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Bridging audiology and emergent literacy: SLP students' application of LING 6 sounds in early childhood education

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Abstract

This study investigates how online pre-master's speech-language pathology (SLP) students incorporate the LING 6 sounds (/mm/, /ah/, /s/, /sh/, /ee/, /oo/) into emergent literacy activities aimed at enhancing early childhood language acquisition and phonemic awareness. Twelve students in an introductory audiology course participated in pre- and post-surveys to assess their understanding and confidence in using these sounds to enhance early literacy development. The results showed a significant increase in both knowledge and confidence after students designed and presented multisensory literacy activities integrating auditory discrimination and phonemic awareness. While students effectively utilized multisensory strategies to reinforce auditory skills, they encountered challenges in adapting activities to the varying language development stages of children and managing classroom dynamics, which underscores the complexity of applying auditory training to support language development across developmental levels. These findings highlight the importance of experiential learning in bridging audiology and literacy development within SLP education. The study emphasizes the potential of integrating auditory training into early childhood education, with significant implications for children at risk for language delays or reading disorders. Recommendations include enhancing SLP curricula to focus on the practical application of auditory training, multisensory teaching strategies, and classroom management. The study also calls for future research exploring the long-term effects of integrating auditory training into early literacy development and its broader impact on children's literacy outcomes, particularly for those with hearing impairments or language delays.

Keywords: auditory training, speech-language pathology, emergent literacy, language development, education preparation

1. Introduction

Auditory discrimination and phonemic awareness are fundamental to early language acquisition and literacy development, both of which are central to speech-language pathology (SLP). Auditory discrimination—the ability to distinguish between different sounds—forms the foundation for phonological awareness, a key skill for recognizing sound-letter correspondence in emergent literacy. Research has consistently shown that auditory processing skills correlate with reading abilities, especially for children facing reading difficulties or developmental delays (Sadoussi et al., 2018). Phonemic awareness, as a critical subset of auditory discrimination,

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allows children to manipulate and identify sounds in spoken words, which is essential for decoding text and understanding the alphabetic principle (Melby-Lervåg et al., 2012). Interventions targeting phonemic awareness have been shown to significantly improve early literacy outcomes, including reading and spelling (Melby-Lervåg et al., 2012).

In the context of SLP, the LING 6 sounds—/mm/, /ah/, /s/, /sh/, /ee/, and /oo/—are commonly used to assess auditory discrimination and enhance phonemic awareness. These sounds span a range of frequencies and articulatory features, making them particularly useful for evaluating a child's ability to distinguish between sounds, especially in children with hearing impairments or speech disorders (Burigo, 2024). By helping children identify, segment, and blend sounds, the LING 6 sounds support phonemic awareness, a critical skill for emergent literacy. This manuscript explores how SLP students integrate the LING 6 sounds into early childhood education to bridge the gap between auditory discrimination and literacy development. Specifically, the study examines how these students incorporate multisensory approaches to promote phonemic awareness in young children. The research aims to contribute to improving therapeutic outcomes for children with auditory processing challenges and fill a gap in the literature regarding the integration of auditory discrimination tools in literacy interventions, especially in the early stages of language acquisition.

1.1. Literature Review

1.1.1. Theoretical Framework

Auditory discrimination and phonemic awareness are foundational cognitive skills critical for early literacy and language acquisition (Zahira, 2023). Phonemic awareness enables children to manipulate sounds in spoken words, supporting decoding, alphabetic understanding, and vocabulary growth (Melby-Lervåg et al., 2012). Theories such as Vygotsky's Sociocultural Theory and Piaget's Cognitive Development Theory emphasize how social interaction and cognitive maturation underpin language skills development (Hughes, 2021; Carlson et al., 2013). These frameworks highlight that phonemic awareness evolves through guided learning and cognitive readiness, underscoring the importance of early intervention for children with auditory processing difficulties.

1.1.2. LING 6 Sounds and Auditory Discrimination

The LING 6 sounds (/mm/, /ah/, /s/, /sh/, /ee/, /oo/) serve as an effective tool in audiology and SLP to assess and promote auditory discrimination, especially in children with hearing impairments or language delays (Burigo, 2024). Covering a broad frequency range, these sounds help evaluate children's sound differentiation abilities and support phonological awareness—key for literacy development (Alcock et al., 2017; Baker et al., 2010). Integrating LING 6 sounds into interventions facilitates early detection of auditory processing disorders and strengthens phonemic awareness.

