Survey of Teachers of Students with Visual Impairments: Students Served and Their Access to State Assessments of Reading

TARA
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Introduction

Federal legislation (IDEA, 1997, IDEA, 2004; NCLB, 2001) has dramatically increased the participation of students with disabilities in statewide achievement testing. Prior to 1997, it had been common to exempt these students from testing. The Individuals with Disabilities Education Act reauthorization of 1997 (IDEA 1997) mandated that students with disabilities be included in state and district assessments and that accommodations be provided as appropriate. Not only were schools required to include students with disabilities in assessments, but they also were to include their scores in the reporting of student participation and achievement. IDEA further clarified in the 2004 reauthorization (IDEA 2004) that states are to provide accommodation guidelines for districts and schools, and to report on the number of students using accommodations to participate in the regular state assessment.

Along with mandating annual student testing in grades 3-8, and once in high school, the No Child Left Behind Act added accountability for assessment results to the requirements of IDEA 1997 (which were confirmed by IDEA 2004). As part of its monitoring processes, NCLB required that participation, achievement, and accountability be disaggregated for subgroups, including for students with disabilities. Although there is no requirement for states, districts, or schools to publicly report data for specific categories of students with disabilities, more than half of the states have the capability of doing so if they choose to (Thompson, Johnstone, Thurlow, & Altman, 2005). Some states have begun to disaggregate assessment data for different disability groups in an effort to better understand how items behave for students with disabilities, and to better understand accommodations needs for various groups (Thompson, Johnstone, Thurlow, & Altman, 2005). For example, students who are blind or visually impaired often use alternative strategies when accessing print, and educators have long been challenged by how to appropriately assess these students, even with the use of accommodations.

Review of Literature

State testing accommodation policies typically allow for students to receive accommodations on tests that are consistent with those they receive for instruction provided they do not compromise the fidelity of the intended construct of the test. In the area of reading, some accommodations used to assist in developing content-specific skills may conflict with the goal of maintaining assessment validity. For example, using a read aloud accommodation to assist in the development of reading skills during instruction may be acceptable, but carrying the read aloud accommodation into the assessment when trying to measure decoding skills may be unacceptable in state policies and may interfere with the constructs tested on statewide assessments.

Further muddying the waters, the accommodations research literature is inconsistent. Johnstone, Altman, Thurlow, and Thompson (2006) reported in their analysis of 49 empirical research studies that conclusions across accommodations, research participants, content areas tested, and even WITHIN accommodations cannot yet be made due to inconclusive and even contradictory findings. For example, five studies published between 2002 and 2004 investigated the use of computer administered tests (Johnstone et al., 2006), and no consistent finding was obtained. Similarly, Zinesky and Sireci (2007) concluded that the research published in 2005 and 2006 on the different aspects of computer assistive technology as an accommodation was inconclusive. They also reported finding conflicting results on the changes to test validity with some research revealing specific interaction effects of the accommodations for students with disabilities (Fletcher, Francis, Boudousquie, Copeland, Young, Kalinowski, & Vaughn, 2006), while other research found that accommodations raised the scores of all students (Leseaux, Pearson, & Siegel, 2006; Kettler, Niebling, Mroch, Feldman, Newell, Elliott, Kratochwill, & Bolt, 2005).

Though overarching conclusions cannot be drawn, recent research specific to technology-based assessment has provided a basis for further investigation. For example Hanson, Lee, and Forer (2002) investigated the use of speech output technology for tests for individuals with visual impairments and found that in general, the usability of the technology was evaluated positively and that 'self-voicing' testing systems have significant potential and may be capable of replacing human readers in certain testing situations. Researchers from the Center for Applied Special Technology (CAST) also investigated group-wide effects and the individualized impact of computer-based read-aloud testing accommodations on student test scores (Dolan, Hall, Banerjee, Chun, & Strangman, 2005). Results of the study indicated a significant increase in scores on reading passages greater than 100 words using technological aids, thus providing preliminary support for the potential benefits and usability of digital technologies in creating universally designed assessments that more fairly and accurately test students with disabilities.

Other research yielded different findings. Higgins, Russell, and Hoffman (2005) examined whether the presentation form of computer administration affected student test scores. They found that there were no significant differences in reading comprehension scores across testing modes. There were no significant differences in scores based on computer fluidity and computer literacy. However, the majority of students who took the reading test on a computer indicated that they would prefer to take the test on computer. Some accommodations research has also been specific to students with visual impairments.

