Spring 2023 Convention Issue

Visual Impairment and Deafblind Education Quarterly

Volume 68, Issue 2

The Voice and Vision of Special Education

Council for Exceptional Children
The voice and vision of special education

Cover photo description: The cover photo contains an image of some of the DVIDB board members at the DVIDB Social in Lexington, Kentucky at the 2023 CEC Convention.

Photo submitted by: Nicole Johnson

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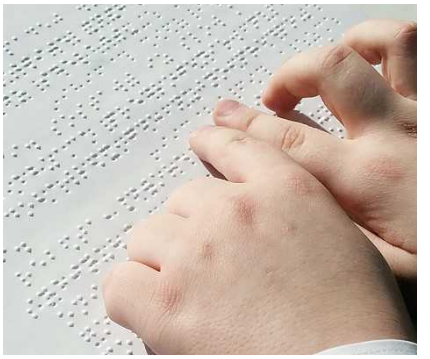

Submissions Due:

July 14, 2023

Back to School Issue

Visual Impairment and Deafblind Education Quarterly

Email your manuscripts to Kathleen Farrand, editor

Kathleen.Farrand@asu.edu

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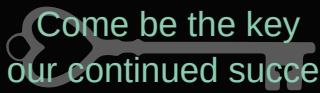
We are currently recruiting for Teachers of the Vision Impaired, AT Specialists and Orientation & Mobility Specialists.



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Message from the Editor

Kathleen M. Farrand

Associate Professor, Arizona State University

Kathleen.Farrand@asu.edu

Welcome to the Spring 2023 Convention issue of the *Visual Impairment and Deadfblind Education Quarterly* (*VIDBE-Q*) journal. I hope that everyone was able to attend convention and engage with members at sessions and the DVIDB social. Thank you to all our wonderful sponsors that made our social possible. It was an amazing time to engage with fellow DVIDB members and meet our award winners too.

In this issue, authors share work from their presentations at the 2023 CEC Convention. Please join me in congratulating Dr. Erika Fundelius, the author of the first article on self-determination, on receiving her Ph. D. In the second article, Karen E. Koehler, Kimberley M. Picard, and Emily Maginn share their collaborative work on postsecondary transitions and outcomes for children and youth with low incidence sensory disabilities. Next, Tina S. Herzberg and Justin T. Kaiser share insightful information from their presentation on processes for orientation and mobility referrals.

Amy T. Parker, Martin Swobodzinski, Elizabeth M. Schaller, and Denise Snow provide key findings and recommendations from their study on youth on using tactile maps and a wayfinding app to navigate an urban college campus. Beth A. Jones and Belinda Rudinger share how Texas A&M-Commerce is promoting assistive technology (AT) integration at a postsecondary AT Lab. Lastly, Tina S. Herzberg, Sara K. Larkin, and Susan A. Osterhaus share information from their presentation about a free online curriculum for teaching students the Nemeth Code for mathematics and science notation. I hope these articles remind you of a favorite session from convention and introduce you to some new ideas that you can apply in your own work.

Here are some important information and tentative dates as we look ahead to the 2024 convention in San Antonio, Texas that will take place from March 14-16,

2024. Please mark your calendars for some upcoming deadlines and make sure to check the CEC website (https://exceptionalchildren.org/convention/2024) for more information and changes to the timeline. The call for reviewers for the 2024 CEC Convention will be open from May 1, 2023, until May 31, 2023. The proposal submission deadline for the 2024 CEC Convention is scheduled for May 8, 2023, through June 2, 2023. A second call for posters and Teacher Slam presentations will come out in October of 2023. If you would like more information about submitting a proposal for 2024, please register for a webinar on May 16, 2023 from 5:30-6:30 PM (EST) at https://cecconvention.org/events/what-know-about-submitting-proposal-2024-cec-convention-expo.

Are you doing something innovative in the field of visual impairments and deafblindness? Submit an article for our summer back to school issue. Email me at Kathleen.Farrand@asu.edu for more information or to submit your article. Submissions are due by July 14, 2023.

THANK YOU 2023 DVIDB PRE-CONFERNECE & CONVENTION SPONSORS:

DVIDB 2023 CEC Convention & Award Winners

Louisville, Kentucky

Award Winners:
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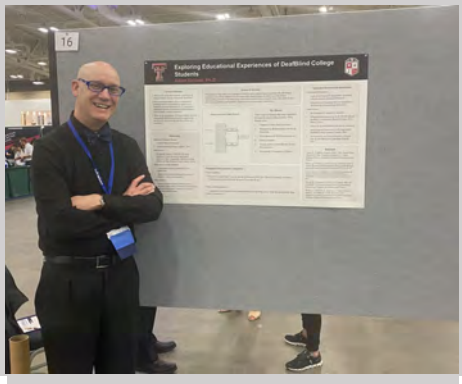

Dissertation of the Year:
Dr. Adam Graves

President's Message

Kathleen Stanfa,

Professor, Kutztown University,

stanfa@kutztown.edu

Happy Spring! It was wonderful to see so many attend the convention in Louisville, KY this year. A strong attendance and terrific opportunities for professional learning and networking made this year's event a great success. In addition to outstanding in-person presentations and events, the virtual component included more than 40 on-demand sessions as well. DVIDB was fortunate to host over 20 presentations, including posters and multi-presentation panels. This year's

DVIDB showcase presentation featured “Reflections from Parents of Children Who are Deafblind.” I am always impressed by the quality of work in our field.

DVIDB members, colleagues, and friends had a wonderful evening at The Tavern on Fourth in Louisville at DVIDB’s annual social event. We celebrated with several of DVIDB’s award recipients who were in attendance where they received their awards. We are proud of the work they do and were honored to recognize the contributions they make. We wish to extend our gratitude to the American Printing House who generously sponsored DVIDB’s social.

Over 70 people attended DVIDB’s February virtual pre-convention, “Teaching Multilingual Learners with Visual Impairments,” led by Erika Fundelius & Dr. Cheryl Kamei-Hannan. This was a fantastic event with valuable information shared about effective supports for English learners with visual impairments. Thank you to Allied Instructional Services and the American Printing House for your sponsorship.

Upcoming events include DVIDB’s spring webinar. On May 11th from 3:00 – 4:30 pm EST “Unmuting Your Microphone: Strategies for Remote Vision Services” will be presented by Amanda Thompson and Jessica Kleinsteuber of Allied Instructional Services. Participants will learn strategies to support remote instruction, including options for remote setup, teaching braille remotely, and techniques for conducting remote FVLMAs. Join us and earn 1.5 ACVREP credits.

DVIDB webinars are free for DVIDB members and $15 for non-members. Registration is available at the DVIDB website.

DVIDB will again offer two $1000 funding opportunities via a competitive grant to provide support for innovative teaching practices for individuals with visual impairments. Information and a link to an online application will be available on the DVIDB website and posted to our social media channels. Eligible applicants must be a current member of DVIDB and work in the field of visual impairments or deafblindness. The DVIDB Innovative Teaching Grant recognizes DVIDB members for their contributions to improved approaches to instruction. Projects eligible are those developed by Teachers of the Visually Impaired, O&M Specialists, Vision Rehabilitation Therapists, and others who provide educational services to individuals with visual impairments.

As the trees blossom, early flowers push through the ground, and the weather turns warm, spring is a wonderful time to renew our commitments to what we value most. While this is often a busy time for educators, it is also a time to reflect on how students have grown during the academic year. I hope you take the time to celebrate the milestones reached.

Enjoy the spring issue of the Quarterly.

