

2013

Creating an interactive iTextbook for pre-service listening and spoken language specialists: A feasibility study

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**CREATING AN INTERACTIVE iTExTBOOK FOR PRE-SERVICE
LISTENING AND SPOKEN LANGUAGE SPECIALISTS:
A FEASIBILITY STUDY**

by

Melanie Paticoff

**An Independent Study
submitted in partial fulfillment of the
requirements for the degree of:**

Master of Science in Deaf Education

**Washington University School of Medicine
Program in Audiology and Communication Sciences**

May 17, 2013

**Approved by:
Heather Hayes, Ph.D., Independent Study Advisor**

Abstract: The goal of this independent study was to determine the feasibility of the iTextbook format for a pre-service guide to listening and spoken language through the design of one chapter.

Acknowledgements

I would like to thank my advisor, Dr. Heather Hayes, for all of her support and guidance not only during my independent study but throughout my time at Washington University. I am grateful for her eagerness to incorporate new technology into teacher training programs and for her creativity with this project. Her feedback has been invaluable, and she is a true inspiration to me.

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Introduction

There has long been a great deficit in the quality of textbooks available for pre-service teachers of the deaf specializing in listening and spoken language. Traditionally, textbooks that are related to deaf education are comprehensive, covering a multitude of communication methods or modalities, namely sign language. Future listening and spoken language specialists must sift through more general information in search of information pertinent to their studies and future students. This results in not only a loss of students' valuable time but also their money in purchasing books that may not be useful to them in the future. Additionally, in the rapidly changing field of oral deaf education, paper textbooks can sometimes be out-of-date before they are even published. They often do not reflect the technology that is so vital to the success of children with hearing loss or the trends in digital learning embraced by other areas of education (Apple, 2012).

What would a textbook designed specifically for pre-service teachers specializing in listening and spoken language include? It would cover a broad range of topics, from anatomy and physiology to language development and mainstreaming, reducing the need to purchase a new book for each individual topic or course. It would embrace technology, just as the field of listening and spoken language does, by following the trends of interactive, dynamic, and digital learning. It would have the ability to be updated easily to reflect new information in a changing field. Finally, it would be built around and focused on what an individual teaching children with hearing loss to listen and speak needs to know. Information would be presented in a way that promotes immediate application of knowledge and clear takeaways from each section.

The iBooks format for iPad offers a solution to accomplish these goals. The development of the iTextbook Store reflects the trend of interactive digital education from elementary school

to graduate school and beyond. Features of iTextbooks include digital highlighting, study cards, interactive diagrams, videos, PowerPoints, and assessments. The goal of this independent study was to determine the feasibility of the iTextbook format for a pre-service guide to listening and spoken language through the design of one chapter. By beginning with an Audiology, Amplification, and Aural Rehabilitation chapter, one can clearly see the differences between text specifically written for teachers as opposed to the current option for pre-service teachers: a traditional textbook designed for audiologists. Students would no longer have to differentiate between the content they need and the content that is not applicable to them. They would be provided a more productive and efficient way of learning about hearing loss and devices in order to best serve their future students and families. Working through the design of this chapter will investigate how interactive features and various ways of organizing content can lead to an improved textbook format for teachers. The rationale and process of creating the iTextbook chapter will be discussed below.

Current Textbooks

Currently, there are very few textbooks available specifically for pre-service listening and spoken language specialists. During my time as both an undergraduate and graduate student in deaf education, I have been asked to purchase many textbooks, some of which were specifically designed for our field, such as *Literacy and Deafness: Listening and Spoken Language* by Lyn Robertson (2009). The book provided a variety of important topics related to literacy, including “Technology and Listening,” “Spoken Language,” and “Assessment Issues and Approaches.” Most chapters were written by Robertson, but some were written by guest authors who specialized in particular areas. The book was published relatively recently and includes many current references. Reviewing a textbook of strategies specifically designed to teaching children

with hearing loss to listen and speak highlighted the importance, efficiency, and increased interest of reading a textbook specifically aligned to our field. *Literacy and Deafness: Listening and Spoken Language* was an ideal option for our literacy course. It validated the idea that learning about deaf education topics such as literacy, behavior management, speech, and aural rehabilitation could be much more productive through specific strategies directly related to listening and spoken language. The need had been filled for a literacy and listening and spoken language text, but the gap remained in many other areas of oral deaf education.