Another study examined the extent to which use of the Talking Tactile Tablet, a math tool with speech output, had a positive impact on the mathematics performance of students who were visually impaired or had difficulty visualizing graphics and diagrams. To the extent possible, the study also explored the Talking Tactile Tablet's impact on the difficulty of items. Results showed that students performed better on five of the eight items when using the Talking Tactile Tablet, and performed the same on the remaining three.

Using the Talking Tactile Tablet also yielded item difficulties that more closely resembled the item difficulties obtained by general education students during testing (Landau, Russell, Gourgey, Erin, & Cowan, 2003).

A unique debate centers on the use of certain accommodations for the reading assessment. At the core is a conflicting definition across the country of what it means to "read." Thompson, Johnstone, Thurlow, and Clapper (2004) found that states define reading very differently. When print-reading technologies are introduced, such as screen readers or screen magnifiers, the complexity of the assessment increases. To meet federal requirements for inclusive and accessible assessment, it is important to define how "reading" is taught and tested, in the context of a wide variety of students, including students with visual impairments (National Accessible Reading Assessment Projects, 2006).

One piece of research suggests that there are many similarities between braille reading and print reading. Wetzel and Knowlton (2000) studied the reading of 47 subjects (24 were print readers, 23 were braille readers) on a reading assessment. The print readers had normal vision, and the braille readers were either totally blind or had limited useful vision and read braille. Individuals received either a regular print or braille version of the test, depending on their needs. Average print-reading rate ranged from 30% to 60% faster than the average braille reading rate. Less than one third of the braille readers read slower than the print readers. Based on their performances in the different modes (e.g., oral, silent, studying), it appeared that braille and print readers employ similar strategies for different tasks.

One approach to ensuring that students with visual impairments can independently access text (when braille and audio recordings are not available) is to hold school districts accountable by assessing students on their ability to use assistive technologies. This would help to ensure that students with disabilities are being instructed using assistive technologies. However, currently there are no models for assessing assistive technology proficiency that can be used for accountability purposes (Watts, O'Brian, & Wojckik, 2004). In addition, a recent review of issues and progress in measuring assistive technology outcomes stated that compared to writing and mathematics "the area of reading appears to lag significantly behind in the development of measurement tools and procedures that will enable the profession to make definitive statements about outcomes of technology enhanced performance in reading" (Edyburn, 2004).

Currently state assessments test students with visual impairments who use assistive technology to read using the standard state assessment with either a human reader or audio recordings (Lazarus, Thurlow, Lail, Eisenbraun, & Kato, 2006). Both of these approaches (human reader and audio recording) might result in scores not being counted for the state assessment, and neither approach is always available to students once they leave their educational environment. For example, not all students who request accommodations on college board tests receive them; students must learn to represent themselves in

accommodations hearings, and may need to "re-explain" why they need accommodations on high stakes assessments like graduation exams (Lazarus & Ofiesh, 2007). Rather than depending on individual advocacy skills, it might be more valuable to have a more accessible assessment based on new research on assistive technologies.

The purpose of this study was to determine the perceptions of teachers on a number of aspects related to reading. It is a small segment of a larger research plan that aims to develop new assessment items based on research work in the area of assistive technology. This survey targeted specifically teachers of students with visual impairments (TVIs). TVIs typically are certified special education teachers with extensive coursework and professional development experiences in communication skills, braille instruction, access to assistive technology, and providing support to general education classroom teachers. TVIs typically work in state schools for the blind or in one or more regular public schools. Those working in public schools tend to work across grades with a wide variety of duties and responsibilities. They generally have a "caseload" of students they work with regularly and get to know very well (often over the course of several years).

Methods

We developed a 25 question survey in the fall and winter of 2006. Items were selected based on previous research from the National Accessible Reading Assessment Projects. Besides demographic items, researchers were interested in the types of technologies used to assist readers. In addition to technologies, items were intended to solicit teacher feedback on the importance of various elements of reading (e.g., foundational skills, literal comprehension, motivation, etc.). Finally, items were designed to explore state reading assessment accommodation guidelines for readers who use technology; a decision was made to target middle school and early high school grades where it was likely that more students would be using assistive technology for their reading instruction and assessment.

The survey was piloted by peers in the field of assessment and visual impairment, and then entered online to provide for greater accessibility. Survey features were tested to make sure there was no loss in functionality in the conversion. Prior to inviting Teachers of students with Visual Impairments (TVIs) to complete the survey, we completed a pilot of the online version with several teachers in our own state. From this effort, we received detailed feedback that helped us ensure the logic and ease of use for both sighted and visually impaired respondents. The survey was released to TVIs through electronic means.

