ists." The authors suggest that faculty in preservice programs need to recognize these changing roles tied to current technology used in education and rehabilitation and to the built environment and adjust their curriculum accordingly.

The third practice piece in this issue, by Duane Geruschat, Mark Rankin, and Jessy Dorn, "An Introduction to Providing Rehabilitation to Individuals with Visual Impairments Who Are Using the Argus II Retinal Prosthesis System," highlights the training that orientation and mobility specialists need prior to working with adults who have received a retinal chip implant, the Argus II. This technology has the potential to enhance the orientation skills of the implant recipient when community rehabilitation occurs in a structured manner. The article offers suggestions for what this training might encompass in order to be functional for the user.

I hope these diverse contributions to the literature create some level of cognitive dissonance as you think about these and other changes occurring in the field of visual impairment in the 21st century that may affect preservice and in-service training for professionals in the field, always with the goal of meeting the needs of children and adults who are visually impaired. Any changes in our field must not sacrifice quality, but there also needs to be a recognition that things may not be able to be accomplished the way they have always been done. As John F. Kennedy once said in 1963, "Change is the law of life. And those who look only to the past or the present are certain to miss the future."

References

Dylan, B. (1963). The times they are a-changin'. New York, NY: Warner Bros.

Kennedy, J. F. (1963, June 25). *Address in the Assembly Hall at the Paulskirche in Frankfurt.* Retrieved from http://www.presidency.ucsb.edu

Lemoine, P. A., & Richardson, M. D. (2015). Micro-credentials, nano degrees, and digital badges: New credentials for global higher education. *International Journal of Technology and Educational Marketing, 5*(1), 1–14.

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Practice Reports

Improving Observation and Practicum Experiences for a Preservice Teacher with Visual Impairment Through the Use of Assistive Technology

Jonathan M. Lima and Sarah E. Ivy

Observations and practicum experiences are an integral part of teacher preparation programs, which are necessary to provide preservice teachers with opportunities to apply knowledge and skills gained from lectures and readings to positively affect school-aged students. Although practicum experiences encompass broad observation and preteaching opportunities of varied length and focus, the context for this paper was a semester-long weekly 2-hour commitment to participate in a classroom serving at least one student with visual impairment and additional severe disabilities for a total of 20 hours. This time was spent supporting the student with visual impairment to participate in typical classroom activities, and conducting essential assessments—functional vision and learning media assessment and assessment in the areas of the expanded core curriculum (ECC) for a classroom assignment. Such assessments, especially when completed with children who have visual impairments and additional severe disabilities, require that teachers of students who are visually impaired make detailed multisensory observations. Preservice teachers who are visually impaired (that is, those who are blind or have low vision) may

need an assistant to complete such observations. A peer, instructor, or professional at the practicum site is often needed to describe student and environment characteristics that cannot be accessed through touch or hearing. Typically, the preservice teacher would ask an assistant standing in close proximity to describe visual aspects of a situation to him or her while the preservice teacher may interact directly with a school-aged student.

This approach to supporting preservice teachers who are visually impaired, though effective, has drawbacks that may be most apparent when the teacher needs to assess students with visual impairments and additional severe disabilities. First, preservice teachers are often rightly advised to avoid discussing a child's ability in front of the student. Second, students with severe disabilities often have difficulty processing competing stimuli, and they may be overstimulated and distracted by discussion among observers (Smith & Levack, 1996), which may negatively affect the results of the assessment. Finally, classrooms serving students with multiple disabilities often have a large (speaking) adult to (non-speaking) student ratio, which poses a unique challenge for classroom management. Based on anecdotal observation from the authors' experience in classrooms, it is not ideal to have an additional pair of adults talking in the classroom, which can be a powerful distraction to other children and the teacher.