There are also textbooks designed specifically for deaf education that are more comprehensive in communication modes. Although some may be appropriate for pre-service teachers of children with hearing loss learning to listen and speak, others are filled with information that is often not applicable to this population. For my undergraduate and graduate coursework, I have purchased comprehensive deaf education textbooks including *Educating the Deaf: Psychology, Principles, and Practices* by Donald F. Moores (2001). This is a book that was first published in 1979 and is now in its fifth edition, published in 2001. The first three chapters of the book are highly focused on the history of deafness. There is also a chapter on “American Sign Language and Manual Communication” and one titled “The Acquisition of English.” There were also chapters that would seem to fit well into our curricula, such as “Deaf Individuals with Additional Concerns,” “Deafness and Social-Emotional Adjustment,” “Early Intervention, Infant, and Preschool Programs,” and “Literacy: The Development of Reading and Writing.” Though the inclusion of various communication modes is of concern to students’ time and application of knowledge, there were aspects of the textbook that I found more concerning than this. The first was a lack of person-first language, which can be seen at first glance in the chapter headings and more so throughout the text. The second was the addition of the “World

Wide Web Resources,” a brand-new feature of this fifth edition that provides some positive resources but does not do justice to the extent of technology that is incorporated into today’s instruction. The third aspect that struck me was the lack of information about audiology, amplification, and aural rehabilitation. As pre-service listening and spoken language specialists, we know that it is part of our job to work with students’ devices, facilitate auditory training, and counsel the family on audiology as needed. However, this textbook dedicated 3 of 366 to “The Utilization of Residual Hearing.” Reviewing a textbook designed for deaf education that has been updated within the last 15 years provides strong validation that there is much room for improvement in resources for students in oral deaf education.

Many times, the textbooks currently used in deaf education coursework are not specifically aligned to deaf education in any way. Students are asked to read through these and apply strategies to their population. Although this can be a beneficial exercise at times, asking students to do this each time they read may be taking away valuable time that they could be learning information specifically related to their future endeavors. Though we can learn so much from colleagues in other fields, this can be done through specific outlets such as articles and websites rather than a book that a student is asked to purchase and keep for years to come. During my coursework, textbooks unrelated to deaf education were used in various courses. One of these was *Comprehensive Classroom Management* by Vern and Louise Jones (2010) which was used for our Behavior Management course. In its ninth edition, the book was current, visually-appealing, teacher-friendly, and provided many applicable tools and strategies. However, it became apparent early on that many of the strategies focused around one key component: *language*. This provided a strong dilemma for us as pre-service teachers. If our future students’ main reason for behavior challenges was frustration due to a lack of language,

how could we solve these through not only language-based, but complex-language-based, strategies? An example from the book suggests altering language such as, “You’re being disruptive” or “You’re late again,” to, “It distracts me and I feel uncomfortable when you talk while I am talking.” Although as future teachers we recognize how beneficial this more positive and descriptive language would be, we also understand that discreet nuances in language and complex language levels may not be the best strategy to reach students with hearing loss in a moment of challenging behavior. Although one would likely be able to alter the strategy to language that fits the needs of the student, this example exposes how beneficial it would be to learn specific behavior management strategies directly from teachers who work with children with hearing loss learning to listen and speak.

Although most of these textbooks included chapters or sections that indeed had important takeaways, in comparison there was a lot of information that might never be used or needed as teachers of children with hearing loss who use spoken language. None of them utilized dynamic technology or had the ability to be updated often. This left me as a student with money spent on many books, storage room spent on books that I was unlikely to refer back to, and time spent reading through general information to find pertinent information. It also left me wondering if the most important parts of these books could be compiled into one easily-accessible format.

Digital Learning Trends

Creating a digital textbook seemed to be the best way to compile information on a variety of topics in a dynamic and current way. Though iPads are not yet found in every deaf education classroom, they are certainly gaining popularity as the tablet-of-choice for speech, language, and auditory training apps and activities. Although the iBookstore has been available for a few years now, last year the iTextbook store launched for Apple, and along with it came iBooks Author,

which can be used to develop iTextbooks. iBooks Author is a highly intuitive program that can be easily accessed and used by anyone familiar with other Apple applications. Though some are more complex than others, it provides a variety of features that can be seamlessly embedded into the iBooks.