Three primary national organizations focus on providing resources and information to TVIs through their Web sites and email: Association for Education and Rehabilitation of the Blind and Visually Impaired (AER), American Foundation for the Blind (AFB), and National Federation of the Blind (NFB). Each organization has a number of interest groups that are connected through email listservs and subscribers to AER, AFB, and

NFB teacher listservs number in the hundreds. Based on consultation with AFB staff and because of confidentiality issues, the most efficient and cost effective way to contact prospective survey takers was to send invitations to participate through these listservs (rather than direct mailings):

- AER Division 17 Listserv (130 subscribers)
- AFB Teacher Listserv (87 subscribers)
- AFB Braille Help Listserv (90 subscribers)
- AFB Research Discussion Group Listserv (202 subscribers)
- NFB Teacher Listserv (158 subscribers)

The survey was deployed via the listserv mailing on May 11, 2007. The invitations referred teachers to a University of Minnesota Web site where the survey could be completed on-line. Although the survey was compatible with a number of large print and voice software applications, we also provided, upon request, text versions of the survey that could be completed as a Microsoft Word document (compatible with large print, voice, and braille software). Twelve teachers requested and returned the survey this way. Many others accessed the survey online, which closed on May 25, 2007 with 185 responses for a total of 197 survey returns.

Survey data were downloaded into a Microsoft excel spreadsheet for summary by respondent and analyses. Spreadsheet data for 42 surveys randomly selected were checked against the actual survey data as originally entered to ensure accuracy in the download process. This process showed zero errors.

A total of 197 respondents completed the survey online or submitted completed surveys. Of these, 146 were completed by respondents who had a caseload with students in grades 7-10. Other respondents may not have been TVIs or may not have had any students on their caseload in the grade levels set as parameters for the study (i.e., grades 7-10). Most items were completed clearly on most surveys. However, for some items, the number of responses was as low as 98. Respondents were from rural, suburban, and urban settings in 24 states with varying caseloads of students who were blind or visually impaired.

Results

Data analyses revealed that respondents who were TVIs had an average of 12.4 years of experience (range = 0.33 - 40 years; median = 8.5 years). Average caseload of students in grades 7-10 was 5.8 (overall caseload average = 16.1 students) as can be seen in Table 1.

Table 1. Caseload Descriptive for TVI Respondents

Average Caseload	5.8
Count of Respondents	146
Median	4
Mode	4
Min	1
Max	49

Primary goals for instruction according to TVIs are shown in Table 2. Respondents spent an average of 35% (median 30%, mode 50%) of their instructional time using computer software assistive technology with students in grades 7-10. Primary goals most often cited for instructional time were "become a proficient user of assistive technology" (42%), and "read using a combination of approaches" (30%), with "become fluent Braille reader" (18%) selected less often. Respondents spent an average of 27% of reading instruction time on direct instruction of how to use assistive technologies to assist in reading, 19% of time in supported reading aloud, and only 9% of time in direct instruction of phonemic strategies (Braille or print).

Table 2. Primary Goals as Stated By TVIs Associated with the Instruction of Students with Visual Impairments

Primary Goal	**Average**
Become proficient user of assistive technology	42%
Read using a combination of approaches	30%
Become fluent print reader using magnification	18%
Become fluent braille reader	18%
Other goals	16%

The characteristics of the population of students served by the TVIs who responded were explored. Survey data showed that most students had congenital vision loss (81%) rather than adventitious (19%). Also, additional disabilities the students had are shown in Table 3. Most students (80%) had an additional disability documented on their IEP, largest among them cognitive impairment (28%), physical impairment (17%), and learning disability (16%). The largest percentage of students (28%) received their services in a general classroom with itinerant support, or a general classroom with resource room support (23%); relatively few received services at a school for the blind (10%).

Table 3. The Percentage of Students with Visual Impairments Who Have Additional Disabilities

Disability	Average
Cognitive Impairment	28%
None	20%
Physical Impairment	17%
Learning Disability	16%
Other Health Impairment (e.g., Attention Deficit/Hyperactivity)	8%
Hard of Hearing/Deaf	5%
Autism Spectrum Disorders	4%
Non-cognitive neurological impairment	4%
Emotional/Behavioral Disturbance	3%

Respondents answered that for students with visual impairments, sounding out words, reading fluently, pronouncing words correctly, advanced comprehension skills (interpretation), motivation to read, and using technology to independently access print are all "very important" to them. The specific products that students use are shown in Table 4. The survey data showed that students with visual impairments use JAWS for Windows (26%), ZoomText Magnifier (13%), Duxbury (13%), and ZoomText Magnifier/Reader (10%) to access text most often.

