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FOUNDATIONS FOR LITERACY: A RESEARCH-BASED EARLY READING PROGRAM THAT IMPROVES OUTCOMES FOR CHILDREN WHO ARE DEAF AND HARD OF HEARING

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One avenue for improving reading outcomes is to ensure children who are deaf or hard of hearing (DHH) enter school with the foundational skills needed to learn to read. Our research team developed an early literacy curriculum specifically for DHH children. Teachers use Foundations for Literacy (FFL) in a one-hour literacy block for the school year. Student learning objectives include improving spoken phonological awareness, alphabetic knowledge, word reading, vocabulary, and narrative. FFL is more systematic, and its instruction is more explicit, multi-modal, and intensive than might be used with children who have typical hearing. Much of the instruction is embedded in language-rich activities. Differentiation of instruction to the wide variation of language and phonological processing skills observed for children who are DHH is integral to the design. Results from multiple studies, including a randomized-control trial, indicates that FFL is an effective intervention for young DHH students.

Children who deaf or hard of hearing (DHH) and are acquiring spoken language need the same foundational skills to learn to read as children with typical hearing (TH). Researchers have found that phonological awareness, alphabetic knowledge, and vocabulary predict reading abilities in young deaf children with cochlear implants and hard-of-hearing children with hearing aids (Ambrose et al., 2012; Cupples et al., 2014; Easterbrooks et al., 2008; Lederberg et al., 2013; Nittrouer et al., 2012; Webb & Lederberg, 2014; Webb et al., 2015). These studies showed that the majority of DHH children are delayed in these skills compared to TH children, with wide individual differences.

There is a strong need for intervention in the early childhood years (3-5 years old) and beginning school years (5-6 years old) that focuses on these skills. Our interdisciplinary team developed and assessed the efficacy of an early literacy curriculum for DHH prekindergarten children, called *Foundations for Literacy* (FFL). This paper describes our research and the curriculum used.

Background

Our team began the process of developing FFL with a systematic review of research that exists about effective early childhood education programs for TH preschoolers/ prekindergartners (National Early Literacy Panel, 2008). Primarily based on the Simple View of Reading (Gough & Tummer, 1986) and Scarborough's Reading Rope (Scarborough, 2001), effective early childhood education programs focus on improving the fundamentals for learning to read by emphasizing both the skills necessary to learn to decode or read individual words (referred to as code-based) and the skills necessary to understand what is read (referred to as meaning-based).

Code-based skills acquired during early childhood include both phonological awareness and alphabetic knowledge (i.e., knowledge of the relations between letter names, sounds, and shapes). Phonological awareness refers to the ability to identify and manipulate the sound units of spoken language. Phonological awareness skills typically taught during preschool include syllable segmentation (e.g., how many word parts are there in *popcorn*?), rhyming (do *cat* and *bat* rhyme?), initial sound identification (what is the first sound in *man*?), and blending sounds (Listen, *c-a-t*, what word do you hear?). Alphabetic knowledge includes letter-name (the name of this letter is m) and letter-sound knowledge (this letter says mmmm). In the United States, early childhood education programs have historically targeted teaching letter-name knowledge. However, evidence suggests that, for TH and DHH children who are acquiring spoken language, letter-sound knowledge has a stronger relation to learning to read because it is foundational to sounding out or decoding written words (National Early Literacy Panel, 2008; Webb, et al., 2015). In a meta-analysis of 78 studies with TH children, Shanahan and Lonigan (2010) found that code-based interventions improved phonological awareness and alphabetic

knowledge in TH preschoolers. Interventions with the greatest impact on learning were those that taught phonological awareness and alphabetic knowledge together.

Early childhood programs also build meaning-based skills such as vocabulary and more complex language, which are foundational for reading comprehension (i.e., for understanding the words decoded.) Research suggests structured book- reading (such as dialogic reading) and language enrichment activities are effective in improving language. A meta-analysis of 37 early childhood programs found large to moderate effect sizes for increasing TH children's oral language skills, particularly vocabulary (Shanahan & Lonigan, 2010).