Within 3 days of the release of the iTextbook Store, 375,000 textbook files were purchased and 100,000 copies of iBooks Author were downloaded (Elmer-DeWitt, 2012). The iTextbook store has grown from just 8 textbooks at launch to over 300 textbooks specifically designed for iBooks in less than 1 year. Initially, three leading educational textbook publishers, Houghton Mifflin Harcourt, McGraw Hill Education, and Pearson, piloted iBooks Author and the iBookstore, further validating the trend toward digital learning (Apple, 2012). Along with iTextbooks for undergraduate and graduate studies, online coursework through iTunesU continues to grow in popularity, with 700 million downloads by 2012 and more leading universities joining each year (iTunesU). By embracing the trend of digital learning at an early stage, the field of teacher preparation in listening and spoken language can best meet the needs of its students by being on the cutting edge of graduate-level education.

Though Apple's iBookstore is the mechanism chosen for this study, digital learning is trending in various formats. Digital learning has a variety of associated strengths, ranging from the efficiency of carrying one tablet filled with eBooks rather than a heavy backpack of textbooks, to academic improvements: students able to retain new knowledge, remember it more vividly, gain a better understanding of it, and apply new skills. More than 6.7 million students are currently taking at least 1 online course, but educational publishers are trying to improve outcomes by creating innovative digital products to support this (Pearson, 2013). Digital education providers often point to two components in their advertising: the "backpacks are so

heavy” argument and the \$15 maximum price for an iTextbook (Waters, 2012). eBook sales rose 117% and tablet sales rose 90% in 2012 (Bowker, 2012). Adults and children alike are responding eagerly to the advent of digital reading and learning, and the Federal Communications Commission has committed to make the transition to digital textbooks for K-12 education in the next five years (FCC, 2012).

The popularity of TED videos is one example of digital learning extending beyond the classroom. Through short, dynamic, auditorily and visually stimulating videos, people are able to effortlessly become lifelong learners. If this is now the way that adults easily access new information, students in the field of listening and spoken language should have the same opportunity to learn about their field through similarly dynamic ways. TED stands for “Technology, Entertainment, Design,” and those three aspects are of high desire in educational tools today. This does not mean that students should only be learning from short videos, but instead points to a trend towards visually-appealing, persuasive, synthesized information (Kim, 2011). The creation of TED Books—short original electronic books produced by TED Conferences—further proves that outside of our field, there is the realization that this is how people want to learn (TED Books App Release, 2012). By bringing new technology into the very specific niche of our field, we are meeting the needs of incoming students for years to come.

Within the field of oral deaf education, iPad use is increasing but still not a regular component of the classroom. Some teachers bring in a personal iPad to use with students; others are fortunate to be in schools where iPads might be available to them. While the educational applications available to teachers are vast, dynamic, and useful, they may not yet be a necessity for classroom teachers, who often have access to a computer and SmartBoard in their room. However, there is an exception within our field: itinerant teachers of the deaf. Because of the

mobility of these teachers, they do not often have a classroom of their own or a computer to work on with a student. Using a portable tablet allows them to keep data digitally, use educational apps with students, and access the Internet during sessions. It also provides access to the iBookstore, something that could be the most important component of all. If the child's school uses a digital textbook curriculum, the itinerant teacher could have constant access to it through her device. She would not have to request an extra set of textbooks. She would not have to share the textbook with the child in order to pre-teach content or vocabulary. She would be able to share notes and highlights with the child, all of which would lead to more prepared, efficient, and helpful pull-out sessions between the student and teacher.

Additionally, it means that the itinerant teacher would not only have access to her students' digital textbooks, but also her own. This adds another market for the Listening and Spoken Language iTextbook: current service providers. Although most textbooks are rarely reviewed following the completion of coursework, a digital iTextbook written with teacher-friendly language that is accessible on a tablet that is always with the teacher, could be viewed with ease in a work environment. The teacher could review information on audiograms before presenting an inservice or review an IEP (Individualized Education Plan) chapter before meeting with the team. Her knowledge would remain accurate and current and information would be retained throughout her post-graduate years. An easily accessible manual for listening and spoken language has the potential to heighten an active teacher's professional development and continual learning in the field.

Design Rationale

As a deaf education undergraduate student for four years and a graduate student for two years, I have had the unique opportunity to compare similar coursework, gather a variety of

textbooks, and draw conclusions about what has helped me to retain and apply information best. I was able to reflect on all of this in order to create an ideal resource for future pre-service teachers of the deaf. See Appendix A for an outline of the feasibility chapter created for this independent study project.

