

Appendix A

Research Foundation

Background

Pathways to Literacy was developed for students with the most severe disabilities who may have multiple disabilities (e.g., physical, intellectual, and visual). In their comprehensive review of the literature, Browder, Wakeman, Spooner, Ahlgrim-Delzell, and Algozzine (2006) found that this population is under-represented in the research on early literacy. One reason for this under-representation is that finding a measure for students who may not use symbolic communication consistently can be especially challenging. This also is an extremely low-incidence and heterogeneous population that makes randomized trials research untenable. Even single-subject research can be challenging because of the difficulty of finding students with similar characteristics for between participant replications and/or identifying observable and measurable responses. In contrast, single-subject research is the most feasible way to build a research foundation for an intervention for students with the most severe disabilities. Pathways to Literacy was derived from a series of single-subject studies and some field trials of the five levels of the curriculum with students in the Charlotte, NC region.

In the first study, the decision-making process for individualizing the story-based lessons for students with specific disability challenges was developed (Browder, Mims, Spooner, Ahlgrim-Delzell, & Lee, 2008). In this study, the researcher taught three students with severe physical and intellectual disabilities to engage with children's stories during read alouds of the books. For experimental control, a multiple probe across participants single-subject design was chosen. The intervention applied principles of universal design of learning (UDL) to increase student engagement, representation, and expression (Center for Applied Special Technology, CAST; 2008). A classroom team met with the researchers to review the task analysis of a story-based lesson for each student and to plan ways to increase each student's participation and understanding. All three students gained foundational literacy skills, such as choosing a book, focusing on objects related to the story, or using an augmentative/alternative communication (AAC) device to

complete a repeating storyline. This study provided many of the ideas included in Pathways to Literacy on how to adapt the task analysis for individual students.

In a second study (Mims, Browder, Baker, Lee, & Spooner, 2009), the read aloud method was adapted for students who had both severe intellectual disabilities and visual impairments. In this study, a multiple probe across materials single subject design was chosen to demonstrate the effectiveness of the intervention. To engage the students with the children's books, the researcher who implemented the intervention attached objects to each page. For example, in the book **Alexander and the Terrible, Horrible, No Good, Very Bad Day** (Viorst & Cruz, 1972), a packet of gum was attached to the page where Alexander gets gum in his hair. The same objects plus other objects, meant to be distractors or foils, were presented to the student as options for responding to comprehension questions. A system of least-to-most prompts was used to teach the students to answer the questions. All three students showed an increase in the number of correct responses to comprehension questions. This study helped refine how to use objects to represent the story's main ideas and how to provide students a way to show understanding. The study also helped determine the types of comprehension questions to use in Pathways to Literacy.

In a third study (Browder, Lee, & Mims, in preparation), the use of the scripted literacy lessons to create the foundation of Pathways to Literacy was evaluated. A multiple probe across participants design was chosen, but each student replication was with an individual with a different response mode. All three students increased both engagement and comprehension in the lessons. This third study helped refine how to individualize the scripts by response mode.

Field Trials of Pathways to Literacy

Based on these three studies, the Pathways to Literacy curriculum was developed and then field tested with students with severe disabilities and their teachers in the Charlotte-Mecklenburg School System. Figure 1 provides the outcomes achieved at the end of one school year for five of these students.