After examining available curricula developed for TH preschool children, our team decided they were not ideal for the majority of DHH children. Commonly used preschool curricula relied too heavily on incidental learning, delivered instruction too quickly, and used instructional language that was too difficult for many DHH children. Our team adopted the literacy objectives of effective, integrated, code- and meaning-based early childhood programs for TH children, but adapted instruction to the unique learning needs of DHH children. FFL is a year-long curriculum designed to be used daily with 3- to 6-year-old DHH children. Hearing loss results in decreased access to spoken language that may cause incomplete phonological representation of words and phonemes, as well as delayed language. Therefore, FFL targets these foundational skills more explicitly and with greater intensity than interventions developed for TH children. Cognitive theories (e.g., Dual-Code theory; Sadoski & Paivio, 2001) and theories of early word reading (Ehri, 2014) suggest that these targeted foundational skills would be acquired best in the context of instruction designed to build multi-modal (visual, auditory, kinesthetic) and semantic (i.e., meaning-based) representations. One novel instructional strategy used in FFL is to build strong semantic associations for the sounds of language. For example, children listen to a story that includes a snake saying *ssss*. The children then make playdoh snakes and pretend their snakes are saying *ssss*. These experiences give children a meaningful connection for the /s/ sound that is reinforced with a picture. During these experiences, the teacher also makes an explicit connection between the letter s and the sound /s/ by saying, "the letter s makes the *ssss* sound, too". Ehri (2014) has shown that TH children remember letters better when they

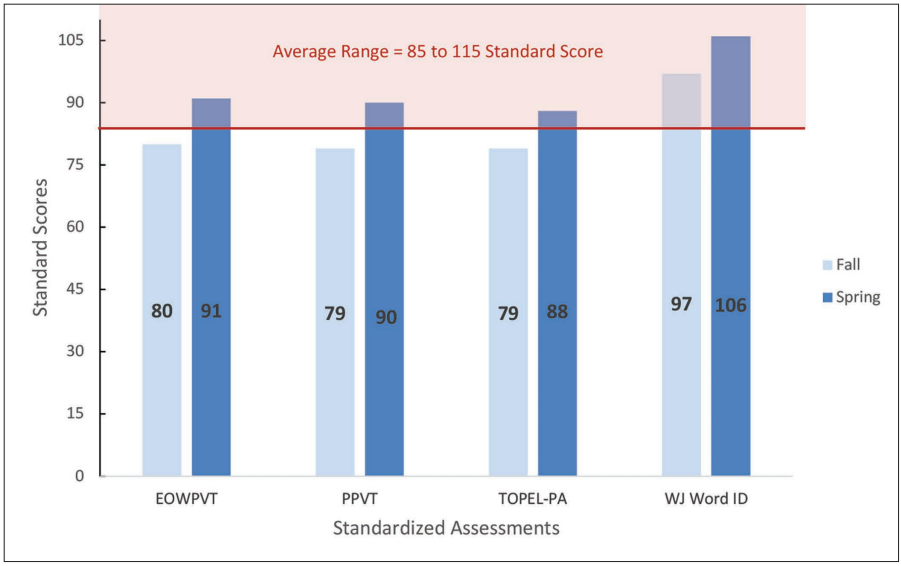
are made more meaningful by pairing a picture with the letter shape. Because DHH children experience greater difficulties remembering sounds than letter shapes, we applied Ehri's semantic association strategy to learning sounds rather than learning to recognize letters. FFL instruction also includes visual and kinesthetic support when teaching phonological awareness, alphabetic knowledge, vocabulary, and narrative elements (i.e., character and setting identification, sequencing of events, and story retell). In order to address most DHH children's language delays, literacy instruction is embedded in language-rich activities that provide a context to teach vocabulary and more complex language while developing code-based skills. Finally, DHH children show large individual differences in early language and literacy skill development. Therefore, each lesson in FFL includes strategies for differentiating instruction based on children's speech perception, developmental language abilities, and language usage. For those children who primarily use sign language and do not have access to sound, we include alternatives to sound-based phonological skills, including fingerspelling and bilingual instructional strategies.

Development of FFL

FFL was developed in three phases. During the first phase, research teachers implemented lessons that followed a basic framework developed by an interdisciplinary team of teachers and researchers. Research teachers were certified teachers of the deaf who were part of the development team. They taught children in small groups—four days per week, one hour per day—for the full school year. They gave immediate feedback to the team on child engagement and instructional effectiveness, and lessons were adapted on an ongoing basis. A series of studies indicated that children taught with FFL by research teachers made educationally meaningful gains in phonological awareness, alphabetic knowledge, and vocabulary (Beal-Alvarez et al., 2012; Bergeron et al., 2009; Lederberg et al., 2014; Miller et al., 2013; Tucci & Easterbrooks, 2014). Children who received FFL made significantly more gains in phonological awareness and alphabetic knowledge than children in the comparison group who received business-as-usual instruction.