Council for Exceptional Children

DVIDB

Unmuting Your Microphone: Strategies for Remote Vision Services

WHEN: MAY 11th

TIME: 3:00 – 4:30 PM EST

Sponsored by DVIDB

Amanda Thompson,
Allied Instructional Services

Amanda Thompson is a certified TVI in multiple states and the Director of Assistive Technology at Allied Instructional Services who has been supporting remote teams for the last two years.

Jessica Kleinsteuber is a certified TVI in multiple states and the Remote Vision Services Coordinator at Allied Instructional Services who has been providing remote services since before COVID.

Jessica Kleinsteuber
Allied Instructional Services

Participants will learn strategies for making meaningful connections with school-based teams to support remote instruction by exploring options for remote setup, teaching braille remotely, and techniques for conducting remote FVALMAs.

Fee: $15 for all non-DVIDB members and FREE for all DVIDB members!

Registration link below

https://www.eventbrite.com/e/unmuting-your-microphones-strategies-for-remote-vision-services-tickets-609009783657

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The Glue that Holds it All Together: Self- Determination

Erika Fundelius

Florida State University

efundelius@fsu.edu

Target audience: TVIs, Service Providers, Parents

In my second position as a new teacher of students with visual impairments (TVI) I inherited a group of four high school seniors without any real transition instruction or plans. As a relatively green TVI, but experienced special educator, I was shocked that what I was taught and used to in my previous practices was not at all implemented with these students. It highlighted what the 1985 report by Kirchner and Peterson (70%) and the recent data are still showing, that 50-60% of the blind or low vision population are not part of the labor force (Kelly, 2019; McDonnall & Sui, 2019). It remains alarming; however, this experience also highlighted the areas we might be falling short. During my doctoral program I

looked for reasons why my students I graduated from high school, will likely not finish college —if they made it in— or upon leaving high school, they simply graduate to their parents' couches. I kept thinking that self-determination has to be the key to their post-school successes or lack thereof.

As a TVI who completed a traditional teacher preparation program, and as a current teacher educator, I have been privy to a variety of viewpoints on how the expanded core curriculum (ECC; Hatlen, 1996) is taught to future educators. In 2007, The Council for Exceptional Children, Division on Visual Impairments and Deafblindness (CEC-DVIDB) elevated the ECC as a competency area for vision professionals beginning with their teacher preparation, professional development, and instruction in the ECC as it became a requirement for accredited teacher preparation programs (Spungin, 2017).

After multiple comprehensive search efforts, I could not find much in terms of actual self-determination research with students with visual impairments nor completed with vision professionals. Rather, my research kept returning to the broader special education field, to studies completed by Drs. Michael Wehmeyer, Karrie A. Shogren, Martin Agran, Susan B. Palmer, among many others. Dr. Agran and colleagues (1999) completed a study with special education teachers in Utah on their perceptions of self-determination. They found that teachers expressed a strong support for instruction in self-determination and that they saw many benefits

in it for their students. Yet, more than half did not include self-determination related goals on their students IEPs (Agran et al., 1999). In 2000, Dr. Wehmeyer and colleagues completed an OSEP-funded national survey study of special educators on self-determination. They mirrored most of Agran et al.'s findings from 1999. Teachers favored all that self-determination can offer for students, but only 22% had self-determination related IEPs goals for all their students (Wehmeyer et al., 2000). Both studies highlighted that even though teacher perceptions of self-determination and belief over its importance might be high, their practices and instructional activities do not actively promote it (Wehmeyer et al., 2000). The Agran et al. (2007) survey study of AER's itinerant teacher population found that TVIs perception and practices mirrors that of their special educator peers, and interestingly, the results of my finding from 2022 are very similar.

Self-determination is an indispensable but not stand alone part of the ECC. I used the definition by Field and colleagues' (1998), and they state that self-determination is:

> A combination of skills, knowledge, and beliefs that enable a person to engage in goal-directed, self-regulated, autonomous behavior. An understanding of one's strengths and limitations together with a belief in oneself as capable and effective are essential to self-determination. When

> acting on the basis of these skills and attitudes, individuals have greater ability to take control of their lives and assume the role of successful adults in society. (p. 115)

Now what does this really mean? In essence, if we utilize the seven component skill areas defined by Wehmeyer (1997) we can set our students up for success, whatever that may look like for them individually. The seven component skill areas are: (1) Choice making, (2) Decision making, (3) Problem solving, (4) Goal making and attainment, (5) Self-regulation/self-management, (6) Self-advocacy and leadership, and (7) Self-awareness and self-regulation. Many of us are already utilizing instruction in some of the skills, and definitions which I received from practicing TVIs use these skill areas to demonstrate teachers' understanding of self-determination.

Let me illustrate how to embed self-determination and its related component skills by starting with a SMART Goal. Well written IEP goals are based on continuous assessment, with student's needs for accessing the now, as well as what will support them to grow into adults functioning as independently as possible. Furthermore, goals vision professionals are expected to write cannot be copied from IEP goal banks as the ECC is different from that of the academic curriculum. I also want to highlight that in any of my teaching in the classroom or in webinars I highlight ways in which the ECC areas overlap and can be embedded into any

academic goal of our students. We do not need to feel overwhelmed, as with a little imagination and pre-planning in the assessment and goal writing phrase, we can cover all nine areas of the ECC. They overlap!

Let us consider that we have a sixth grader academic student with a visual impairment and a mild learning disability. They need to work on internet research skills, digital organization of information and materials, and finding recreation activities they enjoy. They receive 30 minutes per week service from a TVI. In the table below I illustrate how a goal and its objectives can support self-determination alongside multiple areas of the ECC.

IEP Goal and Objectives	Self-determination (SD) skill areas
Goal: By the end of the IEP period, Spectacular Student, when presented with a device with internet access, will independently utilize their choice of web browser and research recreational opportunities within their community, collect information on a document, select an activity they would like to engage in, and make a plan on how to access the activity, as measured by student created document.	<u>It is SMART:</u> Specific, Measurable, Attainable, Relevant, and Timely <u>It supports all seven component skills of SD</u> (1) Choice making (2) Decision making (3) Problem solving (4) Goal making and attainment (5) Self-regulation and self-management (6) Self-advocacy and leadership (7) Self-awareness and self-knowledge

	Supports 6+ areas of the ECC ⇒ Self-determination ⇒ Assistive tech (computer, browser) ▪ Sensory efficiency ▪ Compensatory access ⇒ Social skills (appropriate internet behavior, self-knowledge, requesting assistance, proper interaction with peer or adult, social emotional learning) ⇒ Career education ⇒ Recreation & Leisure ⇒ Orientation and Mobility
Objective 1: By the end of the reporting period, Spectacular Student, when presented with a device with internet access, independently choose, turn on, and engage accessibility features, four out of five times while managing their own emotions, requesting assistance as needed, as measured by teacher created data collection tool.	• turn on device: problem solving, if having trouble asking for help (advocacy) • turn on accessibility features: problem solving, if having trouble asking for help (advocacy), goal attainment, self-awareness and self-regulation re: task and frustration ▪ decision making if needing help or a break
Objective 2: By the end of the reporting period, Spectacular Student, will describe elements of safe internet access (e.g., browsers; types of webpages .net, .org, .com; rules of safe internet usage, methods of identifying safe people and organizations), and independently decide on web browser, demonstrate safe access using their choice of browser, utilizing needed accessibility features, and requesting assistance as needed while regulating their emotions as measured by teacher created data collection tool.	• Choice of web browser: decision making • Utilizing accessibility: self-knowledge as to what they need ○ Choice making as to what features are needed ○ Problem solving if not working ○ Self-regulation if feelings arise ○ Self-advocacy if needing assistance