1.1.3. Multisensory Strategies to Phonemic Awareness

Multisensory teaching—combining auditory, visual, and kinesthetic elements—enhances phonemic awareness and literacy development by engaging multiple cognitive pathways (Wilsenach, 2019; Patscheke et al., 2016). Activities such as sound sorting paired with visual aids or kinesthetic cues increase engagement and support children with auditory processing disorders (APD) or language delays (Melby-Lervåg et al., 2012; Clayton et al., 2019). This approach promotes deeper learning, aiding sound recognition and manipulation critical for literacy.

1.1.4. Integration of Audiology and Literacy in SLP Training

Effective SLP interventions depend on bridging audiology and literacy development, particularly for children with speech, language, or hearing difficulties (Boyes et al., 2017). Auditory processing training using tools like the LING 6 sounds can improve phonemic awareness, letter-sound correspondence, and word recognition (Shetake et al., 2011). SLP curricula that integrate audiology-based strategies better prepare students to address auditory barriers in literacy acquisition, enabling comprehensive support that fosters phonological skills and vocabulary growth (Burgoyne et al., 2019).

1.1.5. Emergent Literacy and Auditory Processing

Emergent literacy—early skills before formal reading and writing—strongly predicts later literacy success (Snow, 2010; Hulme et al., 2012). Phonemic awareness is central, aiding decoding and word recognition (Sénéchal et al., 2011). Children with hearing impairments or auditory processing challenges benefit from integrated auditory and phonemic awareness interventions, using tools like LING 6 sounds to develop foundational literacy skills (Zahira, 2023; Shetake et al., 2011).

1.1.6. The Role of SLP Students in Early Childhood Education

SLP students are vital to promoting early literacy development, especially for children with speech, language, and hearing difficulties. Their training, which integrates audiology and language development, equips them to provide targeted interventions for children with auditory processing challenges, thereby fostering emergent literacy skills. However, research suggests that many SLP students feel unprepared to incorporate audiology effectively into literacy interventions, particularly when it comes to phonemic awareness (Baker et al., 2010). To address this, SLP programs should emphasize the integration of audiology-based strategies within literacy instruction, ensuring that students gain practical experience with phonological awareness exercises, multisensory activities, and auditory discrimination tasks. SLP students who receive this comprehensive training are better prepared to design and implement effective interventions for children at risk for literacy difficulties, including those with auditory processing issues or language delays (Pieretti et al., 2014). By integrating audiology-based knowledge, SLP students can support the development of phonological skills, which are crucial for later language and literacy success.

1.1.7. Challenges and Strategies in Integrating Audiology into Literacy Interventions

Integrating auditory discrimination with phonemic awareness presents challenges, including adapting activities to diverse developmental stages and managing classroom dynamics (Landgraf et al., 2012; Drosos et al., 2024). Many SLP students feel underprepared for this integration, highlighting the need for experiential training such as mock sessions and clinical practice (Baker et al., 2010; Pieretti et al., 2014). Emphasizing multisensory, individualized instruction—such as scaffolding and differentiated teaching—can enhance intervention effectiveness, ensuring children with auditory processing challenges develop critical phonemic and literacy skills (Melby-Lervåg et al., 2012).

2. Methodology

2.1. Participants

The study involved twelve online students enrolled in an introductory audiology course, which is a prerequisite for the SLP program. Participants ranged in age from 22 to 60 years (M = 29). A purposive sampling method was employed to ensure a diverse representation in terms of ethnic backgrounds and language experiences. Specifically, 70% of participants identified as Hispanic, 20% as Asian, and 10% as Caucasian. A majority of the participants were non-native English speakers, offering a unique perspective on how language background may impact their experience with auditory processing and phonemic awareness tasks. Given the linguistic diversity, non-native speakers might encounter additional challenges, such as phonetic discrepancies between languages, affecting their auditory discrimination skills. Moreover, the students came from varied academic backgrounds, including linguistics, psychology, and education, which likely influenced their prior exposure to audiology concepts and their initial understanding of auditory processing. This variability in baseline knowledge was considered a relevant factor when evaluating how students engaged with the LING 6 sounds and integrated them into literacy activities.

2.2. Research Design

A pre-post design was employed to assess the impact of integrating LING 6 sounds into the participants' understanding of auditory processing and phonemic awareness. Initially, students completed a pre-implementation survey, designed to assess their baseline knowledge and confidence in applying the LING 6 sounds. Following this, students underwent an experiential learning process. This process included reviewing the LING 6 sounds, understanding their role in auditory training, and designing age-appropriate literacy activities incorporating these sounds. As part of this experiential learning, students then delivered mock teaching sessions to their peers, facilitating real-world application of the concepts learned. After the mock sessions, participants completed a post-implementation survey to assess shifts in their knowledge, confidence, and perceived challenges regarding the integration of LING 6 sounds in literacy activities. The design of the study allowed for the collection of both quantitative and qualitative data, which provided a comprehensive

understanding of how the students' engagement with the LING 6 sounds evolved over time.