During the second phase, the research team moved FFL into classrooms where instruction was delivered by the teacher of record

Figure 1. Fall and Spring Vocabulary Standard Scores for Children Taught FFL by their Classroom Teachers



Note. Expressive One Word Picture Vocabulary Test (EOWPVT; Martin & Brownwell, 2011); Peabody Picture Vocabulary Test (PPVT; Dunn & Dunn, 2007); The Test of Preschool Early Literacy-Phonological Awareness (TOPEL-PA; Lonigan, Wagner, & Torgesen, 2007); Woodcock-Johnson Tests of Achievement-III-NU Letter-Word Identification. (WJ-WordID; Woodcock, McGrew, & Mather, 2007). All tests have a mean standard score of 100 with a standard deviation of 15, with 85 representing the lower limit of typical development.

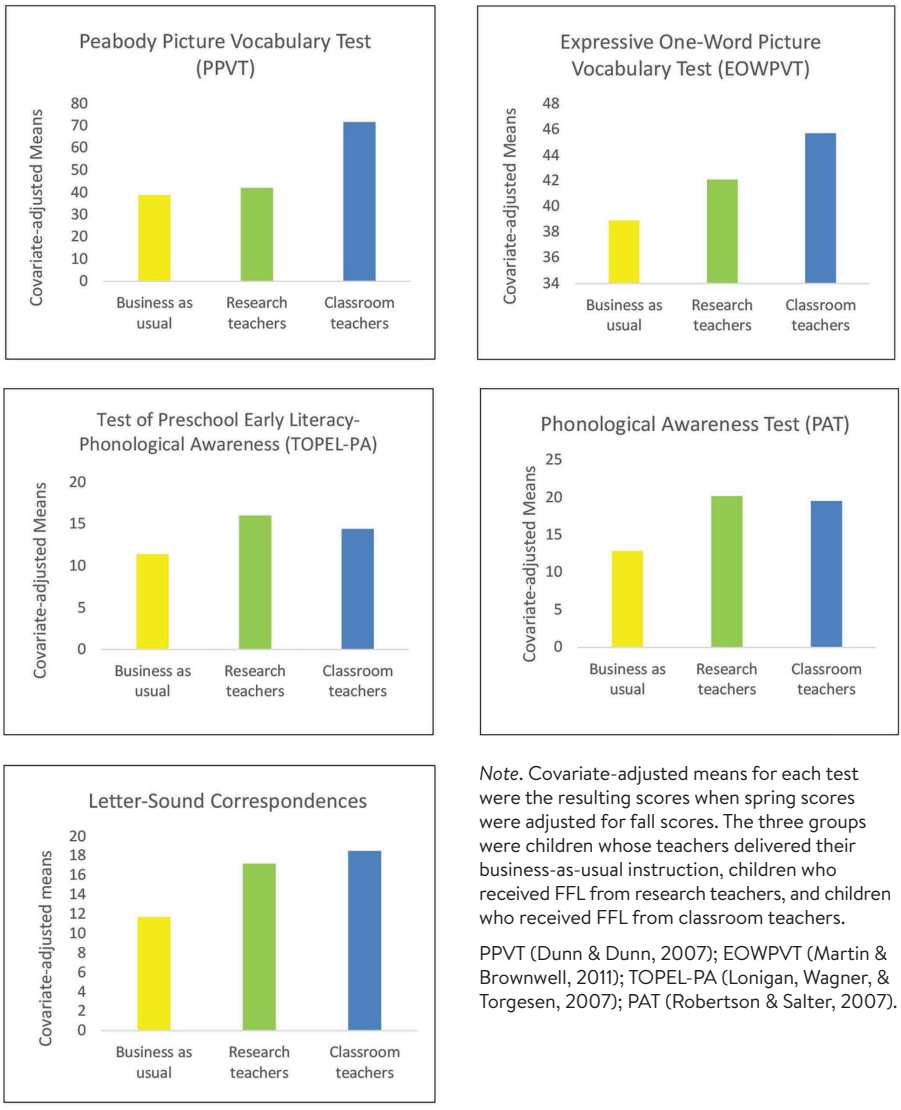
(Lederberg, 2016). The team developed a detailed teacher's manual and a two-day professional learning workshop. Eight classroom teachers attended the workshop and received ongoing coaching by members of the research team. These classrooms teachers implemented FFL as their literacy curriculum. The research team used observations of classroom teachers and weekly teacher feedback to improve lesson content and professional development. As is displayed in Figure 1, the 32 DHH children who received FLL from these eight classroom teachers began the year with delays on standardized measures of phonological awareness, alphabetic knowledge, and vocabulary. By the end of the school year, they gained, on average, 10 standard points and ended the year within a standard deviation of the normative average for TH children. In other words, DHH children who received FFL from their classroom teachers showed accelerated learning and achieved end-of-year scores that placed them within the typical range for TH children for phonological awareness, alphabetic knowledge, and vocabulary.

