Reflections of Teachers of Visually Impaired Students on Their Assistive Technology Competencies

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In today's educational practices, teachers of students with visual impairments are required to demonstrate competencies in the use of assistive technology so they can adequately meet the diverse needs of their students (Abner & Lahm, 2002; D'Andrea, 2012; Gerber, 2003; Smith, Kelly, & Kapperman, 2011). Several researchers have investigated specific assistive technology issues related to students with visual impairments. For example, Lusk (2012), in her study of optimal optical devices for school-aged students with low vision, noted that performance and preference varied among users. She provided evidence that the selection of optimal magnification devices is hinged on individual needs and preferences. Kamei-Hannan and Lawson (2012) found that students were engaged in writing tasks for extended periods and with higher quality when using the braille note taker with its unique features that were not present with the Perkins brailler. Bouck, Flanagan, Joshi, Sheikh, and Schleppenbach (2011) utilized a computer-based voice input, speech output (VISO) calculator to study how students completed basic mathematics problems, with a focus on efficiency as compared to the students' typical approach to calculation. Among their salient findings were: students were more efficient with their traditional calculation technique, although with time, performance with the VISO was equivalent; and the participants indicated that the new technology had great benefits, since it provided them with increased autonomy for solving difficult mathematics problems.

Central to the issues of assistive technology utilization and competency is the need to understand how in-service and preservice teachers feel about their knowledge and skill levels. In order to identify teachers of students with visual impairments' perceptions of their mastery of assistive technology devices and services, two studies were conducted using online questionnaires. The first study included teachers from Texas only, and the second sampled teachers from all 50 U.S. states and contiguous territories. The quantitative analyses of these studies were published in two articles in the *Journal of Visual Impairment & Blindness* (Zhou et al., 2012; Zhou, Parker, Smith, & Griffin-Shirley, 2011). For the Texas study, over half of the participants (57.5%) reported a lack of confidence (that is, no, limited, or some confidence) in instructing students with visual impairments in the use of assistive technology (Zhou et al., 2011). In the national study, over half the participants (59.29%) reported a lack of confidence (that is, no, limited, or some confidence) in assistive technology instruction (Zhou et al., 2012). The purpose of this report is to provide the results of the qualitative data from the two studies.

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Table 1
Categories from the respondents' comments in the Texas Assistive Technology Survey ($N = 114$ comments).

Category	Number of comments	Percentage of total number of comments
Education attainment	39	34
Proficiency with assistive technology	22	19
Collaboration with other services	13	12
Recognition of the importance of assistive technology devices and matching them to their students with visual impairments	10	9
Other	7	6
Funding problems, time away from work, and access to accessible e-texts	5	4
Support concerns	3	3
Survey design or research study	15	13

Methods

Participants and procedures

In this report, the researchers analyzed two sets of data. The first set comprised 165 participants in the Texas study, and 840 teachers of students with visual impairments were included in the national study. Texas Tech University's institutional review board approved both studies. Informed consent was obtained from the participants prior to their completion of the online surveys. The current report focuses on the analysis of the qualitative open-ended "comments" section.

For the Texas study, the majority of the participants were women (96.97%), with a mean age of 48.25 years and average teaching experience of 19.42 years. Only 6.06% reported using assistive technology on a regular basis. Similarly, for the national study, the majority of the participants were women (90.95%), with a mean age of 48.17 years and average teaching experience of 20.09 years. Only 6.67% reported using assistive technology on a regular basis.

Data analysis

As the first step in the data analysis process, the researchers extracted the comments from the two surveys and transcribed them to form a database for this report. An open coding technique was employed to label the meanings that were identified. According to Strauss and Corbin (1990), *open coding* is a strategy where the codes form the basis for later aggregation into core codes. These core codes are the labels that the researcher assigns to the events, activities, functions, relationships, contexts, influences and outcomes.

Next, the transcripts were analyzed word for word and phrase by phrase to label all the data and assign representational conceptual codes to each incident in the data. Once all the transcripts were coded, we identified the similarities and differences among the incidences and then correspondingly coded the similar incidences together, allowing for the conceptual categories and their properties to develop naturally.

