive Technology Research Institute (NATRI) implemented a

series of studies across the nation over a 4-year period. One of their studies analyzed successful

practices and barriers to AT implementation based on 210 teacher interviews representing school

systems across 10 states. Teachers in the study indicated that adequate access to AT equipment

and AT support in their schools were imperative for successful AT implementation. However,

teachers responsible for implementing AT in their classrooms reported the lack of awareness and

device-based training as a major barrier to AT implementation (Temple, 2006).

    While more technology becomes available for people with disabilities, a valuable piece is

still missing. AT services are not in place to support adequate use of AT devices (Edyburn, 2001;

Long, Huang, Woodbridge, Woolverton, & Minkel, 2003). It is not enough just to be aware of

technological options and features of a specific device (Bowser & Reed, 1995; Hutinger,

Johanson, & Stoneburner, 1996; McGregor & Pachuski, 1996; Todis & Walker, 1993; Zabala et

al., 2000). Services enable the use of the devices (Bowser & Reed, 1995). As noted by Zabala et

al. (2000), it is critical to include both devices and support services in an IEP. The provision of

AT services depends greatly on such documentation. There are no data demonstrating how often

AT services are currently considered and documented in IEPs. While the awareness of AT

devices has increased dramatically over the last years, professionals are still concerned that the

delivery of AT services has been overlooked (Edyburn, 2001; Long et al., 2003; Todis &

Walker, 1993). "Success is dependent not only on having access to a device, but also on factors

involving selection, acquisition, and use of a tool" (Edyburn, 2005, p. 242). All AT services are

crucial for the successful implementation of technology (Fuhrer, 2001). The lack of training

based on needs and skills is determined to be the most common reason for AT abandonment

(Barkin et al., 1997; Parette, VanBiervliet, & Hourcade, 2000). Unfortunately, not all

professionals are adequately prepared to provide AT services (Abner & Lahm, 1998; Carey &

Sale, 1994; Derer, Plosgrove, & Rieth, 1996; Judge, 2001; Hutinger & Johanson, 2000; Lahm &

Sizemore, 2002; Lesar, 1998; McGregor & Pachuski, 1996). Family members are also unaware of what AT services are and which ones are needed. In a survey conducted by Margolis and Goodman (1999), 87% of parents of students with disabilities indicated access to some form of technology in schools. However, less than 12% indicated access to AT services. Furthermore, family members were uninformed that AT services were essential in making AT device implementation successful.

As an effort to support those making decisions about AT devices and services, several instruments have been developed to address and guarantee high quality AT services. The Unifying Functional Model (Blackhurst, 2005), Quality Indicators of Assistive Technology (QIAT) (Zabala & Carl, 2005; Zabala et al., 2000), Educational TECH Points (Bowser & Reed, 1995), Six Steps to improve AT services in schools and the School District Profile of Assistive Technology Services (Reed, 1997, 1999), as well as the Consortium Model (Long et al., 2003) are just some examples of standards for AT. The Unifying Functional Model guides the delivery of AT services and focuses on human functioning in a specific environment rather than on a disability label. AT devices and services represent an external support that can be used as one of the options to address functional demands required in a specific context. The Unifying Functional Model identifies important elements and factors that should be taken into consideration to guide the provision of effective AT services (Blackhurst, 2005).

Professionals can seek guidance through a set of validated AT services descriptors, commonly known as QIAT. Designed as a tool for closing the gap between the policy requirements and the realities in educational settings, QIAT represents a set of indicators that can serve as a guide for the development, delivery, and evaluation of AT services. Intent statements and a list of common errors follow each indicator connecting it to specific situations (Zabala & Carl, 2005; Zabala et al., 2000).

The Education TECH Points system (Bowser & Reed, 1995) was developed to direct schools in developing mechanisms for efficient AT service delivery. Each point represents questions that should help IEP team members make decisions about AT devices and, more importantly, about AT services. The questions are asked at all stages of service delivery, including initial referral, evaluation, extended assessment, plan development, implementation, and periodic review. It is a tool to determine existing resources and areas of need in the AT services delivery system.

Reed (1999) suggested six steps to follow in order to improve the delivery of AT services including 1) develop a shared vision of what those services should be, 2) create a leadership team to direct implementation of that vision, 3) develop necessary policies, procedures, and forms to guide district staff in provision of AT devices and services, 4) assure access to assistive technology for both trial and ongoing use, 5) provide training to all staff tailored to their needs, and 6) create a network of collegial support that will continue to increase knowledge and effectiveness in the future. In addition, the School District Profile of Assistive Technology Services (Reed, 1997) offers support to school districts to ensure the provision of AT services through detailed activities and scenarios to demonstrate the various stages of service delivery.

The consortium model (Long et al., 2003) provides a 10-step decision-making process accompanied with guidelines of specific information that the team must consider during each step to secure AT devices and services. This model as with the aforementioned tools is designed to guide professionals beyond the consideration of AT devices towards successful implementation by systematically planning AT services.