Next, we compared these children's fall-to-spring gains with the gains made by DHH children who were in the business-as-usual group enrolled in phase 1 (see Figure 2). DHH children receiving FLL from their classroom teachers improved their early literacy skills more than the DHH children in the business-as-usual group. Specifically, DHH children who received FLL from classroom teachers made greater statistically significant gains on measures of phonological awareness, alphabetic knowledge, and vocabulary than did DHH children taught by classroom teachers who used their typical instruction. In a second comparison, DHH children who received FLL from their classroom teachers made equivalent or greater gains on these measures than DHH children who received FFL from research teachers (Figure 2).

During the third and final phase of our research, the research team conducted a national randomized-control trial (RCT) of FFL (Lederberg et al., 2018). Forty-eight classroom teachers were randomly assigned to either intervention (teachers used FFL as their literacy curriculum) or control (teachers continued their business-as-usual instruction) conditions. Children were enrolled in the condition assigned to their teacher. Classrooms were in rural, urban, or suburban schools located in 14 states. Seventy percent of the teachers used only spoken language with their students, while 30% used both signed and spoken language. The FFL intervention group included 118 DHH children and the control group included 110 DHH children.

Children' ages ranged from 3 to 6 years old (Mean age = 4 years, 3 months). Teachers in the intervention group used FFL for one hour a day throughout the school year. Teachers in the control group implemented their typical instruction. DHH children in the intervention group showed greater statistically significant gains on tests of phonological awareness, alphabetic knowledge, and word reading than children in the control group. Effect sizes were moderate to large. Children in both groups showed accelerated gains in vocabulary learning. At the end of the school year, the research team gave each intervention teacher a summative feedback survey. Eighty-four percent of the teachers returned the survey. Of those who replied, 95% of teachers said they enjoyed teaching FFL, felt their children benefitted from FFL instruction, would recommend it to other teachers, and planned to continue using FFL the following year. Additionally, 62% taught classes with both DHH and TH children (some typically developing, others with disabilities)

Figure 2. Fall to Spring Gain Scores across Three Instructional Contexts



Note. Covariate-adjusted means for each test were the resulting scores when spring scores were adjusted for fall scores. The three groups were children whose teachers delivered their business-as-usual instruction, children who received FFL from research teachers, and children who received FFL from classroom teachers.

PPVT (Dunn & Dunn, 2007); EOWPVT (Martin & Brownwell, 2011); TOPEL-PA (Lonigan, Wagner, & Torgesen, 2007); PAT (Robertson & Salter, 2007).

where all children received FFL instruction and 100% of those teachers agreed that their TH children in their classes benefitted from the FFL curriculum as well.

These studies provide strong evidence that FFL promotes the language and early reading skills of DHH children. Teachers reported

enjoying implementing FFL. Teachers also indicated it is appropriate for TH children, so whole class implementation in inclusion classrooms is appropriate. These results also show that early literacy skills, including phonological awareness, letter-sound knowledge, and early decoding, are malleable skills in DHH children, despite their decreased access to sound and spoken language.

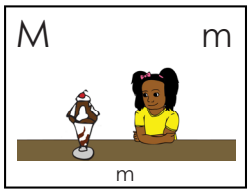
Description of Published Version of FFL

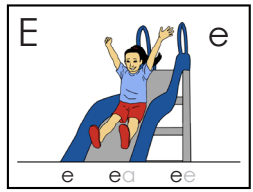
Our team released FFL for commercial sale in the summer of 2017 (selling materials at cost). To ensure that FFL is implemented with fidelity, teachers must complete a 16-hour professional learning workshop to purchase it (Lederberg & Tucci, 2022). Hundreds of teachers from across the country have attended the FFL professional learning workshops offered in a variety of delivery models including virtual national trainings, in-person training at local schools, and statewide trainings. Our trainers have worked with teachers in almost every state and many provinces in Canada. Virtual workshops allow our training team to reach teachers in historically underserved areas. Although only classroom-based teachers were included in our research, FFL is being adapted for use by itinerate teachers and speech pathologists.

We also have created alternative instruction for DHH children enrolled in bilingual (ASL-English) programs. This approach uses fingerspelling phonology and ASL-to-English bilingual strategies to support visual language and early reading skills. These strategies are embedded within the Teacher's Manual. Supplemental materials may be purchased separately.

