

Audiologists on the Literacy Team: A Natural Fit

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Recent research indicates that pediatric and educational audiologists do not discuss literacy development with families. Although there are a variety of reasons for this, overall it appears that audiologists perceive they lack the necessary background and therefore are not qualified to discuss reading, even though preliminary reading skills (phonological awareness) are auditory based. In terms of overall expertise, we defer to reading specialists, but as members of a child's intervention team, we can do more. In our role as hearing/listening experts, it is certainly within our scope of practice to help families recognize that learning to read effectively starts at birth, with consistent access to speech sounds and active thinking about those sounds. These auditory experiences are necessary to prepare a child's brain to associate sounds to letters.

If we currently do not feel qualified to discuss these relationships between hearing, listening, and reading, what would help us grow into this expertise? The following pilot project describes how, with brief training and a few hours of direct intervention, Au.D. students increased their competency in the domain of phonological awareness to the point where they were able to explain and apply the hearing-listening-reading relationship accurately and also assume a sense of professional responsibility toward literacy development. This report concludes with suggestions on establishing a working knowledge of literacy development as a logical extension of our pediatric practices, and applying that knowledge to our settings.

Introduction

Even in this era of early detection and intervention, children with impaired hearing are at risk of developing reading problems (Moeller, Tomblin, Yoshinaga-Itano, Connor, & Jerger, 2007; Robinson, 2009). The reasons are multi-faceted, but at least one likely reason is that families need more support from *all* intervention team members, including audiologists, in the development of reading skills. What is the audiologist's contribution? Because learning to read is typically an auditory-based process, and audiologists are experts in audition, we can legitimately assume a role on the "literacy team" by helping families better understand the connection between hearing, listening, and reading.

The Hearing-Listening-Reading Connection

Although there is more than one way to learn to read, most children learn by associating sounds with symbols (e.g., the symbol **B** makes the sound /b/). To make these associations, children must first become very nimble listeners, developing a skill set based on thousands of hours of practice. In fact, children need about 20,000 hours (5- 6 years of a child's waking hours) of incessant listening, plus paying attention to/thinking about the differences and similarities in speech sounds (phonemic awareness), before they are able to master their first reading lesson (Cunningham, Cunningham, Hoffman, & Yopp, 1998; Luckner &

Handley, 2008; Nielsen & Luetke-Stahlmann, 2002).

During these thousands of hours, neural pathways establish hard-wired connections from the temporal lobe to the rest of the brain. These connections are essential: when a child learns to associate a letter to a sound, the occipital lobe processes the visual signal as the temporal lobes process the characteristics of the auditory signal, and the hippocampus retrieves memories of the sound (Dehaene, 2009). Without these neural connections, the relationship between the sound and the letter lacks meaning and is not learned.

Educators providing early reading instruction expect children to be ready to make these sound-symbol associations by the time they start kindergarten. In the U.S., each state's Department of Education defines expectations for specific skills for specific ages, including pre-kindergarten. As one example, the Ohio Department

Table 1. Pre-Kindergarten Reading Standards re: Phonological Awareness (Ohio Department of Education, 2011)

Phonological Awareness

- Demonstrate understanding of spoken words, syllables, and speech sounds (phonemes)
- Recognize and produce rhyming words
- Using hearing to isolate the syllables of a word by snapping, clapping, or rhythmic movement (e.g., cat, ap-ple)
- Recognize when words share phonemes (sounds) and repeat the common phoneme (e.g., /b/ as in Bob, ball, baby; /t/ as in Matt, kite, boat)
- Differentiate between sounds that are the same and different (environmental sounds, animal sounds, rhyming sounds)

of Education (2011) published pre-reading standards for children not yet enrolled in kindergarten. In order to be fully prepared for kindergarten instruction, children are expected to have mastered some fairly sophisticated listening skills, described in Table 1.

These standards are not unique to one state; readers will find very similar evidence-based standards in their own states as well. The website [education.com](http://www.education.com) has links to all state Departments of Education (http://www.education.com/reference/article/Ref_edu_table/). To find standards specific to literacy, use the following keywords to search: reading; literacy; communication arts.