Several studies have revealed concerns about AT not being used as written in the IEP as well as poor implementation of AT across settings (Copley & Zivani, 2004; Derer et al., 1996; Hutinger et al., 1996). The most commonly identified barriers to successful AT implementation

are inadequate training and lack of follow up support for teachers, parents, and related services providers (Carey & Sale, 1994; Judge, 2001; Lesar, 1998; McGregor & Pachuski, 1996). Many teachers and related services providers lack any training in the area of AT (Derer et al., 1996; Edyburn & Gardner, 1999; Ludlow, 2001; McGregor & Pachuski, 1996; Parrette, 1997). Moreover, even if teachers are proficient in integrating technology into instruction there still needs to be extensive training on the specific device determined to deliver FAPE (McGregor & Pachuski, 1996). The research finds that other barriers preventing teachers from utilizing AT in schools include maintenance of a device; repair of a device (Lesar, 1998; McGregor & Pachunski, 1996); delay between consideration, acquisition, and actual device use (White, Wepner & Wetzel, 2003); and inability of children to use devices across settings (Carey & Sale, 1994; Derer et al., 1996).

These barriers to AT implementation reported in the literature are aligned with the federal definitions of AT services. That allows us to suggest that if services are properly documented and provided; fewer barriers to AT use might be reported. It is crucial to identify appropriate AT services in a child's IEP to ensure that a device is provided, maintained, repaired, and integrated into all settings (Parette, 1997; Reed & Bowser, 2005). Devices must be considered in connection with services to ensure more successful implementation. While teachers and other professionals serving students with disabilities are receiving training in AT devices, it is unknown if they receive any training in what AT services are and what they are responsible for providing to students. The purpose of this study was to describe the current state of AT services delivery as reported by teachers in 14 states in the nation. The following research questions were asked:

1. What is the nature of AT services currently provided to students with disabilities?

2. What professionals deliver which AT services?

3. What types of AT services are provided by professionals contracting with the school

    district to provide services?

Method

National Assistive Technology Research Institute

The National Assistive Technology Research Institute (NATRI) was established in

October 2000 to investigate the status of AT nationwide. NATRI examined a comprehensive list

of issues related to AT as well as searched for best practice in AT across the nation, targeting the

improvement of AT policies and practices for students with disabilities. NATRI was housed at

the University of Kentucky and funded through a cooperative agreement (#H327G000004) with

the Office of Special Education Programs at the U.S. Department of Education. George Mason

University was a sub-contractor and a partner in the project. Numerous studies employing

various research methodologies were designed and implemented to research and disseminate

findings in seven research areas including: (a) status of AT use in schools, (b) policies,

procedures, and resources related to AT, (c) consideration and incorporation of AT in the IEP by

IEP teams, (d) AT training and technical assistance, (e) planning and implementation AT

services, (f) effectiveness of AT devices and services on the academic, social and functional

performance of students, and (g) status of AT instruction in personnel preparation programs

(Lahm, Bausch, Hasselbring, and Blackhurst, 2001). NATRI strived to collect data that would

guide the production of products focused on improved delivery of AT services to students.

The current data were collected as part of a study conducted by NATRI that was designed

to evaluate the status of AT use in the nation. The status of AT use in schools was investigated

by collecting information on students using AT in the schools. A survey named the "Status of

AT Use Survey" was distributed to service providers who reported information on AT users they

served (e.g., their age, gender ethnicity, reasons for AT use, type of AT used, and types of AT

services received). This study focused on the data extracted from the Status of AT Use survey, and specifically analyzed the nature of AT services provided to students across the nation and which professionals are more likely to deliver those services.

Design

Survey design and case study methods were selected to gather information on the current status of AT use by students with various disabilities across the country.

Instrument. The Status of AT Use Survey was developed by NATRI researchers. It contained six sections that asked respondents to report data on student demographics, educational placement, AT use, AT services, related services, and AT documentation. Two forms of the instrument were available; a paper version and an online version. The data used for this study were extracted from the section in which respondents listed the AT services being received by a student and who delivered the service. For each service reported, the respondent was asked to check whether the service was provided by a school system employee or a contracted professional.

Data Collection and Procedures

In order to collect these data, the NATRI staff recruited direct service professionals currently serving students with disabilities aged 3-21 years, who were AT users. The professionals were asked to respond to the survey by reporting data on one or more of their students. One survey was completed for each student and the NATRI staff attempted to obtain surveys from as many respondents as possible across the country. Before completing the survey for each student, participants were asked to fill in the school information portion of the survey and the demographic information for each student receiving special education services and using AT at the time of the study. Respondents assigned each student an ID number so anonymity was maintained. A majority of respondents completed multiple surveys, one for each student

qualifying for this study.

Respondents from three different sources participated in this study. First, 271 surveys were completed by respondents in a case study research project that was simultaneously conducted by NATRI. These surveys came from 10 specific states (i.e., California, Florida, Kansas, Kentucky, Massachusetts, Montana, Oregon, Texas, Virginia, and Wisconsin). Multiple school districts in each state provided data, with a total of 37 school districts participating via the state case study. These states were chosen to represent diversity in geographic location. Surveys from these districts were filled out using a paper-based format and the information was transferred into an electronic database via the online survey by graduate students at the University of Kentucky. The second source was from school districts identified by special education state directors for participation in the survey. These districts agreed to provide data on all students in their districts who were AT users so they could, in return, receive summarized data about their district to use for their own purposes. Of the six districts that agreed to participate, only one large urban district actually reported data and completed 260 surveys. Finally, NATRI staff presented information about the study at various national conferences, thus, encouraging attendees from all parts of the country to complete the survey. As a result of such information dissemination and the general availability of the instrument posted online, 169 more responses were generated. Overall, surveys were completed for 699 students with various disabilities.