Teachers purchase a 398-page manual, along with all the instructional materials necessary to implement FFL (Lederberg et al., 2020). Figure 3 displays sample material used in FFL. The manual contains detailed lesson plans for 28 instructional units. Each unit consists of four one-hour lessons to be implemented within a week. During the first four weeks, teachers explicitly teach the instructional language needed to understand activities for the rest of the year. For example, students are taught the meaning of *same* versus *different* by sorting pairs of familiar objects into same and different categories. In another activity, students are taught the meanings for *sound* versus *name* through a farm animal activity where students learn the names of different farm animals

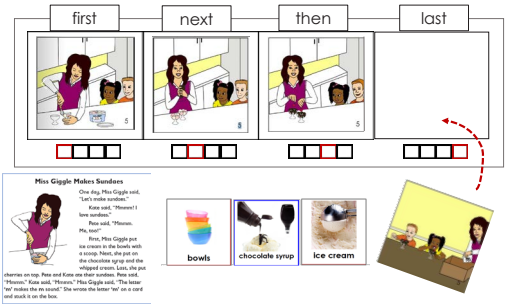
Figure 3. Instructional Materials from FFL



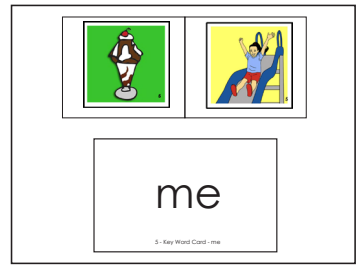


Large Letter-Sound Cards

Small Sound Cards

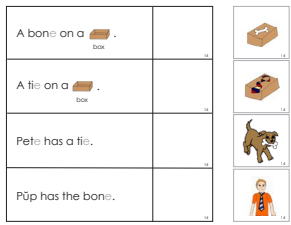


Miss Giggle Story and Vocabulary Picture Cards

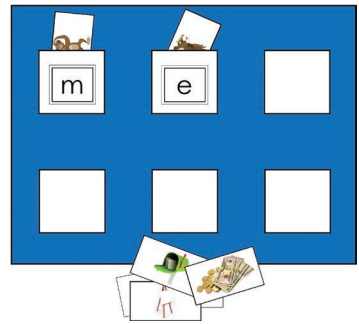


Key Word Blending (Make-a-Word Card)

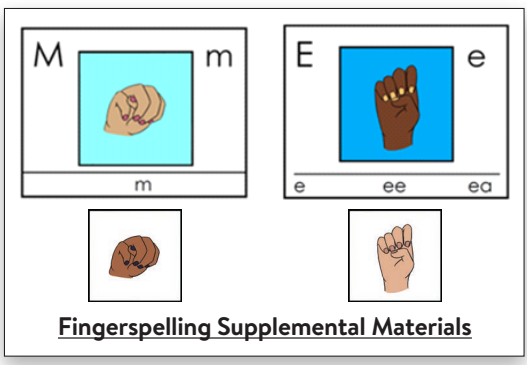
Reading Booklet



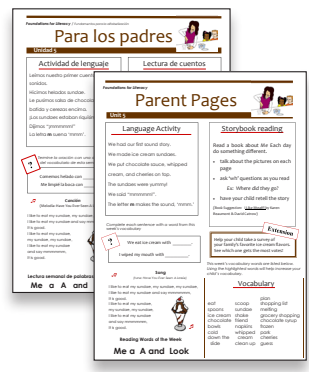
Reading Practice



Initial Sound Identification



Fingerspelling Supplemental Materials



Parent Pages

(e.g., cow, pig, horse) and the sound the animals make (e.g., moo, oink, neigh). Children then identify what sounds are the same. These activities are foundational for later instruction in applying the concepts of same and different to letters and sounds.

The other 24 instructional units have a common structure where each unit is organized around a sound or phoneme (e.g., /m/, /ō/, /ē/, /b/). The target sound is embedded in a unique language experience story that anchors the unit. In the stories, Miss Giggle, an after-school teacher, and her three students, Pete, Kate, and Sue, experience a fun activity in which the target sound occurs. For example, in Unit 5, Pete, Kate, Sue, and Miss Giggle make and eat ice cream sundaes. They are so delicious that the children rub their tummies and say mmmm when they take a bite. Then Miss Giggle says, "Guess what? The letter m makes the same sound mmmm." Miss Giggle draws the letter m and Pete, Kate, and Sue takes turns pointing to the letter and making the /m/ sound.