Objective 3: By the end of the reporting period, Spectacular Student, will create a document in the format they prefer, on which they organize their preferences and at least three local recreation activities (e.g., local park offerings, school social activities such as clubs, school activities such as drama or choir) and create a plan to advocate with appropriate people to gain access to the activity, as measured by student documents and a selfie taken at the activity and submitted to teacher.	• Choice and decision making: as to software to be utilized
	• Self-knowledge: preferences
	• Goal setting and attainment: choosing an activity and attending
	  ○ O&M: Transportation
	  ○ Self-advocacy for support
	• Self-management: getting organized to attend activity
	• Self-regulation: understanding personal needs and preparing for it

I was fortunate to create a webinar series with APH on career education, of which self-determination is an essential part. If you would like to learn more on how to combine areas of the ECC, the series can be found on APH's Youtube and/or in the APH Hive. The five webinars cover birth to age 22, including those with multiple disabilities. I am in collaborations for a future webinar(s) on self-determination and its instructional implications in the near future. Keep an eye out for more information coming.

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The Future Belongs to Everyone

APH is committed to building a future that belongs to everyone by offering a wide selection of inclusive and accessible products, and valuable resources, to support those who are blind and visually impaired, are deafblind, have CVI, or multiple disabilities.

From products that support braille literacy and low vision, to physical education, fine arts, math, health and science, and more: begin building your toolkits for inclusive learning by reading our Toolkit blogs.

APH ConnectCenter

The APH ConnectCenter offers curated advice and resources to assist children, parents, adults, and job seekers who are blind and visually impaired, and their associated professionals. It includes:

- VisionAware: for adults and seniors
- FamilyConnect: for families and parents
- CareerConnect: for job seekers
- Transition Hub: for school-age youth planning for graduation and life after college
- ConnectCalendar: for people and organizations to find and share info about upcoming events in the field of blindness and visual impairment
- **Information & Referral Hotline (800-232-5463)**: for answers to questions related to visual impairment and blindness

APH Hive

The APH Hive is a virtual platform bringing free eLearning and professional development opportunities right into the comfort of your home or office and is perfect for busy educators and families! Teachers, parents, and students can buzz over to aphhive.org and browse through a variety of bite-size courses related to visual impairment, relevant to serving students from birth through graduation.

APH Press

APH Press is a scholarly press which publishes informative, well-researched, and innovative texts which enable people who are blind and visually impaired, their families, and the professionals who support them, to maximize their potential in society. Learn more about APH Press, visit the APH Press resource page, and download the Press Catalog.

APH's mission is empowering people who are blind or visually impaired by providing accessible and innovative products, materials, and services for lifelong success. To learn more about APH and our products and services, visit APH.org today.

Transition Connections: Enhancing Options for Children with Low Incidence Disabilities

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Emily Maginn, South Central Ohio ESC, Emily.maginn@scoesc.org

Transition and post-secondary outcomes for students with disabilities lag behind students without disabilities. According to Sanford et al. (2011), students with disabilities are completing college programs at a rate of just 38% (Sanford et al., 2011), 13% less than the rate of their non-disabled peers. McDonnall (2010) found that among young adults who were not attending high school or postsecondary school, 38% of those with visual impairments were employed compared to 73% of the general population. Some of the challenges to successful transitions from secondary education for individuals who are Deaf or hard of hearing include a lack of professional expertise in resources and strategies that best fit the needs of these students and lower levels of proficiency in college and career readiness skills (Luft & Huff, 2011). Research demonstrates that instruction and success in many areas of the expanded core curriculum such as self-determination,

assistive technology, career exploration, social skills, independent living skills, orientation and mobility and compensatory skills lead to positive post-secondary outcomes. Wolffe and Kelly (2011) found significant relationships between instruction in areas of the expanded core curriculum and positive outcomes related to transition. Transition and postsecondary outcomes for youth with low incidence sensory disabilities (LISD) are lagging well behind even those with high incidence disabilities. Also, resources to address transition are not often specific to this population of students.

Ohio recently unveiled its "Each Child Means Each Child" plan to improve learning experiences and outcomes for students with disabilities. Focus C of Ohio's plan is: "Educating for Living a Good Life: Advancement of Postsecondary Learning Experiences and Outcomes for Students with Disabilities." Along with this focus, Ohio is providing grant opportunities for collaborative work around the areas of postsecondary transition and outcomes.

LISD faculty from Shawnee State University applied for and received a grant from the Ohio Department of Education, Office for Exceptional Children to identify and develop transition resources specifically geared towards children and youth with low incidence sensory disabilities (blind/visually impaired, Deaf/hard of hearing and deafblind). One requirement of the grant was to collaborate with university partners, p-12 school districts or agencies and business partners. The

grant team was comprised of the following partners, which brought the needed expertise on transition and the expanded core curriculum for students with low incidence sensory disabilities:

- LISD faculty – Shawnee State University
- Special Education faculty – University of Rio Grand
- Teachers of the Deaf & Teachers of the Visually Impaired – South Central Ohio ESC
- Teachers of the Deaf & Teachers of the Visually Impaired – Southern Ohio ESC
- District Administrators – Southern Ohio ESC. Portsmouth City Schools, and Ohio Valley ESC
- Business Partner – Functional Training Services

A grant core team met bi-monthly to establish roles and timelines and keep the grant on track. Members of the core team also served as leaders during the full grant team retreats. A grant evaluator also attended each meeting. The full grant team attended 3 weekend overnight retreats (Friday/Saturday) to complete the goals of the project (see below).

The major goals of the grant project were:

- Utilize a partnership model to identify and create resources

- Identify role models who have low incidence sensory disabilities who can serve as guest speakers in existing summer camps
- Embed transition resources into existing summer camps
- Share resources with statewide partners
- Utilize resources in university courses, taught by the LISD faculty, that train teachers of visually impaired and teachers of the hearing impaired

The overnight retreat model was beneficial for allowing the team to have highly focused time in which to accomplish the project goals and develop the resources. During the weekend retreats, the full grant team was split into two working groups: one comprised of those with Deaf/hard of hearing expertise and one comprised of those with blind/visually impaired expertise. Both groups also brought some expertise regarding children who are deafblind. Each group began with a bit of brainstorming about what resources were needed and what might be the best way to organize the resources and researching existing transition resources. Following the brainstorming session, the two teams came back together and shared their ideas. It was decided that the Expanded Core Curriculum (ECC) would serve as a framework for the resources because the ECC is an integral part of education for children who are Deaf and children who are blind/low vision. Also, the team decided to use Google Docs to organize the resources so they could work in a collaborative online space. Once developed, the Google Docs format

would be easy to share with others. Each team also identified role models who have low incidence sensory disabilities who could serve as guest speakers in the summer camps sponsored by Shawnee State University. Members of each team developed a common contact form that could be shared with potential guest speakers.

The major deliverable for the Transition Connections grant was an interactive Google Doc called Transition Connection Resource Guide (See Figure 1). The resource guide organizes the resources by low incidence disability areas (blind/visually impaired, Deaf/hard of hearing and deafblind. It also organizes them by certain ECC areas, including self-advocacy, assistive technology and career and transition. Other categories include assessment, resources and other considerations, summer opportunities and mentors. Each link is clickable and will allow the viewer to read a brief description of each resource before opening the actual resource page. The team included brief descriptions to help the user determine if the resource might be applicable for their needs prior to exploring the resource. In addition to sharing the Transition Connections Resource Guide with state agencies, the resources are embedded into existing coursework by the LISD faculty. Now that the framework is built, there are plans to continue to add resources and include more areas of the ECC in future grant work.