Data Analysis

Due to the qualitative nature of the data on AT services, analysis began with interpretation and categorization of the data. Despite the fact that respondents were offered six distinct text fields in which to report AT services delivered to a student, many respondents reported multiple AT services in one field. For this reason, entries were first separated so that

each entry field contained a single service and provider. Entries were sorted based on the federal definitions and categories of AT services. Those that did not fit into one of those categories constituted an "other" category. Data from the "other" category were further inspected using a constant comparative method for entries that could form a distinct category. Data were manually grouped on similar dimensions creating separate categories (Guba & Lincoln, 1989). The process continued until all possible categories were identified. Ultimately, the data were divided into 22 categories including 11 that followed federal definitions. The categories and their descriptions are shown in Table 1.

In order to calculate frequency and percent, the data were entered into *SPSS* software.

Reliability of Scoring. Because the data were manually coded and categorized by the researcher, the reliability of scoring had to be established. A process of negotiated coding was utilized. The researcher shared the potential 22 categories of AT services described in Table 1 with an independent reviewer without discussing them. An independent reviewer coded a random sample of 10% of the data, and the codes were compared with those of the researchers. The degree of interobserver agreement was calculated using the formula agreements/agreements + disagreements x 100% and a 90% agreement was obtained.

<div align="center">Results</div>

Demographics

The data were collected across 14 states and 60 school districts. The survey respondents were asked to focus on one student for each individual survey. Most of the students were using AT and/or receiving AT services at the time of the study. Only two students out of 699 were reported as not using any AT devices. However, since students may be receiving AT services, such as an evaluation, and not using an AT device, the two data points were not eliminated from the data set. Of the 699 completed surveys, 468 were male and 225 were female. Gender was not

identified in 6 surveys. Students ranged from preschool to the 12th grade. A majority of students

(46.3%) attended elementary school, with 26% attending middle and 27.6% attending high

school at the time the data were collected. Students' special education services were documented

in IEPs, Section 504 plans, Individualized Family Service Plans (IFSP), and Individual

Transition Plans (ITP). Students from every disability category defined in IDEA were

represented in the surveys including the categories of autism, deaf blindness, deafness, emotional

disturbance, hearing impairment, mental retardation, multiple disabilities, orthopedic

impairment, other health impairment, learning disabilities, speech/language impairment,

traumatic brain injury, and visual impairment.

AT Services Categories

This article focuses on respondents' reports of AT services provided to their students as

extracted from the Status of AT Use Survey data set. The respondents were asked to answer the

following questions: "Describe the AT services that the student receives" and "Indicate whether

each service is provided by a school employee or outside service." The survey allowed for

multiple entries if a student received more than one AT service. Consequently, the number of AT

services substantially exceeded the number of students (699). Additionally, 110 survey

respondents indicated that the student did not receive any AT services. In the area of AT

services, 1044 entries were made across the 589 surveys that reported AT services. However,

some entries listed multiple services. After further data manipulation and separating the services

within these entries, 1468 instances of AT services were identified. The results are reported in

relationship to the number of AT services instances rather than the number of students. Thus, the

total number of instances of AT services (1468) is considered 100 percent.

The identified categories of services, the frequency that they were reported, and the

percent of occurrence are show in Table 1. The preliminary analysis and coding process began

with categorizing the data based on the federal definitions of AT services (categories 1-11 in Table 1). The additional categories developed as a result of coding entries that did not fit the federal definition categories were labeled categories 12-22 in Table 1.

<INSERT TABLE 1 HERE>

Current Status of AT Services

Responses to research question one, "What is the nature of AT services currently provided to students with disabilities?" were grouped into three major themes: (a) services that fit the federal definition of AT services (40.2%), (b) other AT services (19.6%), and (c) not AT services (40.2%).

AT services defined in the legislation. Fewer than half of all the entries (40.2%) met the federal definition of AT services. A majority of these entries represented different types of training activities (24.3%). Of those 24.3 %, student-training constituted 13.4 %, unspecified training comprised 6.7%, training and technical assistance for professionals comprised 3.5 %, and family-training constituted 0.7 % of the entries. It is important to mention that the child training category included entries with the direct reference, (e.g., "a child received training…"), as well as entries that were less specific (e.g. "trained to use the device" or "received training…"). Because teachers were asked to fill out the survey with one particular student in mind it was assumed that they referred to that student stating that he/she was "trained to use the device" or "received training" on this or that device.

The next most frequently reported AT service provided to students (13.5%) was "coordinating and using other therapies, interventions, or services with AT devices, such as those associated with existing education and rehabilitation plans and programs" (§1401(2)). This service included the following categories that emerged from the data: utilizing and integrating AT into related services and other activities (5.4%); programming and/or modifying equipment

and its set up (3.0%); providing consultation (2.9%); and developing materials, lesson plans, and

adaptations to curricula utilizing technology (2.2%).

Other entries representing AT services defined by IDEA (1997, 2004) included designing

and maintaining AT devices (1.2%), purchasing and providing AT devices (0.7%), and

evaluation of students needs (0.5%).