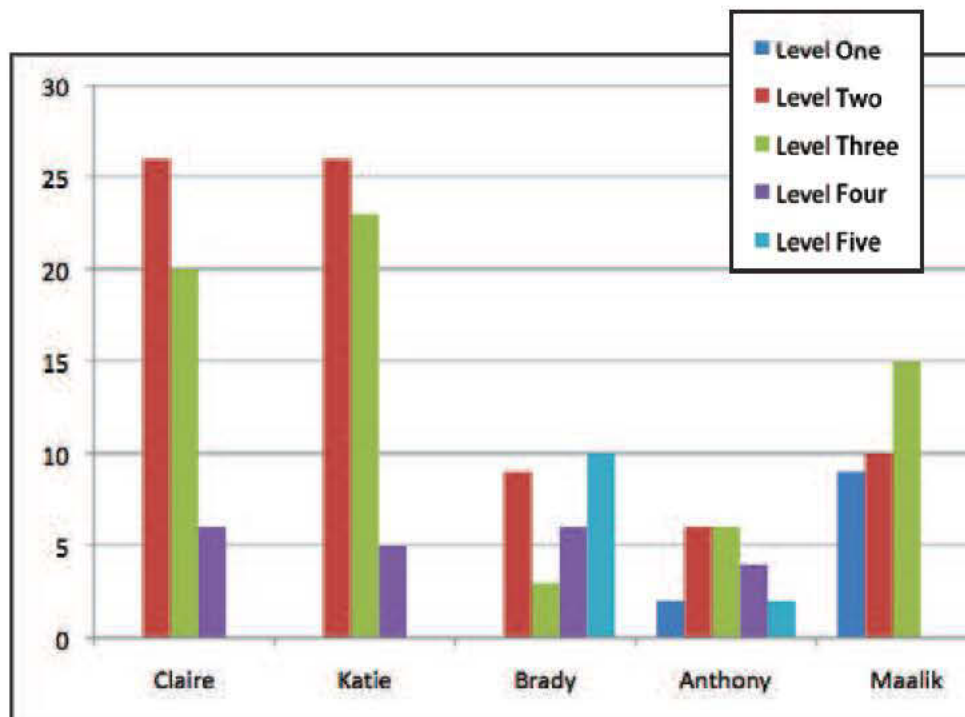


Figure 1 Pathway to Literacy: Number of Days Spent at Each Level

The bar graphs for each student indicate the number of days it took the children to master the steps of the task analysis (independently without teacher prompts) by the end of the school year. The bar graphs support the idea that the levels are progressive. That is, students had more correct responses on lower levels than higher levels. Learning one level also promoted success at the next level. As indicated, not all the students needed to begin at Level One. Two students mastered the Level Five and were ready to begin the **Early Literacy Skills Builder** curriculum (Browder, Gibbs, Ahlgrim-Dezell, Courtade, & Lee, 2007) by the end of the school year. The others needed a second school year with Pathways to Literacy. The following describes each student briefly (names and other details not relevant to the outcomes have been changed to protect confidentiality):

Claire

Claire was a 7-year-old girl with multiple disabilities. She was in a wheelchair, had difficulty making controlled movements with her arms, and was nonverbal. Claire's communication skills were sometimes inconsistent. Although she tried to use her arms, she did not have the fine motor skills to make accurate selections. Claire could not use her arms/hands to press an augmentative/alternative communication (AAC) device. When making choices among objects or familiar pictures, Claire used eyegaze to choose. With her many challenges, it was difficult for Claire to demonstrate what she knew. Due to medical issues, Claire did not get started in Pathways to Literacy until late in the school year. Mastering the first level came slowly for Claire. Finding the best response mode was not easy but by the end of the program, Claire used an AAC device for the story-based lessons and used eyegaze to choose between two selections. It took several lessons for her to consistently use these two response modes. However, as noted on the graph, as Claire progressed through the levels, she mastered each new level in fewer days than the previous level. Claire mastered Level Four in six days.

Katie

Katie was a 6-year-old girl who often was difficult to engage with new activities. She communicated with a combination of touch responses and eyegaze. She understood using objects to communicate and recognized some familiar pictures. Katie and Claire were classmates and although Pathways to Literacy was typically delivered to them individually, these girls were also successful in a small group. Like Claire, Katie progressed slowly through Level Two of Pathways to Literacy but then at a much more rapid pace in Levels Three and Four. Because Katie was easily distracted, she required additional time at the beginning of the curriculum to develop an understanding of how to engage with the story. She also initially required a great deal of prompting; in later levels she began to understand how to listen and make connections between the story and the objects or pictures represented. For both Katie and Claire, the teacher taught Pathways to Literacy with consistency and persistence even though it was difficult in the beginning to get the girls to engage with the story and to respond. As the graphs indicate, this teaching persistence was rewarded by both girls making good progress in learning to engage in story-based lessons.