Currently, there is a gap in research that delves specifically into the topic of assessments conducted by teachers of students with visual impairments who are visually impaired themselves. Variations of terminology ranging from "teachers," "professionals," and "educators," coupled with "vis*impair*," "blind*," or "low vis*" across multiple online databases including JSTAR, ERIC, and Academic Search Complete yielded limited results that specifically addressed educators with visual impairments, and only one study was found that specifically examined teachers of students with visual impairments who are themselves visually impaired. Lewis, Corn, Erin, and Holbrook (2003) surveyed 14 U.S.-based residential, resource, or itinerant teachers of students with visual impairments who are themselves visually impaired regarding their perceived difficulties in the workplace and their strategies for resolving these issues. Lewis and colleagues (2003) classified the participants based on their primary literacy medium, of which there was an equal proportion of braille and print readers. All but two of the teachers of students with visual impairments they studied had at one time worked itinerantly. Although not identified as the most common or persistent difficulty, participants pointed to problems with conducting essential assessments, which they overcame with assistance from others (often paraeducators) and, for teachers with low vision, working in close proximity to their students or using optical devices such as telescopes when applicable. The authors did not report whether the participants worked with children who had severe disabilities in addition to visual impairment or if certain measures were taken to offset issues related to distraction. However, one participant reported using "a series of verbal and touch signals to communicate" with her trained assistant when discussing information in front of students (Lewis et al., 2003, p. 163).

In addition to this one study, the literature on the experiences of educators with visual impairments is largely comprised of narrative pieces related to general education teachers who are visually impaired. For example, Randall (2005) described how a young woman who was blind from an early age, Angela Wolf, used compensatory skills in teaching sighted children, including using a ruler and tape to help write on the chalkboard, feeling children's journals to tell how much students have written, having students read aloud their work, and calling on students to answer questions by drawing names at random. Other examples include the use of dog guides as a means

of effective traveling within the classroom or school, listening intently to students to manage potential misbehaviors, hiring reader services or using screen enlargement or braille transcription assistive technology for access to print, encouraging students to take important roles within the classroom (for example, writing on the board), hiring an assistant or a paraeducator, or creating assigned seating of students to assist in classroom management (American Association of Blind Teachers, n.d.; House, 2015; Mendez, 2014). To our knowledge, literature that addresses the issue of a student's distraction during assessments conducted by a teacher with visual impairment with the assistance of another adult is nonexistent.

Technology solution

Current technology may offer a solution to the issue related to teachers of students with visual impairments who are visually impaired themselves conducting essential assessments for this student population. Bug-in-ear technology—any means of telecommunication coaching whereby one or two people can communicate with each other using ear-piece devices—has provided successful teacher training and coaching in education (Riggie, 2013; Rock et al., 2014; Scheeler, Congdon, & Stansbery, 2010). With this technology, a supervising teacher or coach would be at a distance within the classroom or use a webcam to view the classroom from a remote location and provide one-way guidance to the listener.

Similarly, bug-in-ear technology can be combined with wireless video and audio transmission to allow a preservice teacher of students with visual impairments who is visually impaired herself to receive information from a remote assistant. This method would allow the teacher of students with visual impairments to assess students while minimizing distraction to the student or others in the classroom. Typically, live audio and video used for coaching purposes is transmitted or "streamed" via the Internet. Use of the Internet creates the potential for unauthorized users to break into the Internet protocol (IP) address, which may cause concern for parents, teachers, or administrators; in addition, devices that rely on the Internet can be susceptible to connectivity issues. If such bug-in-ear and video-streaming technology occurred through a secure connection using Bluetooth (a wireless technology that allows direct communication over short distances between two compatible electronic devices), thus limiting the range of access from unauthorized users, then a practical solution exists in providing a distraction-reduced environment for teachers of students with visual impairments who are visually impaired themselves to interdependently and confidentially assess their students.

This technological approach was used in the 2015 fall semester in the Visual Disabilities Program at Florida State University with a preservice teacher of students with visual impairments who has extremely low vision—in her practicum experiences serving and assessing students with visual impairments and additional severe disabilities. During assessments being conducted by the preservice teacher of students with visual impairments using bug-in-ear technology and video plus audio streaming, an onsite observation was conducted by the first author along with follow-up interviews regarding the use of this technology for completing essential assessments. Institutional review board approval and written informed consent from the participant was obtained from the authors' institution.

Participant and materials

The approach of pairing video that is streamed live with bug-in-ear technology to assist in practicum experiences was brought about through the collaboration between the authors, the College of Education Information Technology Services, Florida State University, and the preservice teacher of students with visual impairments, Corey (pseud-

onym). The collaboration sought to find a solution that would improve Corey's capacity to conduct essential assessments during her required practicum. She acquired low vision around 2005, at the age of 38, as a result of diabetic retinopathy. A surgery in 2006 was unable to prevent a retinal detachment in her left eye, rendering her totally blind in that eye. She currently has an unstable visual acuity of 20/800 in her right eye. In the year prior to our investigation, she became unable to use video magnifiers to access print, but she still maintained some useable bright color vision and object detection, which she used to assist her orientation and mobility. In the fall of 2015, during Corey's practicum, her student was an adolescent with low vision and multiple disabilities who was nonverbal and used a wheelchair for mobility.