Services different from federal definitions. Nearly one-fifth (19.6%) of services reported

by the respondents did not match the federal definition of AT services. Sixteen point four percent

(16.4%) of entries identified assistance as an AT service including unspecified assistance and

support provided specifically to a student using an AT device (8.4%) (e.g., "classroom teacher

supports student's use of software"), assistance with AAC devices (5.8%) (e.g., "speech

pathologist helps with AAC device"), and unspecified support and troubleshooting (2.2%) (e.g.,

"OT assists with AT"). While the federal definition includes technical assistance to professionals

working with students using AT as one of the services, aforementioned entries do not specify the

nature and/or recipients of such assistance, and thus, do not fit the federal definition. In addition

to the "assistance" category, some (2.2%) services that differed from the federal definition

identified providing access to AT devices within the educational setting for the student (e.g., "he

has access to Type 2 Learn"), while others (1.0%) referred to the monitoring of AT use (e.g.,

"AT specialist monitors use of software on computer"). While all responses in this group

referred to the use of AT, they did not contain enough detail to fit into any of the federally

defined AT services.

Not AT services. Entries representing something other than AT services constituted

40.2% of all the instances identified by the respondents as AT services. This category included

entries that were left blank most likely indicating that students did not receive any AT services

(7.7%). Furthermore, within this "not AT services" group, 13.6 % listed the AT devices and

programs used by a student rather than services (e.g., voice output devices). Related services that

students were receiving rather than AT services (e.g., "physical therapy service") constituted

3.1% of entries. In 2.6% of the responses, participants indicated working on or training in

functional skills without any reference to technology (e.g., "OT assists with functional skills such

as self-feeding, dressing and toileting"). A majority of data in this group was comprised of

entries that were not specified enough (8.8%) (e.g., "AAC") and entries that were specified but

separated into an "other" category because they did not fit any other category (4.4%) (e.g.,

"transition – looking for school-to-work activities"). Entries in the "not specified" and "other"

categories did not refer to technology. Example of instances constituting "not specified" and

"other" categories can be found in Table 2.

<INSERT TABLE 2 HERE>

AT Services Providers

The data were further analyzed to answer the second research question, "What

professionals deliver which AT services?" The researcher extracted and coded any reference to

professionals who provided AT services to students from the AT services entries. For 371 out of

the total 1468 AT services entries, the service providers were not identified. Of the instances

which identified AT services providers, some included a reference to several providers

delivering the same service. Therefore, the number of reported cases with identified providers

(1349) does not match the number of AT services described (1468).

Professionals providing AT services. Data analysis revealed that a variety of

professionals provided AT services for students with disabilities. Table 3 lists professionals in

the order of how frequently they were mentioned as AT services providers. Professionals that

were reported to provide less than 4% (i.e., less than 45 instances) of AT services were grouped

in an "other specialists" category. "Other specialists" cumulatively made up 13% of responses

and included physical therapists, augmentative and alternative communication (AAC) specialists, vision specialists, instructional technology (IT) specialists, orientation and mobility teachers, nurses, hearing specialists, and others (e.g., vendor, adaptive physical education (APE) teacher, school employee, facilitator, parent).

<INSERT TABLE 3 HERE>

The frequency data in Table 3 were calculated from the total number of entries for the AT services, including those that were later identified as not AT services. For example, as demonstrated in Table 3, speech and language specialists were reported to deliver 18.6% of all services that included any reference to the service provider. After further analysis 9.6% of those services fell into the "not-specified" category (e.g., "Communication-LAS"). Thus, it is crucial to examine the nature of services that each of these professionals provided.

What types of services are delivered by each provider? In order to determine the nature of services provided by each professional, the identified AT services were categorized and analyzed in SPSS using cross tabulation. The analysis demonstrated the extensive number of services provided by each professional. Due to space limitations only the top three services provided by each professional are reported. Figure 1 summarizes this information.

<INSERT FIGURE 1 HERE>

The top three services reported as being provided by speech and language specialists included assistance with AAC (33.5%); child training (19.5%); and assistance and support for a student using AT devices and programs other than AAC (7.6%). Professionals in this category included speech/language pathologists, language acquisition specialists, speech clinicians and speech specialists. It is important to mention that a large number of services provided by speech and language specialists reported by the respondents fell into the "not AT services" group unfitting the federal definition (23.9%) (e.g., "SLP provides speech-language therapy", "speech

pathologies: switch activated software"; "Communication – LAS").

Survey respondents used several different terms for AT specialists. Those terms were AT specialist, AT professional, AT assessor, AT team, AT staff, AT coordinator, AT, Assistive Technology Practitioner (ATP), AT teacher, AT consultant, AT provider, AT case manager, AT personnel, and AT representative. The most frequent services provided by AT specialists were child training (30.3%), training and technical assistance to professionals working with a child using an AT device and/or program (12.8%), and indefinite assistance and support for students using the AT (9.6%) (e.g., "AT specialist is helping w/ prediction software and outlining software").

Three different types of entries were merged into one category, teachers (n=168). This category included general education teachers (n=59), special education teachers (n=58) and not-specified teachers (n=51). All teachers provided indefinite assistance and support for students using AT devices and/or programs (19%). In addition teachers developed materials, lesson plans, and adaptations integrating technology (13%). They trained children to use AT devices (8.9%) as well as programmed, modified, and set up the equipment (8.9%). Interestingly, a slight difference in service provision occurred between the different types of teachers. General education teachers provided more programming, modifying, and setup of the equipment (n=11), while special education teachers and not-specified teachers conducted more training with a student (n=6 and n=7 respectively).