Brady

Brady was a 6-year-old boy who vocalized to get social attention but who did not use words to communicate. When someone sat next to Brady, he would typically reach out as in requesting a hug or requesting to be picked up. In addition to vocalizations, Brady also communicated through eyegaze, facial expressions, and by using a few selected pictures. At the beginning of his kindergarten school year, Brady enjoyed listening to books being read but had a difficult time participating in group story-based lessons. In group settings, Brady would often demand attention by vocalizing. However, he did not engage with the story nor respond using an AAC device, such as when it was his turn to complete a repeated storyline or to answer questions. Brady moved through all five levels of Pathways to Literacy in a one-on-one instructional setting. In the early levels, he improved engagement with the story by using objects to represent ideas in the story. He also responded to hearing his name in the story. By the third level, he began using an AAC device to read a repeated storyline and began using objects to answer comprehension questions. By Level Five, Brady was using pictures to answer comprehension questions and was ready to join his classmates for group story-based lessons.

Anthony

Anthony was an 8-year-old who loved computer games and enjoyed viewing books. Because of Anthony's interest in books, the teacher had spent a year using the Early Literacy Skills Builder curriculum (ELSB; Browder, Gibbs, Ahlgrim-Delzell, Courtade, & Lee, 2007). As a first grader who had never experienced a structured curriculum, Anthony struggled with understanding what was expected of him. Although he loved to look at books, his attention span was very short and he would often get up and wander about the room after less than five minutes of instruction. After a year of instruction, Anthony did not meet mastery criteria for Level One of the ELSB. Even Level A of the ELSB seemed inappropriate given his attention span and difficulty in answering questions. In the next school year, his teacher used the Pathways to Literacy curriculum and began with Level One, which taught Anthony how to engage with the story and respond on cue. Anthony not only began to attend to the lessons, but successfully completed all five levels of Pathways to Literacy. He was highly motivated by books and the concrete expectations of Pathways to Literacy allowed Anthony to learn how to respond to the teacher's requests. He began to understand that the objects presented in the lessons represented events in the story; he also began to understand how to use those objects to answer comprehension questions. As shown in the graph, Anthony moved through Pathways to Literacy quickly. By the end of the school year, Anthony was ready to start Level One of the ELSB, where he would begin adding other elements to his literacy repertoire.

Maalik

Maalik was a 7-year-old boy who did not attend school until he was 6, when his family moved to the United States. Maalik attended a classroom for students with autism. He was nonverbal and English was not spoken in his home. In the previous school year, Maalik received literacy instruction using Level A of the ELSB. After a year, although progress was seen, Maalik did not master Level A. In the next school year, Maalik was seen as an ideal candidate for Pathways to Literacy. In one school year, Maalik progressed steadily through the first three levels of the Pathways to Literacy curriculum. Because he only entered school the previous year and was learning to understand English instructions, Maalik's teachers were still working to establish a consistent mode of responding. He would sometimes touch objects, lean toward objects, look at his preference, and often he would use his mouth to push a switch or make a choice. Maalik's teacher was excited and amazed when he demonstrated purposeful use of a toy car used in one of the stories (he had never shown any interest in playing with toys). He also demonstrated understanding of the purpose of a pillow when he spontaneously put his head down on it when it was used as a prop in a story. The teacher was also quite pleased when Maalik generalized the sign for "more" during a story where a chocolate bar was used. Previously, Maalik had only signed "more" in the cafeteria when he wanted more food. For Maalik these were great accomplishments!