Teachers begin the week by telling the language experience story using illustrative sequence cards and vocabulary picture cards. During the week, teachers and students retell the Miss Giggle story and participate in a three-day language activity sequence where the teacher and the students plan, do, and recall the same experience in the Miss Giggle story. The Miss Giggle story and related language activity sequence create a personally meaningful semantic association for the target sound (e.g., making sundaes and saying, "*mmmm* that's good!"; going down a slide and saying, "*eeee* that's fun!"). The activities also provide a fun context for children to engage in repeated practice in perceiving and producing individual sounds. Each story is accompanied by a large sound card that displays the associated letters and a picture representing the sound concept in the story (e.g., sundae for /m/, slide for /ē/; see Figure 3.) The picture serves as a visual mnemonic to support student recall of the target sound. Children learn to associate the multiple spellings for long vowels (e.g., e, ee, ea for /ē/). The picture is also used on small sound cards to represent the sound in subsequent reading activities (e.g., blending, decoding, encoding). The small sound card helps to make code-based instruction more transparent as there is a one-to-one correspondence between the sound and the picture on small sound cards (unlike using letters if there are multiple spellings for a sound). Using the small sound cards allows teachers to simplifying the task of identifying and blending sounds in a word. Over time, children

transition from small sound cards to letter cards in reading activities.

To support story understanding and story retell, teachers target 6-10 vocabulary words, which they embed in the Miss Giggle story and the three-day language experience. Teachers select vocabulary appropriate for their students' language levels from unit-specific vocabulary lists, which include four levels of difficulty: core, target, challenge, and extension. Vocabulary picture cards are provided for the first three levels (see Figure 3). Teachers use evidence-based practices for receptive and expressive vocabulary learning such as using child-friendly definitions, picture support, and repeated opportunities to learn and use new words in meaningful contexts (e.g., Miss Giggle stories and three-day language experience activities) (Duncan & Lederberg, 2018; Schwanenflugel et al., 2010).

Each week teachers engage in activities centered around a decodable word or words that use taught sounds and their associated spellings. New words are introduced with a language activity that provides repeated opportunities to hear, see, and produce the decodable word. For example, after learning /m/ and /ē/, children play a question-and-answer game where the right answer is *me* (e.g., "Who has these eyes?" when shown a picture of the children's eyes). The activities ensure children have strong semantic (meaning-based) and phonological (sound-based) representation of the decodable word (Ehri, 2014) and prime them for the subsequent blending activities. Following the new word activity, teachers model identifying and blending the sounds of the new word using small sound cards (e.g., saying "me, /m/ /e/, me").

After decodable words are introduced and practiced several times using picture support, children spend time reading printed words in isolation and in connected text. These activities target phonological awareness, word reading, and reading comprehension. Reading decodable words in isolation and in connected text provides repeated opportunities to segment and blend the sounds of a word. Research suggests that children learn sound-level phonological awareness skills better when instruction includes letters (Shanahan & Lonigan, 2010), likely because letters serve as visual support for hard- to-discriminate sounds. In addition to reading words in isolation, children read connected text composed of explicitly-taught decodable words and rebuses (i.e., pictures that take the place of words that children cannot recognize through sight or through decoding; see Figure 3). Teachers use reading

materials to support their students' reading comprehension by probing children's understanding through pictures and questions.

Teachers also explicitly teach syllable segmentation, initial sound identification, and rhyming. These activities frequently use the vocabulary from previous units to ease the language burden so that students can focus their attention on phonological awareness. Daily practice activities of previously taught skills include reviewing letter-sound correspondences, letter(s)-sound correspondences fluency charts, reading connected text, and phonological awareness activities. These are incorporated into every lesson to ensure students have enough opportunities to build skill mastery.

Teachers further reinforce complex language and vocabulary through daily storybook reading using dialogic reading techniques (Fung et al., 2005; Shanahan & Lonigan, 2010). Teachers select a book that connects to the unit theme and identify 6 to 10 novel vocabulary words contained in the storybook based on their students' language knowledge. They read the story and then revisit the story three or four times throughout the week. Each day the teacher emphasizes targeted vocabulary and increases students' active engagement by asking questions, expanding children's answers, and prompting students to provide more detailed answers and discussions.

Final Tips for Improving Phonological Awareness, Alphabetical Knowledge, and Vocabulary

Phonological Awareness

- Provide intensive, explicit, and extensive instruction to support phonological awareness skills which takes months to develop.
- Use familiar vocabulary in phonological awareness instruction so the children can focus their attention on the structure of words, rather than their meaning.
- Use letters to facilitate learning to isolate initial sounds of words. For example, once children know the sounds of two letters (e.g., /m/ and /p/) have children sort words (mop, papa) into two categories using the letters m and p as visual support for the two sounds (see Figure 3).
- Teach rhyming through the identification of pairs of familiar words that rhyme and pairs that do not. It is critical to include

examples of words that do not rhyme for contrast. Make this a listening activity because pictures tend to distract DHH children in this activity. Exposure to rhyming books is insufficient to teach children to rhyme.