The top AT services provided by occupational therapists (OT) included unspecified assistance and support for a student using an AT device/program (16.5%); unspecified training (14.4%); and work on functional skills without any technology mentioned (13.4%) (e.g., "occupational therapist uses tactile and sensory strategies for tactile defensiveness").

The category "paraprofessionals" included paraprofessionals, paraeducators, assistants,

aides, and Temporary Support Assistants (TSA). Besides other reported services this group was responsible for providing access to a device or program for a student (22.4%) (e.g., "TSA: provides switch access"), programming, modifying, setting up the equipment (18%), and indefinite assistance for the student using the device or program (15%).

All other professionals were clustered into a separate "other specialists" category. Due to the fact that so many different professionals were represented in this category, it was challenging to determine which provider delivered what services. Overall, this group of specialists was mainly responsible for conducting different types of training: child training (13.7%), unspecified training (11.4%), and training and technical assistance for other professionals (5.7%). However, similar to other related services providers, a majority of services delivered by this category belonged to the "not AT services" group (40%).

Providers of federally defined AT services. The aforementioned data were also analyzed to determine the providers delivering AT services defined by the IDEA (1997, 2004). The examination yielded the following findings. The few reported cases of evaluating child's needs were conducted by AT specialists (25%), occupational therapists (25%), physical therapists (12.5%), and instructional technology specialists (12.5%). In two cases the provider was not identified (25%). Purchasing, leasing, or otherwise providing for the acquisition of AT was provided by AT specialists (50%); IT specialists (20%); occupational therapists (10%) and non-specified professionals (20%). Designing, maintaining, and repairing AT devices was reportedly the responsibility of AT specialists (47.3%); vision specialists (10.5%); IT (10.5%), teachers (5.2%) and, in one case a nurse (5.2%). In four cases the respondents failed to indicate the service provider (21%).

The majority of the aforementioned professionals coordinated and used AT across other settings and delivered training or technical assistance to children, families, and other

professionals involved in the major life functions of those children. The data demonstrated that several providers were involved in "coordinating and using other therapies, interventions, or services with AT devices, such as those associated with existing education and rehabilitation plans and programs" (§1401(2)). When exploring the federally defined AT coordinating services and professionals who provided these services, specific services were differentially associated with specific providers. Paraprofessionals most often provided programming, modification, and set up of equipment (27%). Speech and language specialists more frequently utilized and integrated AT into related services and other activities (13.7%). Special education teachers developed materials, lesson plans, and adaptations that integrated AT (33.3%). AT specialists provided the most consultation (21%) and also conducted the most training for children and families (32%) and other professionals working with a student (54%).

Services provided by contracted professionals versus school employees. Figure 4 summarizes the findings that answer the third research question, "What type of AT services are provided by professionals from the outside the school system?" This question addresses services that are provided by professionals who are in a contractual agreement with the school district. That is, the district is unable, or find it more cost inefficient, to provide the services with a district employee, so they contract with another agency or independent professional to deliver the AT service.

<INSERT FIGURE 2 HERE>

Out of 1468 reported instances of provided AT services, only 59 cases indicated services provided by specialists from outside the school system. Fifty five percent of all entries of contracted services were not AT services, including the provision of related services (21.7%) (e.g., "He receives PT from outside services"), non-specified services (18.8%) (e.g., "PT – CCS"), functional skills acquisition (2.9%) (e.g., "OT trains fine motor use"), and "other"

(11.6%) (e.g., "wears weighted vest on OT"). Among 45% of federally defined AT services, outside providers delivered training (14.6%), purchased devices (5.8%), and conducted evaluations (2.9%). Professionals from outside the school systems were also responsible for coordinating and using other therapies, interventions and services (§1401(2). This AT service was represented by overall support for students (10.1%) (e.g., "AT to assist adapted devices for written communication"), conducting consultation and monitoring (8.7%) (e.g., "ITS provides consultation…"), as well as programming and equipment modification (2.9%) (e.g., "Nurse: helps to set up equipment for classroom use").

Based on the results, the professionals most likely to be contracted from outside a school system included occupational therapists (21.8%), AT specialists (18.9%), and speech and language specialists (5.8%). A majority of entries that identified outsourced service provision belonged to the "other specialists" category (43.5%) or did not include any reference to a provider (10%).

<div align="center">Discussion</div>

This study provides a description of the status of AT service delivery across the nation. Several studies in the past have looked at the use of AT devices by students with disabilities (Derer et al., 1996; Judge, 2001; Lesar, 1998) while others investigated how teachers are prepared to implement AT into the curriculum (Abner & Lahm, 1998; Hutinger & Johanson, 2000; McGregor & Pachuski, 1996). This study extends the previous research and provides information on the AT services delivered to students using AT devices. The findings of this study raise concerns about the lack of awareness among professionals as to what AT services are. While efforts have been made to educate professionals about the nature of AT devices, successful implementation of technology depends on the provision of services. This requires adequate training and increased awareness of AT services among teachers and other

professionals working with students with disabilities. In order to better understand what AT services are currently provided to students, three research questions were investigated.

AT services. Respondents in this study reported that a large group of students (110 out of 699 students) who were reported to be using AT devices, did not receive any AT services. Such a trend is alarming because successful implementation of AT devices is not possible without the support of AT services. Documentation of AT services is legally required in students' IEPs. It is imperative that teachers are aware of the necessity to consider appropriate services along with the devices during the IEP process. It is impossible to say whether these students did not require any services, if services were never considered for them, or if respondents failed to report the services. However, it is unlikely that such a large number of students using AT devices did not need AT services.