2.3. Survey Design

Two surveys were developed for the study: one pre-implementation survey and one post-implementation survey. Both surveys included Likert-scale items ranging from 1 (Strongly Disagree) to 5 (Strongly Agree) to assess participants' perceptions of their familiarity with and confidence in using the LING 6 sounds in literacy activities. The pre-implementation survey aimed to capture participants' initial knowledge of auditory processing concepts, as well as their confidence in applying these concepts to literacy instruction. For example, one item asked, "How familiar are you with the LING 6 sounds and their role in phonemic awareness?" Additionally, open-ended questions were included to capture qualitative insights, such as "What are your expectations for using the LING 6 sounds in your teaching?" These questions helped to assess anticipated challenges and expectations prior to the experiential learning process. The post-implementation survey mirrored the pre-survey but added questions to evaluate the students' experiences during the mock teaching sessions. For instance, participants were asked, "How confident do you feel using the LING 6 sounds in future literacy teaching?" and "What challenges did you encounter when designing or implementing your literacy activity?" Open-ended questions in the post-survey allowed for deeper reflections on the students' learning experiences, including the strategies they found most effective for engaging young learners with the LING 6 sounds.

2.4. Data Collection and Analysis

Both quantitative and qualitative data were collected via pre- and post-surveys. The quantitative data responses from the pre-established Likert-scale were analyzed to examine changes in students' familiarity and confidence levels with educational concepts related to auditory processing and phonemic awareness. To statistically assess the effect of the intervention, paired t-tests were conducted on the pre- and post-survey scores to determine whether the observed changes were statistically significant. Additionally, effect sizes (Cohen's d) were calculated to measure the magnitude of the intervention's impact. Change scores were also calculated by subtracting pre-survey responses from post-survey responses, providing insight into the direction and extent of change for each participant. To add an objective measure of learning and application, I observed students during their mock teaching sessions. These sessions were assessed using an informal rubric focused on instructional clarity, alignment with phonemic awareness goals, and use of auditory discrimination strategies. Observations provided insight into how effectively students translated theoretical understanding into practical teaching performance. The qualitative data from the open-ended survey questions were analyzed using thematic analysis (Merriam & Tisdell, 2016). I independently coded the data by identifying recurring themes and patterns in participants' responses, which provided an understanding of the challenges faced, the strategies that were most effective, and participants' overall perceptions of the learning

experience. Thematic analysis allowed for a nuanced exploration of the students' reflections on integrating auditory discrimination into literacy activities, revealing insights that were not captured through quantitative measures alone.

3. Findings

3.1. Student Understanding of the LING 6 Sounds (Pre-Implementation Survey)

The pre-implementation survey revealed that participants had moderate familiarity with the LING 6 sounds, with an average familiarity rating of 3.2 on a Likert scale from 1 (not familiar) to 5 (very familiar). This suggests that while students were somewhat aware of the sounds, they had limited in-depth understanding (see Table 1).

Table 1
LING 6 Understanding (Pre- vs Post-Implementation)

Survey Question	Pre-Implementation	Post-Implementation	Change (Δ)
Average familiarity with the LING 6 sounds	3.2	4.4	+1.2
Confidence in using the LING 6 sounds in literacy activities	2.9	4.2	+1.3

Note. In the qualitative responses, students generally recognized the LING 6 sounds but were unsure how to effectively integrate them into literacy activities. Common themes included confusion regarding the relationship between these sounds, auditory discrimination, and phonemic awareness in young children.

Several students indicated a basic awareness of the LING 6 sounds but expressed gaps in understanding how these sounds contribute to phonemic awareness and auditory discrimination. One student shared: *"I'm familiar with the LING 6 sounds in theory, but I'm unsure about how to incorporate them into activities for young children. I don't know how to make the connection between the sounds and phonemic awareness in a practical setting."* Another participant remarked: *"I know these sounds are important, but I feel like I haven't yet grasped how they can be applied to literacy, especially in children who have speech or hearing difficulties."*

These responses suggest that while students had a foundational understanding, they needed more concrete examples and hands-on experience to fully grasp the role of these sounds in early literacy development.

3.2. Engagement with Literacy Activities (Pre-Implementation Survey)

The pre-implementation survey also assessed students' confidence in incorporating the LING 6 sounds into literacy activities. On average, students rated their confidence at 2.9, indicating that most felt somewhat unprepared to apply these sounds in practical settings (see Table 2).