For bug-in-ear communication, Corey and her assistant each wore a Motorola CLP Series two-way business radio with Bluetooth capacity. Communication exchanges were relayed through a microphone in the wireless earpiece while the sender held down a button on the radio. A free application called Livestream was downloaded onto an Apple iPad Air 2 handheld electronic device protected by an Otterbox Defender case, which enabled Corey's assistant to view both video and audio in real time as streamed over Bluetooth from a small GoPro Hero 4+ Black HD (high-definition) camera operated by Corey. Corey and the assistant set up the camera prior to each assessment session to provide full video coverage of the student. Setup options included mounting on a Sony VCT-R100 tripod or furniture via various GoPro accessories (for example, gooseneck clamps or desk clamps) or mounted directly to Corey via a GoPro head or chest mount. The assistant would access video and audio from an office separate from the classroom, away from Corey and the student. The assistant was provided with Shure SE215 headphones for clearer audio. The bug-in-ear technology allowed Corey to ask her assistant for further probing information, and her assistant could then elaborate as needed.

Corey was taught how to use the technology by the first author during two meetings. The total hours of training were less than three, and this instruction also included a practice session in which Corey was asked to reteach and demonstrate the use of the technology with the first author to ensure she was competent in handling the equipment. Corey was tasked with developing her own plan for training her assistant regarding the type of visual information she wished to receive when observing her student, and how she would communicate with her assistant during practicum sessions.

Observation

Corey's practicum experiences lasted for two or more hours each week for 10 weeks between September and November of 2015. During that time, she and her assistant used bug-in-ear technology and video streaming consistently to conduct a functional vision and learning media assessment; ECC assessment; and to complete the Communication Skills Matrix (Rowland, 2017), an assessment tool that identifies the status, form, and progress of early communication to describe a student's present levels of functioning. Corey used bug-in-ear technology in the classroom during student routines but did not use the technology when observing outside play.

The first author completed one live observation of Corey using the technology. During the observation, the first author shadowed Corey's assistant. The observation occurred on the first day in which Corey and her assistant had access to the full range of technology, so setup took longer than anticipated, and it included retraining the assistant to use the Shure headphones, new camera mounts, and newer bug-in-ear headsets. For approximately 20 minutes, Corey and her assistant collaborated while conducting a Use of Sensory Channel form (Koenig & Holbrook, 1995), which is an assessment tool used to deduce the primary and secondary auditory, visual, and tactual behaviors of a

student. The assistant was positioned in an adjacent office and storage room connecting two classrooms, while Corey was sitting with her student in the student's classroom. During this activity, the GoPro was mounted on a tripod to provide a wider angle of coverage because the observation was occurring during a stationary mealtime routine.

There was an approximately one-second delay between video and audio coverage of what was occurring within the classroom. Video image quality allowed the assistant to capture minute details of Corey's and her student's interactions. Using bug-in-ear technology, the assistant described to Corey, in real time, all student behaviors and environmental events that could only be perceived visually. Corey verbally directed the assistant infrequently to classify and catalogue observations by whispering into the microphone that was close to her mouth. Later Corey transferred her notes, which were recorded on a computer word processor by her assistant, onto the Use of Sensory Channel form.

During this brief observational period, the student was calm and alert during and after the mealtime activity as he interacted with Corey. During the observation, only one student who peered through the office window appeared to notice Corey's assistant. The bug-in-ear and GoPro technology was unmoved and apparently unnoticed by either the student being assessed or his classmates, and regular daily routines were implemented without additional distraction.

To provide a comprehensive functional vision and learning media assessment, teachers of students with visual impairments must observe students in a variety of settings indoors and outdoors with different lighting conditions. The first author was unable to observe the technology used during naturally lit outdoor conditions on the day of observation; however, given the various body mounts that can be used with a GoPro camera and the short distance range available over a secure Bluetooth connection, there still exists an avenue to use video streaming and bug-in-ear technology during outdoor conditions.

Interview

Two informal, open-ended interviews were conducted. In-person interviews were completed separately with Corey and with her assistant. The purpose was to discuss the practicality of and users' preferences for this technology and to discuss its potential value for other educators with visual impairments.