Figure 1

Transition Connection Resource Guide

Transition Connection Resource Guide

Click on the desired link for resources.

Self-Advocacy	Low Vision /Blindness	Deaf/Hard of Hearing	Deafblindness
Assessment	Low Vision/Blindness	Deaf/Hard of Hearing	Deafblindness
Transition Planning	Low Vision/Blindness	Deaf/Hard of Hearing	Deafblindness
Assistive Technology	Low Vision/Blindness	Deaf/Hard of Hearing	Deafblindness
Career Curriculum	Low Vision/Blindness	Deaf/Hard of Hearing	Deafblindness
Resources & Other Considerations	Low Vision/Blindness	Deaf/Hard of Hearing	Deafblindness
Summer Opportunities	Low Vision/Blindness	Deaf/Hard of Hearing	Deafblindness
Mentors	Low Vision/ Blindness	Deaf/Hard of Hearing	Deafblindness

Note. Figure shows the Google Docs Transition Connections Research Guide

The final piece of the Transition Connections grant was to invite identified low incidence mentors to visit (either in person or virtually) with our campers at the Shawnee State University sponsored camp for students with low incidence sensory disabilities in rural Ohio. Each day of the weeklong camp featured a different mentor who would spend at least 30 minutes talking with the students

about topics including careers, educational experiences, technology, giving advice and answering questions. The camp students were broken up into 2 groups during these mentor sessions. This way the students who were Deaf could interact with the Deaf mentor and students who were blind could interact with a mentor who was blind. Most of the mentors were not able to travel to the rural camp and attended the mentor session virtually through Zoom. Figure 2 shows one of the mentors on a laptop screen zooming with a group of students and one of the camp instructors. The virtual visit was not as ideal as in-person due to some of the broadband challenges of rural Ohio, however, it provided flexibility for the mentors especially those who had transportation challenges.

Figure 2

Note. Figure shows campers and one of the camp instructors gathered around the laptop zooming with a mentor.

Two of the mentors were able to visit in person and spent extended time with the students. The students really seemed to enjoy spending time with mentors in person and enjoyed activities such as playing Uno, archery and fishing with the mentors. Pictures of the mentors at camp are shown below in Figure 3 and Figure 4.

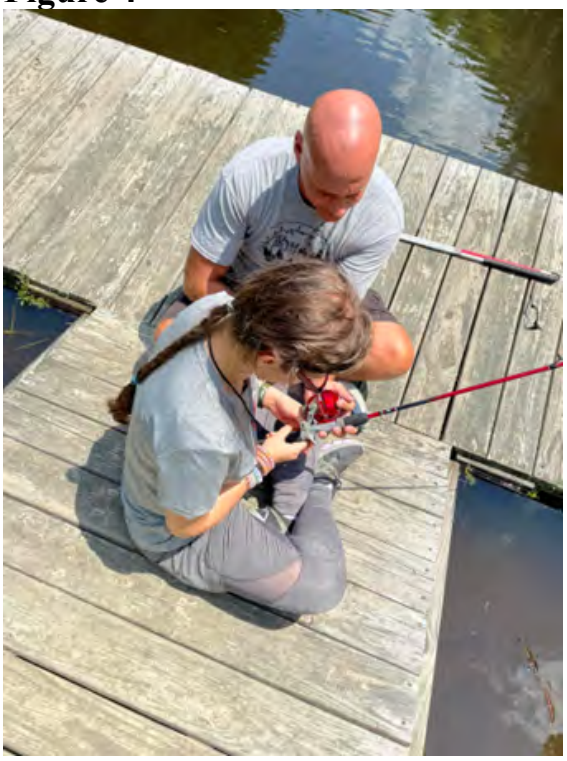
Figure 3

Note. Figure shows campers who are Deaf/hard of hearing gathered around the mentor who is Deaf/hard of hearing.

Overall, the Transitions Grant project was a great success and a starting point for identifying and developing resources for transition that can be used by educators, parents and administrators who provide services for children with low incidence sensory disabilities. Additional grant projects will continue to build on these resources and include additional areas of the ECC in the Transition Connections Resource guide. This type of project provides many opportunities for

experts in the field to work collaboratively and create deliverables that will work in a variety of settings. One of the keys to success is having a great team of professionals who have a real interest in transition and postsecondary options and want to improve options for these students. This type of grant project could be implemented in any setting and tailored for the team's individual areas of focus, needs and expertise.

Figure 4



Note. Figure shows one of the campers sitting on the dock, fishing with the mentor who is blind.

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LOW INCIDENCE SENSORY DISABILITIES

LiSD

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GRADUATE PROGRAMS

Intervention Specialist: Visually Impaired Licensure Program

A 22-credit hour program offering graduate level coursework leading to licensure as a teacher of students with visual impairments (TSVI). The program is designed to be completed in one year and applicants must hold a valid Ohio teaching license. Coursework is mostly online with extensive face-to-face field and practicum experiences.

Intervention Specialist: Hearing Impaired Licensure Program

A graduate level, 24-credit hour program offering coursework leading to licensure as a teacher of the Deaf/hard of hearing. The program is designed to be completed in one year and applicants must hold a valid Ohio teaching license. Coursework is mostly online instruction with extensive face-to-face field experiences.

UNDERGRADUATE PROGRAM

Intervener Certificate Program

A 30-credit hour program offering undergraduate level coursework leading to a Shawnee State issued Intervener Certificate. The Intervener Program is designed to be completed in two years. Applicants must meet the admission requirements at Shawnee State University. An intervener provides consistent one-to-one support to a student who is Deaf, blind or dual sensory impaired (ages 3 through 21) throughout the instructional day. Coursework is primarily completed in an online format, culminating with a field based practicum experience.

- Online Coursework through our Consortium partner institutions of higher education
- Field based practicum/internship experience
- Funding support provided by the Ohio Department of Education, Office for Exceptional Children
- Aligned with Ohio Priorities
- Made possible with support of the Ohio Deans Compact and the Ohio Department of Education

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Exploring Processes for Orientation and Mobility Referrals

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Developing orientation and mobility (O&M) skills is essential for individuals with visual impairments in reaching their potential. In the early years, O&M instruction encourages children to explore natural environments through purposeful and self-initiated movement (Pogrund & Fazzi, 2002). As children grow older, proficient O&M skills allow them to become more independent and travel in increasingly complex environments. O&M skills are necessary for success in postsecondary education, training, and employment.

O&M is a related service under the Individuals with Disabilities Education Act (IDEA, 2004). The legislation is clear that qualified personnel should provide individualized services so that students with visual impairments become safe and efficient travelers in school, home, and community environments. Three states

have enacted additional requirements to ensure that all students who are visually impaired are assessed for O&M services.

So where do educational teams begin? Educational team members, including special education teachers, administrators, parents, and teachers of students with visual impairments (TSVIs), should work collaboratively to ensure appropriate referrals and in-depth orientation and mobility (O&M) assessments. Our presentation focused on practical strategies for professionals and implications from research.

Understanding the roles of each professional is a critical part of assuring effective collaboration and referral processes. O&M specialists conduct assessments, provide direct instruction, and consult with other team members regarding each student's specific needs. Additionally, O&M specialists are solely responsible for providing instruction related to the use of the cane and travel in complex environments. TSVIs are often responsible for referring students for an O&M assessment, reinforcing advanced O&M skills, and communicating with classroom teachers and O&M specialists. At times, TSVIs may teach basic O&M skills such as human guide and protective techniques.