Last, eight categories were identified for the Texas survey (see Table 1), and nine categories for the national survey (see Table 2). The Texas study has fewer categories because of a smaller variety of responses in the "comments" section compared to the national study.

Results

Of the 165 participants in the Texas survey, 53 (32%) provided comments, while 194 of the 840 (23%) participants to the national

Table 2
Categories from the respondents' comments in the National Assistive Technology Survey ($N = 233$ comments).

Category	Number of comments	Percentage of total number of comments
Proficiency with assistive technology	57	24
Education attainment	46	20
Collaboration with other services	26	11
Funding problems	20	9
Recognition of the importance of assistive technology devices and matching them to their students with visual impairments	15	7
Other	14	6
Support concerns	13	5
Equipment concerns	5	2
Survey or research study	37	16

survey gave comments. Many participants supplied multiple comments, which were counted separately, as shown in Tables 1 and 2.

The researchers compared the results to see if there were agreements. For example, the eight comment categories identified from the Texas study were included in the nine categories found in the national study. The top three categories in both studies, Texas and national, were: the need for more education concerning assistive technology (34% and 20%, respectively); the level of proficiency of the teachers of students with visual impairments with assistive technology (19% and 24%, respectively); and collaboration with others (12% and 11%, respectively).

On the national level, concerns of the respondents included recognizing the importance of assistive technology devices and matching them to their students with visual impairments (7%), funding problems (9%), and support concerns (6%). Equipment concerns (2%) were not cited as issues of great importance to the respondents. The areas of least concern to the participants in the Texas study were: recognizing the importance of assistive technology devices and matching them to their students with visual impairments (9%); problems with funding, time away from work, and access to e-texts (4%); other (6%); and support concerns (3%).

Participants' statements

Some examples of participants' statements for the categories are listed below.

I need more education in the use of AT [assistive technology] devices that my students should be using.

> In my opinion, more time and instruction needs to be spent in the training programs for teachers of students [with] visual impairments on some of the "high-tech devices" such as electronic note-takers, screen-reading software programs, and screen-enlarging programs and video magnifiers.

> I don't know where to go to get "beginner" training; all the sessions I've seen are geared toward people with preexisting knowledge of the equipment.

Teachers of students with visual impairments should acquire proficiency in AT use.

> Another problem I have encountered is that although I hear of new technologies,

until I have a student who needs that area of AT[,] I don't pay attention or learn the device.

I require collaboration with other services.

I do feel fortunate that in our district, I work closely with OTs [occupational therapists], PTs [physical therapists], and augmentative communication specialists, and they are always available and willing to answer my questions and help me learn about the various options for my students with visual impairments and other impairments.

I feel it is helpful for the TVI [teacher of students with visual impairments] to be a part of their district's AT Team. You gain insight into other areas of need and specialty and begin to consider options not normally associated with VI [visually impaired] students.

I should recognize the importance of AT devices and their availability to students with visual impairments.

I have used AT devices in my classroom for many years and feel it is extremely important for our VI students to use and learn any AT devices that can enhance their lives and jobs in the future.

I know there is lot of AT out there that we probably are not aware of. I do feel that the AT devices we use at this time are working well for the students.

Other.

Assistive technology is an ongoing learning experience.

Instructing VI students from birth to age 22 with a wide range of abilities in the expanded core curriculum is a challenge in itself!

We should develop an understanding of problems related to funding and accessibility.

One of the major hurdles is AT use within the public education system, its limited funding, and ever-evolving new technologies.

The big problem we have had this year is getting the textbooks in an accessible digital format.

We require ongoing support.

We are asked to teach AT, but are NEVER given any textbooks or systematic methodology to do so. We have to look up tutorials online and try to adapt them to our students' needs.

I appreciate the survey design and accessibility.

I am THRILLED that this survey was fully accessible using a notetaker with braille output! I am a visual learner who uses braille.