Alphabetic Knowledge and Early Reading

- Teach children to associate sounds with letters by focusing on those sounds in isolation. Sounds are typically taught through reviewing what words start with that letter (e.g., It is M week. What words start with the letter M?--milk, mama). This requires children to isolate the letter from these words. Instead, we suggest focusing on the sound (e.g., This is /m/ week). Embed individual sounds in stories that allow children to hear and say a sound in isolation and then associate it with a letter. Those letter-sound correspondences can then be used to identify initial sounds in familiar words.
- Include opportunities to read simple words during reading instruction. Follow learning letter-sound correspondences with sounding out and blending those sounds in decodable words. This shows children why they are learning the sounds of letters and gives them practice in the important phonological awareness skills of segmenting and blending sounds. Because this is an advanced skill, teachers should model sounding out the letters and blending them into a word. Children should practice reading the same words throughout the year. Preschool children may need continuous teacher modeling to begin to read decodable words.

Vocabulary

- Teach five to 10 words a week explicitly. Instruction should include child-friendly definitions and visual or kinesthetic support to clarify meaning (e.g., pictures, objects, and acting out).
- Expand on children's utterances by repeating them with the addition of at least one or two words or correcting syntactic mistakes.
- Read language-appropriate stories using dialogic reading techniques. Books create a meaningful context for children to acquire and practice using new words. Prior to reading the story, identify targeted vocabulary and create child-friendly definitions and picture cards. Embed these definitions and picture supports

while reading the story. Revisit the same book three to four times, encouraging the students to engage in more dialogue with each reading.

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References

Ambrose, S. E., Fey, M. E., & Eisenberg, L. S. (2012). Phonological awareness and print knowledge of preschool children with cochlear implants. *Journal of Speech, Language, and Hearing Research, 55*(3), 811–823. https://doi.org/10.1044/1092-4388(2011/11-0086

Beal-Alvarez, J. S., Lederberg, A. R., & Easterbrooks, S. R. (2012). Grapheme–phoneme acquisition of deaf preschoolers. *Journal of Deaf Studies and Deaf Education, 17*(1), 39–60. https://doi.org/10.1093/deafed/enr030

Bergeron, J. P., Lederberg, A. R., Easterbrooks, S. R., Miller, E. M., & Connor, C. M. (2009). Building the alphabetic principle in young children who are deaf or hard of hearing. *The Volta Review, 109*(2-3), 87–119. https://doi.org/10.17955/tvr.109.2.3.622

Cupples, L., Ching, T. Y. C., Crowe, K., Day, J., & Seeto, M. (2014). Predictors of early reading skill in 5-year-old children with hearing loss who use spoken language. *Reading Research Quarterly, 49*(1), 85–104. https://doi.org/10.1002/rrq.60

Duncan, M. K., & Lederberg, A. R. (2018). Relations between teacher talk characteristics and child language in spoken- language deaf and hard-of-hearing classrooms. *Journal of Speech, Language, and Hearing Research, 61*(12), 2977–2995. https://doi.org/10.1044/2018_JSLHR-L-17-0475

Dunn, L. M., & Dunn, D. M. (2007). The Peabody picture vocabulary test (fourth edition). NCS Pearson, Inc.

Easterbrooks, S. R., Lederberg, A. R., Miller, E. M., Bergeron, J. P., & Connor, C. M. (2008). Emergent literacy skills during early childhood

in children with hearing loss: Strengths and weaknesses. *The Volta Review, 108*(2), 91–114. https://doi.org/10.17955/tvr.108.2.608

Ehri, L. C. (2014). Orthographic mapping in the acquisition of sight word reading, spelling memory, and vocabulary learning. *Scientific Studies of Reading, 18*(1), 5–21. https://doi.org/10.1080/10888438.2013.819356

Gough, P. B., & Tunmer, W. E. (1986). Decoding, reading, and reading disability. *Remedial and Special Education (RASE), 7*(1), 6–10. https://doi.org/10.1177/074193258600700104

Fung, P. C., Chow, B. W.-Y., & McBride-Chang, C. (2005). The impact of a dialogic reading program on deaf and hard-of-hearing kindergarten and early primary school- aged students in Hong Kong. *Journal of Deaf Studies and Deaf Education, 10*(1), 82–95. https://doi.org/10.1093/deafed/eni005

Lederberg, A. R., & Tucci, S. (2022, March 29). *How to receive training.* Georgia State University. https://clad.education.gsu.edu/foundations-literacy-home/how-to-receive-training/

Lederberg, A. R. (2016). Effective intervention strategies for teaching early literacy skills to deaf and hard-of-hearing children. *Published proceedings from the CI 2015 Emerging Issues Symposium: Literacy and Cochlear Implantation: Outcomes and Intervention Strategies, Cochlear Implants International, 17*(5), 228–229.