Table 4. Specific Products and the Percentage of Time they are Used by Students During Instruction with TVIs

Product	Percent of Time Used
JAWS (Job Access with Speech) for Windows	26%
Duxbury	13%
ZoomText Magnifier	13%
ZoomText Magnifier/Reader	10%
MAGic with ZoomText	4%
Mega Dots	4%
BigShot	3%
Windows-Eyes	3%
Lunar Screen Magnifier	2%
Freedom Box	2%
MAGic Standard	1%
MAGic Professional	1%
Connect Outloud	1%
Home Page Reader	1%
Windows-Eyes Professional	1%
Linux	1%
SuperNova Reader Magnifier	1%
BRLTTY	0%
Hal	0%
Mobile Speak Pocket	0%
Pocket Hal	0%
Speakup	0%
VoiceOver	0%

Survey findings also revealed that students access print through visual (25%) or visual + audio (29%) means a majority of the time. Respondents also revealed that a majority of their students (96%) use some kind of accommodation or assistive technology at times in the classroom, largest among them audio (38%), large print (35%), read aloud (26%), and braille (25%), as seen in Table 5.

Table 5. Percentage of Students Using Specific Accommodations at Times in the Classroom

Accommodation	Average
Audio (Digital/Tape)	38%
Large Print on Page	35%
Read by Live Person	26%
Handheld Optical Magnifier	25%
Braille	25%
CCTV's or Video Magnifiers	21%
Screen Reader (e.g. JAWS)	21%
Computer Magnifier/Reader combination (e.g., ZoomText, Magic, or Lunar)	21%
Digital Talking Book	18%
Text Reader (e.g. Read Right, Kurzweil)	8%
Other	8%
None	4%

Relationships Among Variables

Significant correlations were found between several of the responses. For example a positive correlation emerged between the number of years spent as a TVI and the percentage of students using tactile + audio to access print (p=.010). This implies that TVIs who have been working longer more often have students who access print thought both tactile and audio means. Other interesting positive correlations were: Services in School for the Blind with: (a) percent of students using braille (p=.038), and (b) Screen Readers as accommodations (p=.031). In addition, percent of students whose primary goal is to become a proficient user of assistive technology correlates positively with TVIs spending a student's instructional time using computer software assistive technology (p<.001)

Negative correlations also existed, most noticeable among them being the inverse relationship between the size of the caseload and the percent of students using these accommodations: Braille (p=.044), Audio (p=.004), CCTVs (p=.030), and Screen Readers (p=.003). In other words, the larger the caseload a student is part of, the less likely the student is to spend time using these accommodations. Other notable negative correlations included: (a) percent of students whose primary goal is to read using a combination of approaches with the relative importance to the students TVI of sounding out words (p=.011); and (b) percent of students whose primary goal is to become a fluent braille reader with the percent of students using visual + audio to access print (p=.012).

Discussion

Federal legislation over the past decade has pushed for the inclusion of all students in state accountability systems, including large-scale assessment. With schools, districts, and states concerned about making adequate yearly progress, it is important that stakeholders better serve the needs of students with visual impairments in assessment. The perceptions of teachers of students with visual impairments (TVIs) are important in understanding the wide variety of technologies used in reading instruction and assessment. Results indicate widespread and varied use of both high- and low-tech assistive technologies in both instruction and assessment. Statewide assessment policy, however, is still in flux regarding what technologies are considered accommodations rather than standard practice and what technologies are thought to interfere with the assessment of reading (Thurlow, 2007). It is important for research to continue in the area of technology assisted reading to provide stakeholders with a clearer picture of the avenues that students with visual impairments take to access reading and demonstrate their reading skills.

A 2001 survey conducted as part of the Special Education Elementary Longitudinal Study (SEELS) reported on the frequency of specific accommodations used in the regular and special education classrooms. It reported that tests were read aloud to students with IEPs 35% of the time in the regular classroom, and much more often in the special education classroom (67%). This aligns with this study's finding that 26% of students with visual impairments who sometimes use read aloud accommodations. The TVIs responding to the survey also reported that students used audio accommodations (38%), and screen readers (21%) frequently, possibly showing a trend of increased use of mid to high-technology accommodations (Wagner & Blackorby, 2004).