For instance, I took one undergraduate course in teaching speech, and one graduate level speech course. In the first course, we were asked to purchase *Speech and the Hearing-Impaired Child: Theory and Practice* by Daniel Ling (1980). While this textbook was absolutely designed to teach children with hearing loss to speak, because of its publication date of 1980, it was missing a very important component: teaching children with hearing loss to speak through *listening*. The book was no longer relevant to the way we teach speech today because it was written before the advent of cochlear implants and digital hearing aids, both of which not only changed our field as a whole, but also dramatically altered the teaching of speech and articulation in particular. Conversely, in my second speech course, we were not asked to purchase a textbook. Content came from our professors, hands-on speech practicum, and carefully chosen articles. It was significantly more meaningful than the undergraduate course with the textbook, and yet it did leave a gap in that we completed the course without one central text to refer back to in the future.

Not only did I use my experience with a variety of coursework and text, but I also incorporated my personal perspective as a family member of a child with hearing loss into the iTextbook design. Rather than just conveying content, I tried to relate information to how it could be used in the classroom and how it could affect the child and/or the family. One example of this was in writing the section on causes of hearing loss. Not only did I include topics of etiology of the loss, disorders, and syndromes, but I also wrote about the importance of being

sensitive to the cause or unknown cause of the hearing loss and how this affects the family. The ability to interweave and connect information from various content areas comes not only from my own educational background but also this understanding of the whole child and whole family dynamic through my personal experiences.

The decision to write the textbook from a first-person perspective, and more so using teacher-to-teacher language, was a conscious one. Although it leads to the loss of more formal, professional language, it was important that the text felt like it was made for future teachers of the deaf by a future teacher of the deaf. It creates a text that is completely accessible and a tool that can be easily revisited. During my own graduate school experience, I learned content in many different ways. Though some sources were textbooks, research articles, and other professional texts, much of my learning came from hands-on experience, teachers and colleagues, and discussion. Presenting information in a clear, accessible, and even conversational way helps the reader to absorb the information and be able to share it with others for better understanding. It leads directly to clear takeaways from each section, with readers understanding exactly how the content relates to supporting children with hearing loss and their families.

Though I was fortunate to have a plethora of background knowledge, student teaching experiences, and personal perspectives on hearing loss to draw content from, I still looked to colleagues and professors to collaborate on the design of the textbook. Because I decided to do my feasibility study with an Audiology, Amplification, and Aural Rehabilitation chapter, I reached out to our Aural Rehabilitation professor to look over the outline of the chapter. There was only one main question that I asked her: “What did you want us to know at the end of your course?” Based on her answers, I was able to not only design the content of the chapter but also the quiz questions at the end, which clearly help readers understand the takeaways. Although we

took separate courses in Audiology and Aural Rehabilitation, I felt that it was appropriate to combine the chapters, as aural rehabilitation is contingent on a strong audiology foundation.

iTextbook Features

Aside from the efficiency of a digital textbook and ability to be updated as needed, one of the biggest reasons I chose to use the iBooks Author format was because of the many features it offers. I learned about each feature and had an idea of how they could lend themselves to various content I wanted to include. Each feature was designed to help readers understand and retain the content. An introduction at the beginning of the iTextbook will be added to explain how readers can take advantage of some of the dynamic tools included in the iBook.

One of the simplest features that adds a lot of value to the efficiency of an iTextbook is the interactive table of contents. It supports the textbook not only as something to be used during coursework but also as a resource to refer back to throughout school and even during the first few years of teaching. For instance, a new early interventionist can reference a specific section within the Audiology, Amplification, and Aural Rehabilitation chapter by tapping the section title in the table of contents before her next parent session. She can review audiograms or types of testing and therefore be more confident and accurate in explaining results to parents. The table of contents is further supported by searchable features that help students quickly find specific information they need by searching terms that may not be included in chapter or section titles.