Lederberg, A. R., Easterbrooks, S. R., Burke, V. & Connor, C. M. (2018). *A randomized-controlled trial of foundations for literacy: An intervention for young children who are deaf or hard-of-hearing, technical report.* Georgia State University. https://clad.education.gsu.edu/foundations-literacy-home/research/

Lederberg, A. R., Miller, E. M., Easterbrooks, S. R., & Connor, C. M. (2014). Foundations for literacy: An early literacy intervention for deaf and hard-of-hearing children. *Journal of Deaf Studies and Deaf Education, 19*(4), 438–455. https://doi.org/10.1093/deafed/enu022

Lederberg, A. R., Miller, E. M., Easterbrooks, S. R., Tucci, S. L., Burke, V., & Connor, C. M. (2020). *Foundations for literacy: An intervention for young children who are deaf and hard-of- hearing.* Georgia State University.

Lederberg, A. R., Schick, B., & Spencer, P. E. (2013). Language and literacy development of deaf and hard-of-hearing children: Successes

and challenges. *Developmental Psychology, 49*(1), 15–30. https://doi.org/10.1037/a0029558

Lonigan, C. J., Wagner, R. K., Torgesen, J. K. (2007). *Test of preschool early literacy*. Pro-Ed.

Martin, N. A. & Brownell, R. (2011). *Expressive one-word picture vocabulary test (EOWPVT)-fourth edition*. Slosson Educational Publications, Inc.

Miller, E. M., Lederberg, A. R., & Easterbrooks, S. R. (2013). Phonological awareness: Explicit instruction for young deaf and hard-of-hearing children. *Journal of Deaf Studies and Deaf Education, 18*(2), 206–227. https://doi.org/10.1093/deafed/ens067

National Early Literacy Panel. (2008). *Developing early literacy: Report of the national early literacy pane*l. National Institute for Literacy.

Nittrouer, S., Caldwell, A., Lowenstein, J. H., Tarr, E., & Holloman, C. (2012). Emergent literacy in kindergartners with cochlear implants. *Ear and Hearing, 33*(6), 683–697. https://doi.org/10.1097/AUD.0b013e318258c98e

Robertson, C., & Salter, W. (2007). *The phonological awareness test, 2nd ed*. LinguiSystem.

Sadoski, M., & Paivio, A. (2001). *Imagery and text: A dual coding theory of reading and writing*. Lawrence Erlbaum Associates Publishers.

Scarborough, H. S. (2001). Connecting early language and literacy to later reading (dis)abilities: Evidence, theory, and practice. In S. Neuman & D. Dickinson (Eds.), *Handbook for research in early literacy* (pp. 97–110). Guilford Press.

Schwanenflugel, P. J., Hamilton, C. E., Neuharth-Pritchett, S., Restrepo, M. A., Bradley, B. A., & Webb, M. L. (2010). PAVEd for success: An evaluation of a comprehensive preliteracy program for four-year-old children. *Journal of Literacy Research, 42*(3), 227–275. https://doi.org/10.1080/1086296x.2010.503551

Shanahan, T., & Lonigan, C. J. (2010). The national early literacy panel: A summary of the process and the report. *Educational Researcher, 39*(4), 279–285. https://doi.org/10.3102/0013189x10369172

Tucci, S. L., & Easterbrooks, S. R. (2014). A syllable segmentation, letter-sound, and initial sound intervention with students who are deaf or hard of hearing and use sign language. *Journal of Special Education, 48*(4), 279–280. https://doi.org/10.1177/0022466913504462

Webb, M. L., & Lederberg, A. R. (2014). Measuring phonological awareness in deaf and hard-of-hearing children. *Journal of Speech, Language, and Hearing Research, 57*, 131–141. https://doi.org/10.1044/1092-4388(2013/12-0106

Webb, M. L., Lederberg, A. R., Branum-Martin, L., & Connor, C.M. (2015). Evaluating the structure of early English literacy skills in deaf and hard-of-hearing children. *Journal of Deaf Studies and Deaf Education, 20*(4), 343–355. https://doi.org/10.1093/deafed/env024

Woodcock, R. W., McGrew, K.S., & Mather, N. (2007). *Woodcock-Johnson III-NU tests of achievement*. Riverside Publishing.