Our Role on the Literacy Team

There is much we do not know. We do not know if families are aware of these school expectations. We do not know, as they contend with the daily challenge of optimal amplification, if they are encouraged to look ahead, to prepare their children for their first reading lesson by helping them listen for 20,000 hours. We do not know if they are provided family-appropriate strategies designed to develop phonemic awareness skills, or reinforced as they attempt this important task.

We do know that, if families have made the hearing-listening-reading connection, it is likely due to their own resources, or support from other professionals. Although audiologists may be aware of the hearing-reading-reading connection, we probably do not relay it to parents. A recent survey of audiologists revealed that most respondents reported having little or no background in this area, and therefore do not have discussions with parents or provide materials to help them develop their child's reading skills (English & Snyder, 2010). These data were collected from practitioners in the field and reflect past training.

Are today's audiology students being taught about the hearing-listening-reading connection? Based on textbook review and syllabus review, we can tentatively conclude that the answer is *no*. For instance, the following three well-known textbooks are designed for Au.D. education:

- *Hearing in Children* (5th ed.)(Northern & Downs, 2002),
- *Pediatric Audiology: Diagnosis, Technology, and Management* (Madell & Flexer, 2008), and
- *Comprehensive Handbook of Pediatric Audiology* (Seewald & Tharpe, 2011).

A careful review indicates the first two texts make no mention of literacy development, although the third has two pages on the topic (pp. 768-770)(English, 2011).

Of course, textbooks do not fully inform this discussion because instructors often build their courses on pre-determined learning objectives and then use textbooks to support those

objectives. If a course included a learning objective not covered in a textbook, it would be supported with supplemental readings and, more importantly, would be reflected on the course syllabus. A few years ago, a review of 25 syllabi (English & Vargo, 2006) from courses in educational audiology/school-age child management was conducted, and no mention of the hearing-listening-reading connection was found. No review of course syllabi addressing pediatric issues among the birth-to-five population has been published.

Given the ongoing concerns about children's reading skills, it would seem we have an opportunity and an obligation to refine our scope of practice (American Academy of Audiology, 2004) to include the development and application of a working familiarity with literacy development. Of course, before considering change, audiologists will desire evidence to support this logical but infrequently mentioned application of their listening expertise. The following is a report describing a pilot project involving three Audiology Doctoral (Au.D.) students who, with an introductory-level background, provided phonological awareness (PA) lessons to preschoolers with impaired hearing. We wanted to know if this experience yielded a measurable improvement in the Au.D. students' understanding of the hearing-listening-reading connection. Did they conclude that some degree of expertise in literacy development is a "natural fit" for audiologists? The project described below was approved by the University of Akron Institutional Review Board.

Methods

Participants

Participants included the second, third, and fourth authors of this report, who at the time of the project were first and second year Au.D. students. Their participation was voluntary and was based on their expressed interest in the topic of literacy and children with hearing loss.

Materials

Materials included a set of classic children's books (see Table 2) and 24 simple lesson plans adapted from Zongc (2000). Lessons were designed to highlight targeted phonemes presented

Table 2. Books used in PA lessons

Brown Bear, Brown Bear, What Do You See? By Eric Carle
Chicka Chicka Boom Boom by Bill Martin
Five Little Monkeys Jumping on the Bed by Eileen Christelow
Hop On Pop by Dr. Seus
Llama Llama Red Pajama by Anna Dewdney
Pajama Time by Sandra Boynton

in the books, focusing on the pre-literacy skills of rhyming and alliteration. See Appendix A for a sample lesson.

Procedures

Before beginning the project, the Au.D. students received a one-hour tutorial on the relationship between hearing and reading (Wiley & English, 2010) and instructions on conducting their phonological awareness (PA) lessons. They were then assigned to a rotating 12-week schedule to provide PA lessons at a local preschool to three children (ages 3-4) with hearing impairment severities ranging from mild to severe.