Educational teams should discuss factors that might indicate an O&M assessment is warranted. Possible questions to consider include:

- Is the student overly dependent on classmates when traveling in various environments?
- Does the student tend to look at the ground while walking?
- Does the student have a progressive visual condition or challenges when traveling in dim lighting or at night?
- If the student is in high school and will likely not become a driver, how comfortable are they accessing alternate transportation, such as public transit?
- Is the student consistent in their travel performance across environments?
- Does the student sometimes bump into objects and/or fall down?
- Does the student have difficulty traveling independently?
- Would the student like to become more independent in their travel skills?
- Is the student prepared for future mobility needs and/or challenges (e.g. transitioning to a new school, entering a work program)?

Educational teams tend to refer students who are blind and/or have obvious mobility needs. Sometimes children and youth with low vision are not considered for an O&M assessment, especially if they are independent travelers in their school environment. However, these students may benefit from O&M instruction in the community. In addition, children with additional disabilities, including

deafblindness, may also benefit from O&M instruction and ongoing opportunities to become more independent.

There should be a formal or informal screening process to determine whether each student with a visual impairment should be referred for an O&M assessment. The process may or may not be a part of a Functional Vision Assessment (FVA). Whenever possible, educational teams should seek input from certified O&M specialists when developing screening tools and referral processes. Best practices suggest the initial evaluation process for all students with visual impairment should include an O&M assessment. When the educational needs are re-evaluated for a student, the potential need for O&M should be re-evaluated. O&M screening processes should include an observation of the student traveling at different times during their school day. Natural environments might include the playground, getting on/off the bus, stairs, crowded hallways, and sidewalks around the school.

We strongly encourage TSVIs to actively inform educational teams about the value of O&M. They are often the only educational team member with background and experience with O&M. If educational teams are unsure, we highly recommend contacting a certified O&M specialist who may be able to provide information and assist teams in making an informed decision.

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Wayfinding in Practice: Take-Aways from an Investigation with Youth on an Urban College Campus

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Celine explored the tactile map while a gusty west wind pushed against her back. Rain misted the sides of her neck, cheeks, and the tops of her ears, making her more alert than the morning coffee she had finished before arriving at campus. It was a typical blustery spring day in Portland, and she felt ready to test her orientation and mobility (O&M) skills, using the tools that the research team provided. When her O&M Specialist informed her about the purpose of the wayfinding study, she was eager to participate, not only because of the opportunity to take a field trip, but because she wanted to see how she would handle a new travel environment. Celine's O&M Specialist agreed it would be a good experience because of her post-secondary goals. She would be the first person in her family to

pursue a college education, studying music. Though her family felt protective of her due to her visual impairment, they were also proud that she was gaining confidence and greater independence in her last years of high school.

As Celine's fingers followed the raised-line path heading east, she listened to the sounds of traffic ahead. She centered herself, knowing she was on a pedestrian path and would not be making a street crossing. At the same time, Celine recognized that the campus was entirely new to her, and her senses were confronted with a myriad of sounds and scents. Overhead, mature trees rustled and crows raucously announced their presence. Urban pedestrians and college students picked their way along the paths around her. Celine scanned the landmarks on the map with her hands and referenced the map's braille and high contrast key. She confirmed the map's symbols, reading the braille labels carefully. Using her vision, Celine could just make out vast shadowy shapes of the buildings ahead of her, and she tactually confirmed their locations on the map, noting the overpass that connected the buildings above the pedestrian path. "I'm ready to start," she announced, handing the map back to a researcher and positioning her cane. Along the route, Celine asked to consult the map twice. The first time, she confirmed her position on the route, noting the distinctive echoing sound of the concrete overpass as she tapped her metal-tipped cane and read the map. "Okay, since I'm here, I must have passed all the concrete benches and the first sets of bike racks," she

observed, continuing to face east. The second time, she reviewed the map as she stood perpendicularly, facing the busy city street. “This must be Broadway, so I need to turn left to get to my building.” In less than a minute, Celine arrived at her destination doors. “I’m here,” she announced confidently, “How long did it take me?” “Just under 5 minutes,” the researcher replied, and Celine smiled widely, feeling a sense of accomplishment.

Later, Celine tested a route, similar in length and numbers of turns, using a wayfinding app on her phone. Following the auditory turn-by-turn directions, she noted when some were inaccurate by tuning into the sounds around her. She was also excited to try wayfinding in a building using the GoodMaps app to find a key destination indoors. After completing her outdoor and indoor routes using the tactile map or the wayfinding app, Celine participated in a focus group with seven other young adults with blindness or low vision. As the team shared their thinking about the wayfinding tasks, the wayfinding tools, and their own O&M experiences generally, Celine felt a greater sense of connection with her fellow travelers. “For those of us who are younger,” she offered during the focus group, “using apps is just a part of our everyday lives. I mean, we *expect* to use them.” Later, she reflected that “I’ve never used a tactile map before. I felt frustrated using it in the rainy weather, but I liked how it gave me a sense of the whole route.”

While Celine is a fictional character, this vignette encapsulates some of the combined experiences of participants in the PSU and APH wayfinding study, which included 28 participants, both youth and adults, on an urban college campus. This study was a part of a multi-year investigation about the use of wayfinding apps by travelers who are blind, DeafBlind, or have low vision in urban environments that was funded by the National Institute for Transportation and Communities (NITC). All aspects of the investigation focused on the real-world wayfinding experiences of participants, using focus groups, systematic literature reviews that included in-situ evaluation of apps, and mixed-method approaches to observe and analyze wayfinding behavior (Parker et al., 2021; Swobodzinski et al., 2021). While the focus of this report is on the youth participants in the study, adults from ages 19-70 were also included in the wayfinding tasks (Swobodzinski et al., 2022).

Transition from high school to college environments is fraught with challenges for students with disabilities. There are specific challenges for youth with visual impairments, because college campuses are notoriously complex to navigate. For this mixed methods study, we gathered insights from 15 diverse youth with visual impairments on what wayfinding tools supported their successful navigation on the urban college campus of Portland State University. Naturalistic inquiry, observation using audio and video recording, and data sheets

were used to collect data in dynamic travel environments with varying weather conditions, other pedestrians and bicyclists, and possible encounters with car traffic. All travel routes had outdoor and indoor components and the participants were accompanied by a researcher at all times. The wayfinding behavior of the participants was recorded through video and any comments participants made or questions that were asked were noted. Among other data, the researchers measured the duration for the completion of the outdoor and indoor routes on an individual basis. All participants were asked to travel two routes that were closely matched in terms of their length and the total number of turns, using a tactile map on one route and a wayfinding app on the other. The wayfinding experience was followed by a focus group conversation with participants. All participants also completed a number of surveys that captured their orientation and spatial awareness abilities based on the Santa Barbara Sense of Direction Scale (Hegarty et al., 2002) as well as information on their socio-demographic background and visual function.

Key Findings

"Human wayfinding and navigation are key organizing activities that allow human beings to acquire knowledge about the environment and develop cognitive representations in support of such essential tasks as route planning and travel" (Swobodzinski & Parker, 2019). Young adult participants in this study needed to

rapidly organize new information in order to be able to navigate within an urban college campus. In this vein, the tactile map and the app provided valuable information to travelers, and each had limitations.