In this survey of teachers of students with visually impairments, very few teachers had only middle school students on their caseload, indicating that specialization in reading instruction for this age group is not common. In other words, vision teachers rarely have specialized training in working with this age group or this content. Most tend to be generalists with a K-8, K-12, or 6-12 grade focus.

This finding may not be that unexpected given the importance for these students of focusing on literacy tools in middle school. Middle school students with visual impairments may have more barriers to literacy than other groups of middle school students. They are just as likely as others (or more so) to have learning disabilities, limited opportunities to read out loud, and limited opportunities for leisure reading. Because most TVI's are not necessarily literacy experts, having assistive technology access meets only part of these students' needs.

The precise role of an individual vision teacher in reading instruction must vary greatly from school to school. This coincides with the relative skills of regular classroom teachers (language arts teachers in particular) to teach "reading" to students with visual impairments. It is important to keep this in mind because most students with visual impairments spend a good percentage of their time in the general classroom. According to the

National Longitudinal Transition Study (Wagner, Cameto, & Newman, 2003), nearly 70% of students with visual impairments spent at least 40% of their time in a general education classroom, and most spent more than 80% (U.S. Department of Education, 2002). In fact, 45% of students with visual impairments spent all of their time in a general classroom setting (as compared to just 20% who spent none of their time in a general classroom setting) according to a 2001-2002 survey (NLTS2, 2002). In elementary and middle school, these students are more likely to receive their education in a general classroom with the whole class present (69%) than one-on-one with a teacher (28%) (SEELS, 2001).

The availability of specific technology will vary considerably from school to school. Because of the low incidence and varied visual acuities of individuals in question, there may be limited exposure to the "best" accommodations available and it is possible that some students end up using technology that is "around" or less expensive. It was suggested by the project's technical advisory committee that access to assistive technology may differ in schools for the blind compared to regular schools. In the former, a majority of students have other disabilities (including physical and developmental disabilities) and instructional goals and processes may differ, resulting in different applications of assistive technology. In regular schools, students may (or may not) receive outside access to assistive technology through state agencies or community based organizations, access that is not dependent on the individual school.

Adequate braille instruction may not be available to all students who desire it—there is a shortage of certified braille instructors in certain parts of the country. Some students receive several hours of braille instruction per week while others receive considerably less. Also, adequate braille texts are not always available or if they are, are not provided to students at the same time that printed texts are given to sighted students. Failure to have access to texts becomes a greater difficulty as students become older because texts are longer and transcription becomes more difficult. This may lead to more texts being accessed in audio formats by individuals who prefer braille. It is important that students be able to independently access print in a manner to which they are accustomed, especially given the emphasis given to reading silently, which accounted for 63% of reading time in a SEELS study of elementary school students (SEELS, 2001).

The impact of co-occurring disabilities should be examined further. Vision impairment or blindness is generally considered the primary disability even if the co-occurring disability significantly affects the individual's cognitive abilities. Individuals with visual impairments are just as likely (or more so) to have learning disabilities or developmental disabilities than sighted persons. Respondents to this survey reported that roughly 80% of their students with disabilities in grades 7-10 had an additional disability. Ferrell (1998) similarly found that teachers of preschool students with visual impairments taught children with at least one additional disability 59% of the time. The implications of these additional disabilities for the use of assistive technologies may be important to explore.

Conclusion

TVIs were interested in responding to the survey and provided clear information regarding several of the basic questions the survey sought to answer: (1) demographics, (2) technologies, (3) importance of elements of reading, and (4) state guidelines for reading assessments. Their answers to the survey questions pave the way to further discussion with teachers, and to explore in more depth some of the issues that surround the assessment of reading for students with visual impairments.

The next step in the research flowing from the survey is to interview TVIs, and then ideally to talk to students. In thinking about the interviews of TVIs, interview questions will likely grow from what we have learned in this survey. For example, we will want to pursue in greater depth many of the questions that could be asked at only a surface level in the survey, including information about the use of computer software, various tacking, audio, and visual methods of access print, and the teacher's role in reading instruction for middle school students. Questions about state testing and the participation of these students will be sought, including information on what happens at the IEP team meeting. These are just a sampling of the types of questions that might be recommended for a next step in the survey. Of course, in addition to these types of questions will be questions about teachers' understanding of current requirements for students, and their understanding of what proficient performance is related to the use of assistive technology for students with visual impairments.

The Technology Assisted Reading Assessment project will continue down this pathway, with teachers of students with visual impairments being interviewed in the fall of 2007. These interviews will feed into the development of specific items to use for testing the accessibility characteristics of students with disabilities.

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