The iBooks format provides an easy-to-use glossary feature in which one can choose certain words to highlight. These words are all automatically added to a glossary, where a text definition, chart, and/or picture can be linked to them. The reader is able to utilize the glossary feature in three ways. First, the reader can tap highlighted glossary terms as she reads, immediately activating a small box with the definition. Second, the reader can tap a glossary

button to reveal all of the glossary terms and definitions in one central location. Third, the reader can access a study card section, where she will find digital index cards for every glossary term and definition. Studying these terms is easy, dynamic, motivating, and memorable. I applied this feature by choosing glossary terms as I wrote the content for the chapter. For instance, in the first section, I chose to create glossary terms for *audiogram*, *degree of hearing loss*, *type of hearing loss*, and more. While some of these terms, like *audiogram*, would likely be found in a traditional glossary, others, such as *type of hearing loss* might not have been chosen as a glossary term in a traditional textbook. However, I chose to include broader terms like this knowing that they would lend themselves well to study cards. I know that I would not only benefit from three cards that defined sensorineural, conductive, and mixed hearing loss individually but also from one card that tested my knowledge of the three types of hearing loss. The creation of interactive study cards from glossary terms changed the way I chose which terms to include by thinking from the reader's perspective in a nontraditional way to create an efficient and useful study tool.

One important feature of the textbook is the ability to embed videos both as an introduction to the book and within chapters. Short video clips follow trends seen through avenues like TED Talks in which information is given in a short, engaging, multisensory way (Kim, 2011). An initial video to begin the book would grasp readers' attention and set the tone for the rest of the text. Accessibility is key and easily incorporated, so any videos included would have captioning provided. The ability to hear content directly from an audiologist or cochlear implant user rather than simply reading it in text provides a dynamic and memorable way of accessing information that activates both visual and auditory learning. Various clips can be used such as short interviews with leaders in the field, slideshows of images accompanied by voice over and captions, and even case study clips of people with hearing loss.

The iBook provides various ways to format text. Authors can choose a variety of page views, from one column that fills the iPad screen horizontally, to two and three column views. Text boxes and shapes can also be used to highlight text. In the chapter, I used a shape graphic to highlight one of the most important takeaways about hearing aids. I also used a table to present information on types and degrees of hearing loss, as I felt that the numbers involved lent themselves more to a chart than to a text-based paragraph. Additionally, iBooks Author provides the opportunity to embed Keynote presentations, an Apple program similar to PowerPoint. This provides a simple way for professors to include a favorite presentation on a topic to present information in a different, visual way. In the Aural Rehabilitation class, I shared a memorable assignment that helped to take information and apply it as a teacher: a PowerPoint presenting audiological information at an in-service for a case study student. I chose to include it because it shows readers how the information in the chapter can directly be applied to them as a classroom or itinerant teacher.

One of the widgets available in iBooks Author is the gallery feature. A single gallery of images can be placed at any point within the text and scrolled through by hand. This is such a dynamic feature completely unique to digital learning because it not only saves valuable space on the page but is also better able to demonstrate features of images than seeing the images laid out alongside one another. An example of this was the use of a gallery to show the different degrees of hearing loss. By using the same audiogram and only differentiating the degree of loss, a very clear idea of how the degrees of loss compare to each other as one scrolls through the images, more so than I believe they would were they just separate images on the page. This example shows how the gallery was not simply just aesthetically pleasing to the eye but also helped the reader to categorize information in their minds. Another example of this

categorization can be seen through the use of galleries to present the different cochlear implant brands and products. Because of my personal experience with three family members who are cochlear implant users along with my participation in hearing loss conventions for many years, I have always had a clear understanding of the devices currently available. However, in our first year of school it became evident to me that most of my peers were lacking in this knowledge, having not yet had hands-on experience with students or devices. By presenting devices and their features in individual categories for each cochlear implant company, readers can immediately take new information and know how to categorize it, rather than jumbling everything under a general cochlear implant category.

Another available widget is an interactive images feature. It is a great tool to help label pictures. When a label is touched, the image zooms in on that specific part and opens to an additional description. This lent itself to presenting the parts of a hearing aid and cochlear implant. The reader is able to tap a label, such as *processor*, zoom in to get a closer look, and then read additional text describing the part. As later discussed, this feature pairs very well with the ability to create label-based multiple-choice questions for readers to quiz and self-assess.