- Broadly, young adult participants really appreciated the turn-by-turn instructions while they were traveling, when this feature was working. There were several times when participants needed to borrow a researcher's phone to use when their own phone was not synchronized with the app.
- Several participants expressed that tactile maps were entirely novel tools to them. While many found them hard to manage in poor weather conditions, they expressed appreciation for giving them information about the whole route. Some thought they might be more helpful for planning routes. Others wanted to go back to find key landmarks that were represented on the map to confirm their location after the route was completed.
- Generally, travelers expressed a great desire for technologies to be better integrated, more intuitive, and more responsive to individual traveler characteristics and needs.
- Both types of wayfinding tools can provide confirmation of in-route information, as well as assisting individuals in building their own mental maps of environments.

- When comparing the young adult travelers with the older adults as a group, the youth were much faster travelers on their routes; however. their ratings on the Santa Barbara Sense of Direction scale were much lower than those of the adult travelers.

Recommendations

For practitioners and family members of students with visual impairments, there is a need to integrate technology and universally designed teaching materials into transition and community-based learning experiences.

- The opportunity to go "outside" of one's comfort zone while using no-tech or high-tech technology is an important experience for young adults who are blind, DeafBlind. or have low vision. Both appear to be useful in building competence and confidence in navigating in complex environments.
- Environmental literacy, comfort with technological tools, orientation and mobility, self-determination, and self-advocacy are vital skills that require direct instruction and practice for students with visual impairments and deafblindness.
- Facilitating opportunities and experiences requires thoughtful collaboration and partnership. Youth are a part of this partnership!
- O&M experiences that integrate direct experiences with wayfinding tools in college settings should be further investigated for increasing competence and

confidence.

- The experience of participating in a focus group with fellow travelers was valuable to participants. The conversations were often animated and confirmatory of what was seen to be useful or frustrating about the wayfinding experience and in wayfinding in general. For this reason, small group lessons with opportunities for young adults to compare notes about their insights and experiences with their O&M Specialists are important for facilitating learning and confidence.

Social Validity

Participants—as well as O&M Specialists—expressed appreciation for the experience. After the event, O&Ms arranged additional visits to campus to encourage the use of the app. One O&M reported that one of her most hesitant students chose to begin using the wayfinding apps on community routes and those that integrated public transportation. Participants expressed their appreciation of O&M and the use of apps and tactile maps to solidify and grow their skills. The journey to adulthood, college, and career readiness is complex. Our study gave voice to the experience of diverse travelers who use wayfinding technologies to accomplish important life tasks.

Figure 1

Map of Routes on Portland State University's Campus

Note. An aerial view of PSU's south park blocks with 3 equidistant routes represented. One route begins just north of the Millar library, heading east to Broadway, then turning north to end at the east entrance of Smith Memorial Student Union Building (SMSU). A second route begins just west of Shattuck Hall walking north along the west side of Broadway, turning west to enter the south entrance of SMSU. A third route begins at the southeast corner of Neuberger Hall, heading north along the west side of Broadway and turning west to enter the north entrance of SMSU.

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Promoting Assistive Technology Integration: Strategies from a Postsecondary AT Lab Five Years After Inception

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In 2017, Texas A&M University-Commerce (TAMUC) held the Grand Opening for its Assistive Technology (AT) Lab. Shortly thereafter, Jones, Williams, and Rudinger (2018) published an article detailing the process for designing and implementing an AT Lab in postsecondary education environments. As there are many areas in which AT can be utilized (see Table 1), the Lab was deliberately arranged by stations and with the intent of including representations of AT devices for all areas it can support. Every aspect of the Lab was intentional, from where it would be located (i.e., in the campus library to improve access) to the size of the computer monitors at each station (e.g., to illustrate that a bigger computer screen isn't always advantageous for a student with a visual impairment). In the five years that have elapsed since the Lab's inception, research conducted in

the Lab has demonstrated that exposure to AT devices (Jones et al., 2018) and training on effective AT assessment (Jones et al., 2020) can improve preservice teacher competencies with AT. However, this time--which included a global pandemic-- has also brought valuable lessons regarding ways to extend the reach of the Lab.

Lab Additions

In an effort to keep the Lab relevant while expanding its scope to explore other areas in which AT can be employed, new areas of focus and additional equipment have been incorporated. For example, an adapted play and recreation area for young children has been established. This area includes adapted games and interactive activities and toys such as an adaptive dice roller, a card holder, brailled game cards, a switch adapted massager for sensory experiences, and a large musical keyboard for desk or floor use.

The physical impairment station was also updated with several adaptive options. These include a variety of switches (e. g., pillow, finger, different sizes, bluetooth) as well as a mounting system for switches that could be used with a wheelchair. Options for adapting commercially available electric and battery-operated devices are also demonstrated at this station (e. g., battery interrupters, electrical switch interface).

Table 1

Categories of Assistive Technology

Category	Definition
Academics	Technology used to promote academic skills (e.g., reading, writing, mathematics)
Recreation and Leisure	Devices used to facilitate participation in games and entertainment (e.g., large print playing cards)
Activities of Daily Living	Technology that facilitates independent living (i/e/. Braille tags for clothing)
Mobility	Devices that allow individuals with disabilities to maneuver their environment (e.g., wheelchairs, walkers)
Environmental Control	Items that aid individuals in accessing and controlling their environment (e.g., grabbers/reachers)
Communication	Includes technologies that provide an avenue for communication of needs, wants, and thoughts (e.g., iPad apps, picture communication systems)
Positioning and Seating	Supports that assist with correct posture and placement (e.g., adapted chairs and walkers)
Vision	Technologies that magnify, braille, and/or read text, either written or digital.
Hearing	Devices that aid individuals in hearing auditory stimuli (e.g., FM Systems)

In addition, several new options were added to the communication and behavior station. Items to promote social and emotional regulation are now featured, including several different adaptive fidgets (e. g., foot roller, beaded bags, weighted stuffed animal, lap pillow white board). A Basic Talk 4 voice output device (Enabling Devices, Hawthorne, NY, USA) was also added to demonstrate another low-tech option for speech and communication. This device offers four recordable options with an opening for pictures or tactual graphics.

Additional activities and information related to visual impairments have also been introduced at the sensory impairment station. These include a Perkins Brailler (Perkins School for the Blind, Watertown, MA, USA), a Braille Buzz (American Printing House for the Blind, Louisville, KY, USA), braille stickers, braille books, and a tactile drawing pad. In addition, the Lab now features a Snellen eye chart and a Zimmerman Low Vision simulation kit (Dr. George J. Zimmerman, Naples, FL, USA), which allows students to experience different variations of vision loss, such as cataracts, field loss, macular degeneration, scotomas, and visual acuities ranging from 20/70 to 20/800.

A final update to the Lab was made possible with the help of a grant. The original set of iPads were replaced with the newest model. This purchase was carried out in conjunction with a local training on dyslexia for early childhood teachers, which included an additional training component for how AT can support

learners with print disabilities (e. g., dyslexia, specific learning disabilities in reading, and visual impairments). Each iPad, along with the Lab computers, was set up with an AT Lab Google Workspace profile featuring a Bookmarks Bar full of links to specific sources of AT references and information.

Perhaps the greatest extender of the Lab's reach thus far came in Fall 2021 when a new way of marketing the Lab was launched. Specifically, a Marketplace site was debuted (TAMUC Assistive Technology Lab Marketplace, n.d.), which provides an avenue for school district personnel to reserve time in the Lab for training and professional development. Trainings can include elements of AT assessment and inclusion in the student's individual education program (IEP), but it is tailored to the specific needs of the individual or group. The Lab Marketplace also provides a way for the Lab to encumber the funds associated with providing these trainings, which allows the Lab to be self-sufficient. This one addition has, and continues to be, vital to the ability to sustain the Lab and keep the technology updated.