Before each session, the Au.D. students conducted listening checks (stethostet, Ling 6 sounds) to confirm functioning of the preschooler's personal and/or classroom amplification devices. The sessions were conducted in a one-on-one format in a quiet room away from the classroom. Lessons were 15 minutes long and were provided twice a week. After each lesson, Au.D. students recorded their observations, communicated with the classroom teacher, and sent a duplicate lesson plan home with the child to keep families informed. At the completion of the 12-week project, each Au.D. student had accumulated six hours of experience delivering PA lessons to preschoolers.

Analysis

After completing the project, the Au.D. students were asked to summarize their experiences by writing responses to the following three questions:

- (1) Describe your background re: the relationship between audiology and pre-literacy skills before and after the PA project, using the following rating system:
 - 1 = No background (no awareness of PA)
 - 2 = Novice level (was aware of PA)
 - 3 = Apprentice level (completed formal assignments on PA)
 - 4 = Participant (actively engaged in structured process on PA)
 - 5 = Expert (am qualified to give workshops and write on PA)
- (2) Describe any insights ("aha" moments) during and after the project.
- (3) Having experienced a learning opportunity that most audiologists do not share, if you were to give a presentation about your activities in the PA project, what would you want audiologists to know?

The results section provides a summary of their responses.

Results

Self-Evaluations

All three Au.D. students rated their initial status as *novice* (level 2). They acknowledged being aware of the topic of phonological awareness (PA) but had no formal background. As one student put it, "I knew very well that a child needs to hear constant input (especially in the critical learning period of the first five years of life) to adequately develop speech and language at a rate similar to that of their normal hearing peers. However, what I feel was not stressed enough is the importance of the relationship between hearing and reading/writing development."

After the project, all three students rated themselves as *active participants* (level 4). Some ways in which they described their "learning curve" include these observations:

I feel comfortable and confident now when counseling children and their families on the importance of reading and listening and its influence on the development of literacy and pre-literacy (reading and writing) skills.

After this project, I have become an active participant in the process of promoting the relationship between literacy skills and audiology. Since then, I have completed a rotation in the school systems and was provided the opportunity to actively engage in marrying the two concepts, particularly with pre-school and elementary students with hearing impairment. I frequently discussed with parents the importance of reading aloud to their child, encouraging the child to participate in the story.

In the few short weeks that we were able to participate in this project, I learned so much. The lessons that we were going over became almost second nature.

The reliability of these self-reports were triangulated (Knudsen et al., 2012) in two ways: after the project, the first author (1) held a one-hour debriefing with the Au.D. students to verify their mastery of the topic and (2) interviewed the classroom teacher, who confirmed the students' knowledge base and competency levels based on her post-session debriefing consultations.

Insights Shared ("Aha" Moments)

It would be expected that getting involved with an unfamiliar topic would lead to insights about the topic and the process. Au.D. students shared these thoughts:

The first day that I met with the children was eye-opening to say the least. It was clear from the start that these children were struggling when it came to reading and literacy... It seemed as though their motivation was very low and they were not particularly interested in the activities. As the weeks went by, we had found new ways to deliver the same stories to keep them interesting. The children began to open up and participate. I found myself leaving the school just to sit in my car in the parking lot thinking about all the progress that we seemed to be making. By the end of the project, the child who would hardly speak and almost refused to participate was laughing as we (yes WE) talked about what was happening in the stories.

Another "aha" moment was when I figured out what worked to motivate the children to excel. At first, I thought it was essential to do the same routine each day and be in charge the entire time. I was not letting the child make any decisions. What works better is to include the children and ask their thoughts and opinions. As long as I switched things up and wasn't predictable in my agenda, I gained the children's attention and saw improvement. For example, instead of just re-reading the book with the child for a second time, it was more interesting for them to go through the book and pick out words rhymed/started with the same letter (alliteration).