I answered these questions with my specific students in mind. . . . My answers might have changed slightly if I were asked to answer them with another age- or grade-level group of students.

We need to stay abreast of technological innovations.

. . . Getting all the devices, or even most, to operate correctly, consistently, and efficiently is another dilemma, and then keeping them running, current, and

upgraded as things change is usually a huge bugaboo.

I haven't had any new AT for years. The last items I was given were a Mountbatten Braillewriter and SAL [speech-assisted learning]. I couldn't get the Mountbatten to interface with the Patterns curriculum and it wasn't suitable for little ones to use.

Limitations

The primary limitation of the two studies was the fact that the researchers were measuring the teachers of students with visual impairments' self-perceptions of their knowledge and skill level in assistive technology. Actual competence of their knowledge and skill level with assistive technology was not measured (Zhou et al., 2012; Zhou et al., 2011).

In qualitative studies, Creswell (2008) mentioned that a small sample size can lead to a lack of generalizability to a total population as a possible limitation. Therefore, the small percentage of participants (32% for the Texas survey, and 23% for the national survey) who provided comments compared to the total number of participants in the two studies is a potential limitation. In addition, the researchers had no control over participants' provision of comments as this was a voluntary act on their part. There may be a significant difference between the population of participants that leave comments versus the population of participants that choose not to do so.

Discussion

An interesting aspect of the study presented here is that an average of nearly half of the comments were related to the need for more education and the level of proficiency of the participants. This singular observation underscores the importance of adequate preservice training for professionals in the field. Furthermore, it indicates the necessity of providing professional development training for practicing teachers who may feel they lack the requisite knowledge and skills to meet the instructional needs of their diverse learners.

Clearly, students with visual impairments need to become proficient with assistive technology to compensate for their visual limitations. They must have the competence in the use of assistive technology to have better access to education, information, employment, social networking, and independence. To gain skills in assistive technology usage, these students should be taught by specialist teachers. Therefore, these professionals themselves must have adequate competencies in assistive technology instruction.

Conclusions and Implications for Practice

Based on the participants' comments, it would seem that a valuable recommendation would be the need to develop innovative models for service delivery and the actual format for instruction for assistive technology. In this instance, program implementers need to find appropriate answers to such questions as: Who should teach assistive technology? How should assistive technology be supported? What is the potential role of the assistive technology personnel at the district level? What are the mandated requirements for the level of proficiency for teachers of students with visual impairments? In addition, the model of service should consider factors that affect learners, such as age of onset, degree of vision loss, presence of additional disabilities, linguistic or cultural differences, and access to qualified personnel, since decisions are made pertaining to assistive technology.

To conclude, we recommend the following ideas for effective assistive technology service delivery:

- Appropriate training at the preservice and in-service levels for teachers of students

with visual impairments regarding assistive technology instruction is necessary.

- Prior to their students' receipt and use of new technologies, teachers of students with visual impairments need access to these technologies so they may practice using them.
- Collaborative consultation among general and special educators, assistive technology specialists, and other stakeholders is suggested. Such collaboration will be beneficial to learners with visual impairments as they are introduced to assistive technology usage.
- Assistive technology specialists need to develop expertise in working with, and providing technical assistance to, students who are visually impaired and their teachers.
- Professionals serving learners with visual impairments, their caregivers, and stakeholders need to advocate for funding for assistive technology to ensure learners receive the technological skills they need to be independent in home, school, and community settings.
- Such additional funding can be applied to ensure proper maintenance of equipment so that broken equipment can be fixed and utilized rather than being shelved.

Further research

A qualitative study exploring the competency level of teachers of students with visual impairments concerning assistive technology instruction is needed. The methods of obtaining data would include: observations of teachers instructing students in the use of assistive technology, interviews of teachers concerning their own use of assistive technology, and analyses of documents that demonstrate how teachers use assistive technology with students who have visual impairments. Such data collection would provide information that is more representative of the true performance of instructors as well as students with visual impairments in regard to assistive technology usage. Finally, future research could explore the beliefs and opinions of students themselves.

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