Activities to Extend Lab Reach

Virtual Scavenger Hunt

While nothing can replace hands-on experience in the AT Lab, multiple requests for AT activities that could be included in online classes were received from instructors of online programs. To address this area of need, the original

scavenger hunt activity listed in Jones, Williams, and Rudinger (2018) was adapted in 2021 to a virtual option (see Figure 1 and Table 2). This virtual version still prompted users to explore AT categorized by function and included links to videos, accessibility options, and AT company catalogs.

Figure 1

Virtual Scavenger Hunt

TEXAS A&M UNIVERSITY
COMMERCE

Assistive Technology Lab
Virtual Scavenger Hunt

1. AT for Communication:
   a. Watch the video "Meet Elle"
   b. Review the Speech Generating Devices on the AbleNet website. Choose one new device to learn about.
2. AT for Independence & Daily Living
   a. Watch the video "Meet Nick"
   b. Review the Household Products section on the MaxiAids website. What is one adaptation that you hadn't thought of previously?
   c. Review the video on Battery Interrupters to see how to adapt common battery adapted items for switch use.
3. AT for Academics
   a. Watch the video "Meet Joseph" or "Meet Brody"
   b. Review the Bookshare website. Who qualifies for this service? What recent books are available?
   c. Explore Virtual Manipulatives. How could these options be used with students?
   d. Review the accessibility extensions available for Google Chrome and choose a new extension to learn about.
4. AT for Sensory Impairments
   a. Watch the video "Meet Mason"
   b. Play at least three different games on the Braille Bug website
   c. Explore the Paths to Technology website and choose an article to read.
5. AT for Physical Impairments
   a. Watch the video "Meet Jared"
   b. Review the Rifton stories website and note how AT for positioning and mobility can support students.
   c. Review the selection of adaptive and assistive keyboards at the Special Needs Computers website. Who might use these?

Table 2

Links for Virtual Scavenger Hunt

Area of AT Implementation	Resources
Communication	Meet Elle, Pacer Center YouTube https://www.youtube.com/watch?v=g95TO20hnmo Ablenet, Speech Generating Devices: https://www.ablenetinc.com/speech-generating-devices/
Independence and Daily Living	Meet Nick, Pacer Center YouTube https://www.youtube.com/watch?v=__FyPAuLRYI MaxiAids, Household products: https://www.maxiaids.com/household Enabling Devices https://enablingdevices.com/product/battery-interrupters/
Academics	Meet Joseph, Pacer Center YouTube https://www.youtube.com/watch?v=cL5tHylZKBs Meet Brody, Pacer Center YouTube https://www.youtube.com/watch?v=D6i5CtPoGh0 Bookshare https://www.bookshare.org/cms/ Toy Theater, Virtual Manipulatives https://toytheater.com/category/teacher-tools/virtual-manipulatives/ Chrome Web Store, Accessibility extensions https://chrome.google.com/webstore/category/ext/22-accessibility
Sensory Impairments	Meet Mason, Pacer Center YouTube https://www.youtube.com/watch?v=IcUNnnwFm4g Braille Bug https://braillebug.org/games/ Paths to Technology https://www.perkins.org/paths-to-technology/
Physical Impairments	Meet Jared, Pacer Center YouTube https://www.youtube.com/watch?v=Bhj5vs9P5cw

Rifton Stories
https://www.rifton.com/resources/blog-categories/stories
Special Needs Computers, Adaptive Keyboards
https://www.specialneedscomputers.ca/index.php?l=productlist&c=319

Assistive Technology Selection and Implementation

In selecting new items for the AT Lab and producing new professional development options to meet the needs of community organizations, several resources provided invaluable guidance. The International Society for Technology in Education (ISTE) (International Society for Technology in Education, n.d.) offers a roadmap of standards for students, educators, and education leaders in the area of instructional technology. These standards are being included in many teacher personnel preparation programs and reflect a set of core competencies related to instructional technology. An additional area of guidance for the Lab is the Quality Indicators for Assistive Technology Services (QIAT) (Quality Indicators for Assistive Technology Services, n.d.). This website lists a series of indicators of high-quality AT programs, along with aligned matrices for self-reflection and evaluation of programs. These include the Consideration of AT Needs, Assessment of AT Needs, AT in the IEP, AT Implementation, Evaluation of AT Effectiveness, AT in Transition, Administrative Support for AT and Professional Development for AT. Two final resources that provide detailed

guidance in assessment are the SETT Framework (Zabala, n.d.) and the Wisconsin Assistive Technology Initiative (WATI) (Wisconsin Assistive Technology Initiative, n.d.). These sources all provide a wealth of knowledge not only for sustaining an AT Lab, but also for programming in different settings.

Low Cost Accessibility and Assistive Technology Options

The first five years of the Lab have demonstrated the need for different training options for online programs and clustered locations. While distance and location may preclude students from physically visiting the AT Lab, there are many additional ways to foster awareness of AT options. Mobile AT kits can be packaged and taken to satellite locations to provide experiential access to smaller groups in different geographical regions. It is also possible to scale up AT training with even one device. For example, if a given trainer or instructor only has access to one iPad, one PC, or one Chromebook, this one device can be used to highlight accessibility options within these ecosystems (e.g., iOS, Windows Ease of Access, Chrome). Simply having access to one type of switch, a single battery interrupter, and one battery operated device (purchased from a local store) can provide a mobile "switch access kit" for less than $100. Even simply referencing online catalogs from companies specializing in AT can encourage professionals in the field and pre-service teachers to explore AT options as they continue to evolve. Table 3 lists options for AT instruction using minimal equipment.

Table 3

Accessibility and Technology Options

Technology	Accessibility Options
One iPad	Apple Accessibility https://www.apple.com/accessibility/
One PC	Windows Accessibility https://www.microsoft.com/en-us/windows/accessibility-features?r=1
One Chromebook	Google & Android Accessibility https://about.google/belonging/disability-inclusion/product-accessibility/
One switch, one battery interrupter, one battery operated device	Enabling Devices Battery Interrupter https://www.youtube.com/watch?v=N3P8jv6wufA
One online catalog	Enabling Devices catalog https://enablingdevices.com/ Ablenet catalog https://www.ablenetinc.com/

Conclusion

Research indicates that students' success using AT is largely related to the comfort level their teacher has with the technology (Judge & Simms, 2009). What is more, Lee and Vega (2017) found that training in AT impacted teachers' perceptions of its importance. Thus, the goal should be to increase the awareness of and confidence in using AT. Additionally, instruction is needed regarding proper AT assessment and implementation as part of the IEP. The creation of an AT Lab in a postsecondary education program is one way that this can be accomplished. However, it is important to also consider ways in which this goal can be achieved without access to a lab; education related to the importance of AT must be provided on a wider scale. There also needs to be a dissemination of information regarding ways in which users who do not have access to expensive devices can identify AT solutions. In sum, as AT becomes more valued and seamless, it is more likely that it will be incorporated and sustained.

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Wisconsin Assistive Technology Initiative (n.d). https://www.wati.org/

Zabala, J. (n.d.) https://www.joyzabala.com/

CONNECTCENTER

Connecting people with useful information and resources

The APH ConnectCenter offers curated advice and resources to assist children, parents, adults and job seekers who are blind and visually impaired and their associated professionals.