The week before our project was to end I asked the teacher what she thought of the students' performance in the classroom since the beginning of the project. She told me that they were completely different kids. She said that they were performing better with in-class activities, were speaking more (and more clearly), and were overall more interested in participating. This description met very closely with what I had observed over those weeks as well.

What should audiologists know?

From their responses to this question, it appeared the Au.D. students did not find the topic of literacy development a daunting or overly specialized topic, or a topic that exceeds audiology's scope of practice. Rather, their recommendations seem very consistent with typical family counseling. For example, they hoped audiologists would inform families that:

- Early accessibility to individual sounds within words and sound patterns/structure of words can have a positive effect on early reading skills;
- Reading books to children is one of the most effective ways to develop pre-reading/listening skills;

- Ways to get children involved while reading include: having the child repeat back words that rhyme or have alliteration (words that begin with the same or similar consonants); point to the words together; talk about similarities among words; have the child point to pictures in the book that rhyme or start with the same consonant.

Discussion

First, a point of clarification. We do not propose that all Au.D. students replicate this kind of preschool experience. The project required considerable time and external financial support, and was available to only a fraction of the class. However, we do propose that Au.D. students can learn about the relationship between hearing and reading in a relevant course in a reasonable amount of time and be able to explain it to families. The brief preschool experience described here suggests that this is an achievable and relevant learning objective.

As with all pilot studies, this project has inherent limitations, including the small number of participants, the lack of a control group, and the use of a non-standardized self-evaluation tool. With those caveats, however, this pilot project did yield an interesting finding: that a change in self-evaluation from *awareness* to *active engagement* occurred after delivering only six hours of PA instruction. (As an aside, based on regular review meetings, it is the first author's judgment that this degree of competence was more likely reached within 3 hours of experience, and the remaining hours helped solidify confidence levels.)

Like the Au.D. students in this project, many pediatric and educational audiologists would currently describe themselves as *novices* to phonological awareness. We can cautiously conclude, however, that advancing to *active engagement* seems to involve a reasonable time commitment. For Au.D. students, instructors could develop a unit on phonological awareness with a few articles (e.g., Wiley & English, 2010), using role-play or oral exams to verify students' knowledge and skills, and/or enlist the support of SLP faculty who specialize in this area. The unit would recognize our limited but vital role in literacy development: going beyond the fitting of amplification to providing parent-centered rationales for full-time device use. For professionals, a half-day workshop comprised of readings, lecture, demonstration, hands-on experience, feedback would provide the means to obtain the requisite background to qualify as members of the literacy team.

Application of this skill set, of course, is another issue and will depend on the setting. Audiologists who work with toddlers and preschoolers regularly interact with early interventionists and speech-language pathologists; these colleagues would surely welcome our support in their work on PA development. By adding

a few relevant questions to the case history, for instance, we convey to families that *all* team members are dedicated to their child's reading future. At the same time, we also learn how much families have absorbed about listening and reading and how far along they are in the commitment to full-time device use.

To support that conversation, the handout in Appendix B was created (Wiley & English, 2012). Audiologists can refer to these developmental milestones to determine if their patients are "on track." Parents can take a copy of this handout to the early interventionist and speech-language pathologist and ask for more help if needed.

Another discussion point should include books. The recurring recommendation from reading experts is to encourage parents to read to their child, ideally 20 minutes every day (Luckner & Handley, 2008; MacDonald & Cornwall, 1995; National Center for Family Literacy, 2009; National Institute of Child Health and Human Development, 2006). As we relay this recommendation, parents might appreciate direction about book titles by age group. There are several creative ways to provide help without using much time, including the suggestion to consult with the local library. Additionally, parent volunteers might be willing to create handouts, provide book reviews for a website, or manage a "take one, bring one back" library.

Audiologists who work with older children have already seen the effect of delayed reading development, and may feel there is nothing to be done at this point. Although some critical windows of learning have passed, it is never too late to learn to listen to a story and then translate those listening skills into reading. Trelease (2006) describes the evidence supporting the academic and cognitive benefits of listening to read-aloud stories and reading out loud to children of all ages. Audiologists can promote these benefits to families and encourage reading to their children for several more years as a way to enhance literacy development.