It appears that some respondents were not aware of what AT services were, which might contribute to why so many of the students lacked access to AT services. Among reported AT services provided to students, almost half of all the entries (40.2%) included something other than AT services. Despite the fact that a previous question on the survey specifically asked the respondents to report related services, at least 3% of entries about AT services identified related services instead. Given the respondents entered services that were not AT services may indicate a lack of awareness of the AT services definitions.

Several entries (19.6%) included some reference to AT and could constitute federally defined services if more details were provided. It appeared that in many cases students received assistance and support. However, the nature of such assistance and support was unclear and too vague to connect these entries to the federal definition.

Among services that fit the federal definition (40.2%), a majority included different types of training and coordinating activities. The participants reported that students were receiving

training on how to use specific devices and in most cases more than one professional delivered

such services. It is encouraging to see that professionals coordinated their activities and

integrated technology across the settings. For example, AT was integrated and utilized during the

provision of related services and other activities. Teachers and other professionals developed

materials, lesson plans, and adaptations to curricula, integrating technology throughout. The

programming and modification of equipment, while related to integration within the curriculum,

most often involved AAC devices. The possible interpretation of this finding draws from the

fact that AAC devices require different communication overlays/boards and should be

programmed in order to be used across the settings. Furthermore, it appeared that teachers

received support and consultation as needed from different professionals. It is also interesting to

note that although 13.5% of entries fit the federal definition for AT coordinating services, no

entries used the exact word "coordination." While professionals delivered such services, they

might be unaware of how AT coordination is defined in IDEA (1997, 2004).

While these findings are reassuring and demonstrate some effort has been made to

support the successful implementation of AT devices through trainings and coordination of

activities, it is somewhat discouraging that all other services comprised less than 2.4 % of all

responses. Only 0.5 % included evaluation of students with disabilities. Such a low number may

be attributed to the fact that almost all students considered for this survey used some kind of

assistive technology at the time the data were collected. However, evaluation of student's needs

and evaluation of the effectiveness of a chosen device or program should be an ongoing process

in order for technology implementation to be successful (Bowser & Reed, 1995; Zabala & Carl,

2005; Zabala et al., 2000). In addition, it is surprising that maintenance and repair of the devices

is reported in only 1.2 % of entries. These findings suggest once again that while teachers may

consider more AT devices for their students, they are not considering AT services. It is critical to

educate professionals on what the services are and how they should be documented.

AT services providers. Many different professionals delivered AT services to students with disabilities. Responsibility for AT implementation extended beyond AT specialists and teachers. A large number of services were provided by speech and language specialists and other related services personnel. However, the responsibilities were different for professionals from the various disciplines. Teachers appeared to be more responsible for technology integration into the curriculum and student training, while paraprofessionals were charged with setting up the equipment and providing general support to students. Teachers seemed to provide services differentially based on whether they were general or special educators. Those various services appeared to be appropriate to their job responsibilities. General education teachers programmed and modified equipment suggesting the intent of integration into the curriculum and classroom activities. Special education teachers provided training to students most likely due to their one-on-one time with students or knowledge of specialized instruction. Students using AAC received assistance in a majority of cases from speech and language specialists while AT specialists provided all kinds of training for students, families, and professionals.

The reported number of such important AT services as evaluation, purchasing/obtaining, or maintenance/repair was alarmingly low. This raises suggestions that teachers and other specialists working with students with disabilities need to remember to consider these services during the IEP process that are vital for successful AT implementation. However, it is important to note that a majority of the AT evaluations reported were conducted by qualified personnel. AT specialists and OTs, that included occupational assistive technology specialists, delivering 50% of all evaluation services.

Services provided by contracted professionals versus school employees. A close look at the use of internal and external sources of AT service delivery, suggests discrepant

consequences. On one hand, the fact that most AT services are provided by professionals within the system is a positive result because these service personnel from within the system are more likely to know the students' abilities and needs as well as resources available through the school system. However, in cases when available professionals within the school system are not aware or experience difficulty in considering and delivering AT services for students with disabilities, they are expected to seek help from beyond the system. Independent AT specialists can provide necessary knowledge and expertise. The fact that so few AT services fitting the federal definition were reported may be a result of professionals within the school being unaware of AT services and what is required of them by law. If that is the case, schools should refer more to outside professionals in order to stimulate AT services delivery and successful AT implementation.

Limitations. The aforementioned findings emerged from the data analysis should be interpreted with caution taking into consideration the following limitations. Originally this study was designed to survey AT use among all students with IEPs, Section 504 plans, IFSP, and/or ITPs. However, the data were collected only on those students receiving special education services who at the time of the study were using some type of AT, thus, jeopardizing the generalization of findings. Despite the relatively large distribution across 14 states, a large part of data (37%) came from one urban district that agreed to participate in the study. Generalization from the results must be made with caution with such an overrepresentation of one school district. Moreover, while questions in the survey related to AT devices were provided in the checkbox format to guide participants providing them with information on what was expected of them as well as with ideas of what AT devices were, questions regarding AT services were asked in an open-ended format. The large variety of services reported as AT services may be attributed to the lack of clarity of federal definitions.