Vision Aware™

For adults and seniors
www.visionaware.org

Career Connect®

For job seekers
www.aphcareerconnect.org

Family Connect®

For families and parents
www.familyconnect.org

TransitionHub™

Connecting students & families to transition resources

Looking for information and resources related to vision loss?
Our information and referral line is here to help.
(800) 232-5463 Mon-Fri 8am to 8pm ET
or email connectcenter@aph.org

Teaching Students the Nemeth Code for Mathematics and Science Notation

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Nemeth Code within Unified English Braille (UEB) Contexts (hereafter called Nemeth Code) provides access to grade-level mathematics and science materials for students who are blind or visually impaired and read braille. When Nemeth Code instruction is integrated with math, it is more meaningful and may lead to improved student performance. For the first time, there is a free online curriculum to teach the Nemeth Code. The presentation highlighted the step-by-step curriculum for young students, focused lessons for students of all ages, and the Nemeth symbol library. Since a field study of the curriculum was conducted in the fall of 2022, we concluded the presentation with a brief description of those results.

The comprehensive Pre-Kindergarten through Second Grade Curriculum contains teacher scripts, braille ready files for students, answer keys, data collection tools, review activities, and assessments. It is available for download at https://accessibility.pearson.com/resources/nemeth-curriculum/grades-pre-k-second. Students learn to read and write the Nemeth Code within mathematical expressions and not in isolation. The curriculum makes meaningful connections between learning the Nemeth Code and learning grade-level math concepts. Scaffolding is used to break up new concepts and build on previous learning. Since data collection tools and pre/posttests are available, instructional decisions can easily be made about the needs of the student. Fun facts about different modes of transportation are included as motivation to keep students moving forward to reach the next fun fact.

Ready-made puzzles, activities, and games are incorporated throughout the curriculum to provide additional practice and make learning engaging and fun. Some of the games were created by the authors of the curriculum, and others are adaptations of classic games such as Bingo and Connect Four. For example, after second grade students learn to read and write monetary expressions, they are invited to play Connect Four. The players take turns reading flashcards with different monetary expressions. Then, they quickly scan their game card and place a marker such as a small piece of Wikki Stix® on the monetary expression that

was called. The game is played until a student has four markers in a row down, across, or diagonally and calls out Connect Four. A variety of Connect Four game cards are available in both print and braille within the curriculum, so students can easily play this game with their peers.

Similarly, the Nemeth Code Focused Lessons are designed to help students learn the Nemeth symbols and increase their knowledge and understanding of key mathematical concepts. Students of any age may enjoy and learn from these user-friendly lessons, especially if they need a refresher or additional practice with Nemeth symbols. The focused lessons are available to download at https://accessibility.pearson.com/resources/nemeth-curriculum/grades-three-eight. The lessons focus on fractions, mixed numbers, multiplication, division, number lines, radical expressions, the five-step rule (used when writing modified expressions such as line segments and multi-digit repeating decimal numbers), and the exceptions to the five-step rule (used in place value and single-digit repeating decimal numbers). Each focused lesson contains: 1) how to read and write new symbols in Nemeth Code; 2) how to use these symbols within mathematical context; 3) examples in braille; 4) examples in print and SimBraille for parents and teachers; 5) activities and games to reinforce the targeted symbols; 6) a list of special symbols for reference; and 7) abbreviated lesson documents with examples and problems only. These abbreviated documents can be used to help support

students who are transitioning to braille or new to the Nemeth Code. Although the focused lessons were initially written for students, answer keys and reference materials are also included at the request of parents and teachers.

Students are introduced incrementally to Nemeth symbols throughout the focused lessons. For example, in the first focused lesson for number lines, students learn how to create number lines, using a variety of labels for the scale marks including whole numbers, fractions, decimals, negative numbers, and large numbers. In the second focused lesson for number lines, students learn how to interpret points on a number line as well as how to graph points on a number line. In the following lessons, students learn to read and write the symbols used to graph inequalities on number lines. There is an assortment of optional games included within the lessons, some of which incorporate tactile dice and/or a tactile spinner. For instance, in the dice game in Lesson 4: Compound Inequalities, students roll two dice and then make a number line graph that represents x is less than the lower number or x is greater than the higher number.

The online Nemeth Symbol Library (https://accessibility.pearson.com/resources/nemeth-curriculum/nemeth-symbol-library) allows individuals to look up Nemeth symbols and math related terms, using the words a student is accustomed to hearing in their math and science classes. The library contains over 136 definitions for writing symbols, expressions,

or equations in Nemeth Code. Similar terms (e.g., power, superscript, exponent) will send the individual to the same definition. In addition, there are 600 examples at different grade levels, available in print and SimBraille as well as braille ready files. Each example includes how to read the expression or equation. A variety of mainstream and assistive technology can be used to access the library, including a screen reader and braille display. A video of Sara Larkin demonstrating the Nemeth Symbol Library can be found after the heading "Nemeth Symbol Library Using NVDA Reader" on the webpage: https://www.pathstoliteracy.org/nemeth-code-symbols-used-grades-2-5-resources.

If students are uncertain about how to write braces (sometimes called curly brackets), they could use the Nemeth Symbol Library and select the link for braces which would take them to the following definition:

> Braces, also known as curly brackets
>
> Braces, sometimes called curly brackets, are a type of grouping symbol. The opening brace (dots 4-6, dots 1-2-3-5-6) and closing brace (dots 4-6, dots 2-3-4-5-6) are used as a third level of parentheses or for set notation. The numeric indicator is not used inside grouping symbols such as braces. Note: The opening and closing indicators after the dots 4-6 are the same as the "of" and "with" contractions.

If they select one of the links after the description, they will be taken to a file with examples such as the following:

Braces Examples with SimBraille

1. Eight plus open brace open bracket seven open parenthesis ten divided by five close parenthesis minus six close bracket plus one close brace is written
   $8+\{[7(10\div5)-6]+1\}$
2. The empty set can be written
   $\{\}$
3. The set including one, two, three, four, etc. is written
   $\{1,2,3,4,\ldots\}$
4. The set including a, b, c, d is written
   $\{a,b,c,d,\ldots\}$
5. The set of all x such that x is greater than zero is written
   $\{x|x>0\}$

In fall 2022, a field study was conducted to explore the effectiveness and usability of the Nemeth curriculum. Forty-one teachers of students with visual impairments, parents of children who are learning the Nemeth Code, and students over the age of 18 who use Nemeth Code participated in the study. They shared

feedback about what worked well and areas for improvement and/or expansion. The following are representative comments from participants:

- Teacher script and visual of braille on teacher script were very helpful.
- The variety of activities and questions kept my student engaged and interested and motivated him to work hard.
- I like that there is a teacher guide to help explain the concepts, as well as the special symbols sheet to make the student familiar with the Nemeth prior to starting the lesson.
- This is for the focused lessons. Would it be possible to expand those?
- Continue to add more symbols, especially those pertaining to Taylor expansions.
- As usual the [Nemeth Symbol Library] website is fast and responsive, example BRF files are easily obtained, and the written explanations were concise and accurate.

On the post-survey, approximately 80% of the participants, including the teachers, reported an increased knowledge of the Nemeth Code symbols. Thus, the field study data strongly support the use of this curriculum in teaching the Nemeth Code.

In the coming months, the curriculum will be transitioning to the National Federation of the Blind website. We welcome your questions and/or feedback. We hope that these resources will support teachers of students with visual impairments and parents as they teach the Nemeth Code to their children/students. Learning the Nemeth Code should be enjoyable and meaningful!


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