Corey praised this technology as a valuable tool, which she felt increased her independence with assessment because she was able to get more real-time visual information while not distracting the student or having to divert her attention from the student she was assessing. She said, "I know I have my limitations, but having this technology helps me to do my job. It's less distracting [for me,] and kids are less likely to get distracted [when I use this technology]." Her assistant noted that communication was clear and suggested that in some situations the GoPro could be strapped to the teacher, which would help the assistant to share the teacher's frame of reference and possibly improve her ability to provide detailed information about student behavior. Both Corey and her assistant believed this technology was helpful and nonintrusive, and that it offered a pragmatic approach to assist educators with visual impairments.

Conclusion

For this project, we identified a technological approach to support a preservice teacher of visually impaired students with extremely low vision to conduct essential assessments for a learner with multiple disabilities and visual impairment with limited distraction to the child and classroom. The selected technology was purchased with funds provided by a departmental grant, but it would be relatively affordable to an individual living on the average salary of a teacher working in the United States. In addition, as the demand for

streaming sports cameras and tablets rises, basic economics indicate that the cost of such items should continue to be reduced. Experimental research is needed to address whether the technology described in this paper can be used to decrease distractions and increase the quality of assessments completed by teachers of students with visual impairments who are visually impaired themselves. With these factors in mind, bug-in-ear technology with live audio and video transmission could be considered as a possible accommodation for teachers of students with visual impairments who are visually impaired themselves or other types of teachers who are visually impaired. Concurrently, other uses of live-streaming video and bug-in-ear communication could prove beneficial for other preservice or professional teachers with visual impairments who may need assistance in working with learners with or without visual impairments and with or without additional disabilities for assessment, classroom management, or academic instruction. For example, live-streaming and bug-in-ear technology could be used to assist teachers with visual impairments to notice any type of student behavior typically observed visually, such as stereotypies or other challenging behaviors or cane technique, allowing teachers with visual impairments to provide immediate feedback or reinforcement to their students.

References

American Association of Blind Teachers. (n.d.). *The challenges of teaching young children in special education* (anonymous interview). Retrieved from http://www.blindteachers.net/presley.html

House, R. L. (2015). Surviving the sixth-grade challenge. *NFB: The blind educator*. Retrieved from https://nfb.org/blind-educator-issue-1

Koenig, A. J., & Holbrook, M. C. (1995). *Learning media assessment of students with visual impairment: A resource guide for teachers* (2nd Ed.). Austin, TX: Texas School for the Blind and Visually Impaired.

Lewis, S., Corn, A., Erin, J., & Holbrook, M. (2003). Strategies used by visually impaired teachers of students with visual impairments to manage the visual demands of their professional role. *Journal of Visual Impairment & Blindness, 97*(3), 157–168.

Mendez, C. (2014). Life lessons from a tree. *NFB: Braille monitor*. Retrieved from https://nfb.org/images/nfb/publications/bm/bm14/bm1404/bm140409.htm

Randall, K. (2005). Uncommon vision: Blind student focuses on her goal to become an elementary school teacher. *University of Texas at Austin Features*. Retrieved from http://www.utexas.edu/features/2005/wolf/index.html

Riggie, J. L. (2013). *Supporting early childhood educators' use of embedded communication strategies by providing feedback via bug-in-ear technology* (doctoral dissertation). Florida State University, Tallahassee.

Rock, M. L., Schumacker, R. E., Gregg, M., Howard, P. W., Gable, R. A., & Zigmond, N. (2014). How are they now? Longer-term effects of eCoaching through online bug-in-ear technology. *Teacher Education and Special Education, 37*(2), 161–181. doi: 10.1177/0888406414525048

Rowland, C. (2017). Online communication matrix (website). Portland, OR: Oregon Health & Science University, Design to Learn Projects. Retrieved from http://communicationMatrix.org

Scheeler, M. C., Congdon, M., & Stansbery, S. (2010). Providing immediate feedback to co-teachers through bug-in-ear technology: An effective method of peer coaching in inclusion classrooms. *Teacher Education and Special Education, 33*(1), 83–96. doi: 10.1177/0888406409357013

Smith, M., & Levack, N. (1996). *Teaching students with visual and multiple impairments: A resource guide* (2nd Ed.). Austin, TX: TSBVI.

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