One of the most important parts of any digital learning format is the ability to incorporate active links within the text. The ability to tap a hyperlinked term in the text and immediately be brought into an Internet application increases the likelihood that readers will visit that page. When they are done looking at the page, they can tap on iBooks and be taken back to the exact page where they left off. This is a completely different experience from traditional textbooks, which might offer a resource that requires the reader to shut the book, log onto a computer, then return to the text, or, more likely, write down the resource to look at another time, which may or may not ever happen. The ability to hyperlink within text is especially important for this

iTextbook because it is designed to cover such a wide range of topics within listening and spoken language. In order to make the book comprehensive, each chapter must be limited to the most important information. However, through active links, readers are able to access much more detailed information to further explore topics. Though hyperlinks are very simple features, they add so much efficiency and detail to the textbook that could not otherwise be achieved.

As future teachers of the deaf, accessibility is very important to our students and their families, and we are learning to become not only advocates for our students but facilitators of our students' self-advocacy skills. One of the best ways to learn about accessibility features, especially those offered through technology, is to use them ourselves. iBooks Author is able to embed various accessibility features. Images can be captioned and read aloud for those with visual impairments. Text can be enlarged as well. All audio and video can be captioned. With today's technology and level of awareness, there is no excuse for a lack of captioning, and certainly not for a textbook on listening and spoken language.

While researching educational trends such as digital learning, I also learned more about trends in active learning, like receiving immediate feedback using inquiry-based learning. This helps students to regulate their learning and measure their own level of comprehension as they read. Many students don't realize the efficacy of practice testing and may not be provided with tools to do so, especially in post-secondary education (Dunlosky et. al., 2013). Providing such tools should lead not only to improved test scores but also to greater depth of understanding. Digital learning is unique in that it allows for independent and immediate feedback. Through interactive multiple-choice questions, active learning can be easily incorporated into the iTextbook. Although I chose to place the questions at the end of the chapter, they can be embedded onto any page throughout the book. I based my quiz questions on the most important

takeaways our professor wanted her students to know at the end of her course. iBooks Author offers different types of interactive questions, such as text-based, image-based, or label-based formats, all of which complement other features throughout the book. I chose which type of question to use with which content based on any features I had used for that content within the chapter. For example, I used the gallery feature to show three different audiogram images when writing about sensorineural, conductive, and mixed hearing loss in the chapter. To assess readers' knowledge of the three types of hearing loss, I mirrored this format with an image-based multiple-choice question. Another example of this was when I wanted to assess the students on the parts of a cochlear implant and hearing aid. In the chapter, I used the interactive image feature to label a picture of the device with all of its parts. The multiple choice option I chose included an option to match labels to parts of a picture, perfectly mirroring the content from the chapter to allow students to practice labeling and self-assess with instant feedback.

During our graduate education, we are taught to embrace technology. For our teacher certification, we are required to incorporate technology. We are asked to prove how we learn through technology, use technology as a resource, and incorporate it into our teaching. In order to support our students in using technology as a learning tool and resource, we need to be able to model this ourselves. By embracing digital learning through an iTextbook, we are able to do just that. We are able to learn more efficiently, retain more information, and apply our knowledge and skills. By designing a chapter of an iTextbook for future listening and spoken language specialists, it is clear that creating a comprehensive multimedia resource would add significantly to a pre-service teaching curriculum.

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Appendix A

Chapter Outline: Audiology, Amplification, and Aural Rehabilitation

1. Audiograms and Hearing Tests
 - a. Degrees of Hearing Loss
 - b. Familiar Sounds Audiogram
 - c. Types of Hearing Loss
 - d. Audiogram
 - e. Types of Testing
2. Causes of Hearing Loss
 - a. Onset of Hearing Loss
 - b. Etiology of Hearing Loss
 - c. Common Disorders/Syndromes Associated with Hearing Loss
3. Hearing Aids
 - a. Parts of a Hearing Aid
 - b. How a Hearing Aid Works
 - c. Common Pediatric Hearing Aids and Features
 - d. Bone Conduction Hearing Aids
4. Cochlear Implants
 - a. Parts of a Cochlear Implant
 - b. How a Cochlear Implant Works
 - c. Cochlear Implants and Their Features
5. FM Systems
 - a. Parts of an FM System
 - b. How an FM System Works
 - c. Common Pediatric FM Systems and Features
6. Auditory Training
 - a. Device Checks
 - b. Ling 6 Sounds
 - c. Sequence of Auditory Skill Development
 - d. Auditory Training Curricula
 - e. Teacher-Audiologist Relationship
7. Conclusion
 - a. What Else Affects Success?
 - b. Assessment