<center>Conclusions</center>

In summary, this study provides an overview of the status of AT services delivery in various school systems across the nation. As reported by survey respondents, a majority of AT services provided to students with disabilities as defined by IDEA (1997, 2004), concentrated on various training opportunities provided to students, parents, and other professionals working with students. While these results are encouraging, the low number of other federally defined AT services is disappointing and concerning. It is hard to believe that only 8 students out of 699 required AT evaluation and only 18 students needed equipment maintenance and repair. A large percent (19.6%) of all the services reported by participants as AT services were in fact not AT services. Such lack of awareness may interfere with AT services delivery and successful implementation. Along with disseminating knowledge and conducting training on AT devices and programs, it is critical to focus more attention on educating teachers and other professionals about AT services. Services should be documented in students' IEPs, which cannot happen if IEP team members are unaware of federally defined AT services. They need to be able to consider devices in conjunction with services to ensure greater results. This finding is corroborated by previous research asserting that staff should receive ongoing awareness level training including definitions of AT services (Bowser & Reed, 1995).

The results of the study reveal that different professionals deliver different services. It appears that services provided are aligned with the nature of activities these professionals engaged in with students, as well as with their job descriptions. This finding demonstrates that not only special education teachers or AT specialists are responsible for implementing AT devices and services. As it appears from these results, all professionals involved in student's daily activities at least partially participate and support a student's use of technology. In addition, a vast majority AT services are delivered by school system employees. In many cases having professionals who know students' strengths and weaknesses may be beneficial for consideration

and delivery of AT devices and services. However, it is important to make sure that IEP teams are aware of the possibility and the necessity to seek help from outside in cases when they have some difficulty with the consideration or provision process.

In response to the question whether AT services are being considered, it is evident that much more work has to be done in the areas of increasing awareness and practical implementation of AT services. The findings from this study have implications for both professionals working with students with disabilities as well as for personnel training programs. School systems and personnel training programs need to recognize the lack of knowledge about AT services among professionals working with students with disabilities and address this problem. Although some professionals may think that they know what AT definitions are, it appears many of them need additional training in this area.

The present study provides just a glimpse of the current status of AT service delivery across 14 states. Additional research is needed to determine how schools consider AT services and ensure their implementation, particularly when professionals from multiple disciplines are involved. In the current study, surveys were completed for those students who already used some kind of AT. Further research is needed to explore initial consideration and delivery of AT devices and services to students who are just beginning to use AT. Moreover, it is important to recognize the possible limitations associated with the open-ended format of survey questions in this study. Using federally defined categories generated by the qualitative review in this study, the follow-up survey study utilizing checkbox format is highly recommended. Providing respondents with the opportunity to check suggested AT services that apply and possibly prioritize their choices would ensure that they know what is expected of them. This way more accurate information on currently delivered AT services to students with disabilities will be obtained.

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Table 1

Frequencies of Entries Identified as AT Services

Identified Services	Frequency	Percent
Federally Defined AT Services		
a. *Evaluation of the needs of a child with a disability, including a functional evaluation of the child in the child's customary environment*		
1. Evaluation of the needs of a child with disabilities	8	0.5
b. *Purchasing, leasing, or otherwise providing for the acquisition of AT devices by such child*		
2. Purchasing, leasing, or otherwise providing of AT	10	0.7
c. *Selecting, designing, fitting, customizing, adapting, applying, maintaining, repairing, or replacing AT devices*		
3. Designing, maintaining, repairing, or replacing	18	1.2
d. *Coordinating and using other therapies, interventions, or services with AT devices*, including:		
4. Utilizing/integrating technology in related services and other activities	80	5.4
5. Programming/modifying equipment, setting up the equipment	44	3.0
6. Consultation	43	2.9
7. Development of materials/lesson plans/adaptations integrating technology	33	2.2
e. *Training or technical assistance for a child with a disability or, if appropriate, that child's family*		
8. Training and/or technical assistance for a child with disability	197	13.4
9. Training and/or technical assistance to the child's family	10	0.7
f. *Training and technical assistance for professionals who provide services to, employ, or are otherwise substantially involved in the major life functions of that child*		
10. Training and technical assistance for professionals	52	3.5
11. Unspecified training (entries indicated training on AT device occurred but it was unclear who received it)	98	6.7

Other AT Services

12. Indefinite support for students (entries indicated that students receive support using a device/program but the nature of such support was not specified)	123	8.4
13. Assistance with AAC devices (The nature of assistance was not specified in the entry.)	85	5.8
14. Unspecified support/troubleshooting	32	2.2
15. Access to AT (entries that indicate that a student had access to AT devices/programs)	33	2.2
16. Monitoring AT use, checking on progress	15	1.0

Not AT Services

17. AT devices/programs used (Entries listed devices and programs that a student was currently using)	199	13.6
18. Not specified (e.g., The entry said "AAC")	129	8.8
19. No entries	110	7.7
20. Other (Entries that did not fit any other category)	65	4.4
21. Related services including physical, occupational as well as speech and language therapy	46	3.1
22. Working on functional skills like mobility without using any AT device/program	38	2.6
Total	1468	100

Table 2

Example of Instances Constituting "Not Specified" and "Other" Categories

"Not specified" category	"Other" category
"SDC Teacher: Collaborative model"	"Parent as advocate"
"Communication – LAS"	"Teacher will sometimes provide worksheets."
"Nurse"	"Will receive assistance with all regular education assignments and tests in the EBD classroom."
"Teacher: in the computer lab"	"Will be graded by the EDB teacher, according to his effort and participation noted by the regular education teacher."
"Annual goal #2; Benchmark 1,2"	"Music therapist will use music to assist in meeting goals."