Conclusion

Pediatric and educational audiologists do not screen for literacy development, primarily because of a lack of background (English & Snyder, 2010). This pilot project suggests that acquiring the background is manageable and is consistent with the "manage the child, not the ears" philosophy to which pediatric and educational audiologists subscribe.

More research is certainly needed, including input from parents. It would be very helpful to know if a focus on reading skills resonates with and inspires parents, perhaps more so than our traditional focus on speech and language. After all, "developing speech and language" is an admittedly vague goal, and probably intimidating to parents, but "developing pre-reading skills" by

the first day of kindergarten, as defined by their state's standards, provides a specific deadline and concrete goals that parents can readily manage.

Are audiologists part of the literacy team? The answer is *yes*: we are the "first responders" by fitting amplification, and amplification gives access to literacy. The role is a natural fit for our profession, and the need for our engagement is great. We do have some work to do, of course, to contribute meaningfully to the team effort. In the meantime, new questions at this point include: how will pediatric and educational audiologists incorporate reading development into their professional practices? How will we measure effectiveness, and how will we identify best practices? Where are we going to be on this issue in 5, 10 years? Can't you just hear Carol Flexer? "Tick, tick, tick..."

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Appendix A

Sample Phonological Awareness Lesson

Book: *Brown Bear, Brown Bear, What Do you See?*

Objectives: Print awareness and rhyming recognition

1. Read assigned book with child, pointing to words and the pictures associated with those words.
2. “This book keeps using the same 2 words: ME and SEE. Those words rhyme because they end with the same sound: ee. Let me hear you make that ee sound.”
3. “Other words end in ee, too, so they also rhyme with ME and SEE. Listen: words like (have child repeat after you):

He	She	Tree	Key
Key	We	Bee	Three

4. “So, ME and SEE rhyme. Do these words rhyme?” Write in child’s answer and provide feedback: confirm when child is correct; clarify if not.

ME and KNEE _____	ME and YOU _____
TREE and BEE _____	HE and HOUSE _____
BEE and BOY _____	SEE and SHE _____

Total Correct: _____

5. “Your turn!” Read book again, leaving last word of each phrase for child to say:
Brown bear, brown bear, what do you _____
 6. Spend closing minutes talking about the book in general: what’s your favorite picture, etc., and remember to read this book with your mom or dad at home tonight.
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Appendix B

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For Audiologists: Phonological Awareness Skills Acquisition *Developmental Sequence*

Lori Wiley, AuD and Kris English, PhD © 2012

Rhyming	(Examples: cat, bat, sat, mat)	
<u>Age</u>	<u>Skill</u>	<u>Date</u>
2-3 years	Participates in nursery rhymes, finger plays, jingles, songs, reading books	
3-5 years	Matches words that rhyme	
4-5 years	Produces words that rhyme	

Alliteration	(Examples: ball, bounce, bath, bug)	
<u>Age</u>	<u>Skill</u>	<u>Date</u>
3-5 years	Recognizes words with a common initial sound	
5-7 years	Produces words with a common initial sound	

Blending		
<u>Age</u>	<u>Skill</u>	<u>Date</u>
3-5 years	Combines sequences of isolated <i>syllables</i> to produce words (hot-dog; air-plane)	
5-7 years	Combines sequences of isolated <i>sounds</i> to produce words (d-o-g; t-r-ee)	

Segmentation		
<u>Age</u>	<u>Skill</u>	<u>Date</u>
3-4 years	Counts number of syllables in words	
4-5 years	Identifies initial sounds in words	
5-6 years	Isolates and pronounces initial, medial, and final sounds in 3-phoneme (CVC) words	

Adapted from Paulson, L.H., & Moats, L. (2010). *LETRS for early childhood educators*. Cambium Learning Sopris West.

<http://gozips.uakron.edu/~ke3/AudiologistChecklist2012.pdf>