Table 3

Frequencies of AT Services Provided by Different Professionals

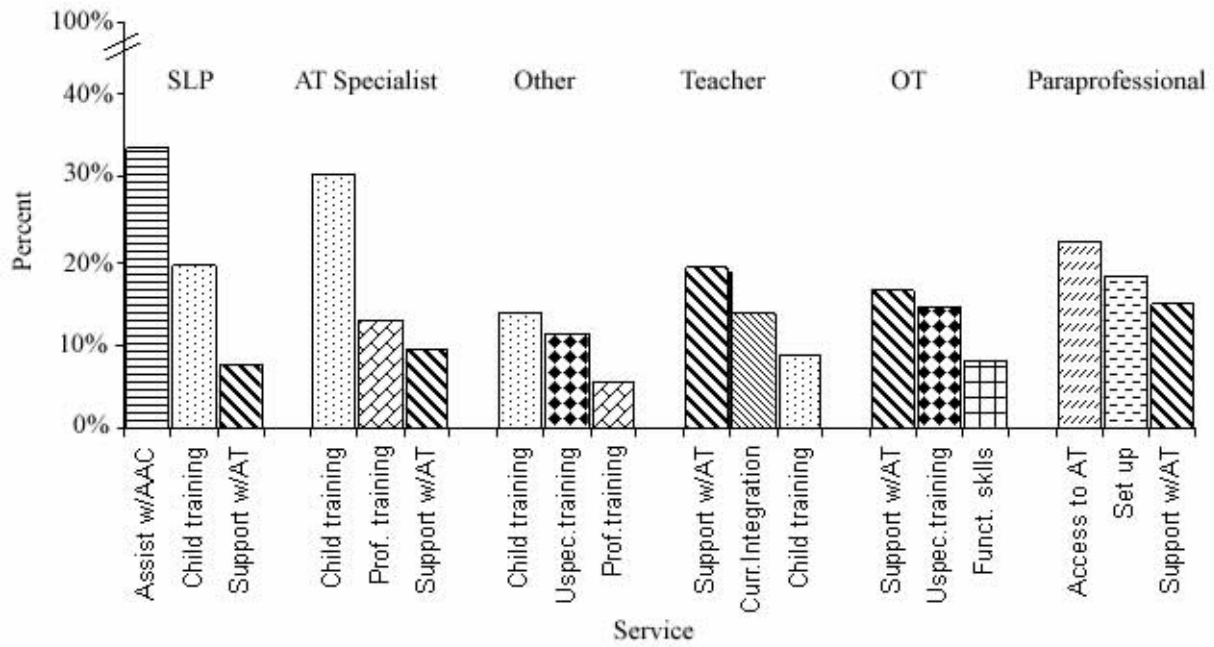| Providers	Frequency	Percent
Not specified	373	27.6
Speech and language specialist	251	18.6
AT specialist	218	16.1
Other providers	175	13
Teacher	168	12.5
Occupational therapists	97	7.2
Paraprofessionals	67	5
Total	1349	100.0

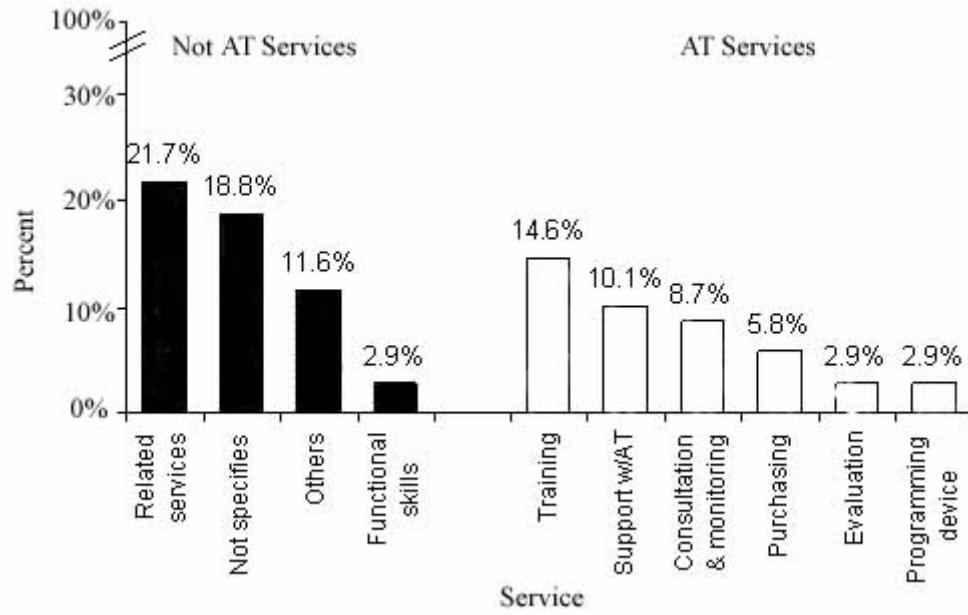*Figure 1*. Top Three AT Services Delivered by Each Provider

Figure 2. Services and Their Providers Contracted from Outside the School System.