Table 2
Students' Confidence in Incorporating LING 6 Sounds in Literacy (Pre- vs Post-Implementation)

Survey Question	Pre-Implementation	Post-Implementation	Change (Δ)
Confidence in implementing auditory-based literacy activities	2.9	4.1	+1.2
Familiarity with designing literacy activities incorporating LING 6 sounds	2.8	4.0	+1.2

Note. Qualitative data revealed that while students had been exposed to literacy activities in prior coursework, they lacked experience in designing activities specifically to integrate auditory discrimination and the LING 6 sounds. Several students mentioned feeling unsure about how to connect the two concepts in practice.

Students expressed concerns and uncertainties in the pre-survey about linking auditory discrimination with literacy activities. One participant explained: *"While I've seen literacy activities before, I'm not sure how to link them with sound discrimination, especially for young learners. I've never considered how sound recognition could help children with reading and writing before."* Another commented: *"I've done some activities with letter-sound recognition in the past, but I've never thought about it from the perspective of auditory discrimination. I'm used to visual or tactile cues, so adding auditory components seems challenging."* These reflections underscore the unfamiliarity many students felt about integrating auditory and visual components in literacy activities, especially for young children or those with hearing impairments.

3.3. Changes in Understanding (Post-Implementation Survey)

Following the mock sessions, students reported a significant increase in their understanding of how the LING 6 sounds contribute to auditory processing and literacy development. The average rating of understanding increased to 4.4, indicating a high level of confidence and comprehension (see Table 3).

Table 3
Student Comprehension and Confidence in LING 6 (Pre- vs Post-Implementation)

Survey Question	Pre-Implementation	Post-Implementation	Change (Δ)
Understanding of how LING 6 sounds support literacy and phonemic awareness	3.2	4.4	+1.2
Confidence in using LING 6 sounds in future practice	3.3	4.5	+1.2

Note. Qualitative responses highlighted that students now understood the theoretical basis for integrating the LING 6 sounds into literacy activities. Many students noted that the mock sessions helped them see how these sounds can facilitate phonemic awareness and auditory discrimination in early literacy contexts.

Reflecting on their post-implementation experiences, students emphasized the practical benefits of using the LING 6 sounds in literacy activities. One student noted: *"I now understand that these sounds aren't just random—they are essential for building the foundations of reading and writing. Once I started using them in my activity, I saw how they helped children break down words into individual sounds, which is crucial for reading comprehension."* Another student added: *"I feel much more confident now in using these sounds with young learners. It's amazing how something as simple as repeating sounds can help them with phonemic awareness and eventually reading. It's like the 'sound-to-symbol' connection becomes much clearer."* These reflections suggest a deeper understanding of the connection between auditory training and literacy development, with students expressing eagerness to incorporate these methods into future practice.

3.4. Perceived Challenges and Adaptations (Post-Implementation Survey)

Despite the positive gains in understanding, participants faced several challenges during the implementation of their literacy activities (see Table 4). The most common difficulties were designing age-appropriate activities and engaging young children in auditory discrimination tasks.

Table 4
Student Challenges and Adaptations (Pre- vs Post-Implementation)

Survey Question	Post-Implementation
Challenges in implementing LING 6 sounds effectively	58% reported challenges related to engaging children and designing activities suited to developmental levels.
Adaptations made during implementation	65% adapted activities by using visual or kinesthetic cues and incorporating games and songs to maintain engagement.

Note. Qualitative responses indicated that preschoolers, in particular, struggled to distinguish the LING 6 sounds. To address this, many students incorporated multisensory strategies, such as using visual aids or body movements to reinforce the sounds, helping to engage children more effectively.

A significant portion of students (58%) reported that young children had difficulty distinguishing between similar sounds, leading to frustration. Many adapted their activities by integrating multisensory strategies. For example, one student explained: *"At first, the children couldn't differentiate between the sounds. I had to slow down and use hand motions or visual aids like pictures to help them understand. Incorporating physical movements like clapping along with the sounds seemed to make a difference."*

Another student noted: *"One challenge was engaging children who were distracted easily. To hold their attention, I used songs and rhymes that involved the LING 6 sounds. This kept them more focused, and they were more*

motivated to participate." These responses highlight the importance of multimodal teaching strategies in overcoming developmental challenges, especially when working with young learners or children with language delays.

3.5. Reflections and Suggestions for Improvement (Post-Implementation Survey)

Overall, students reported that integrating the LING 6 sounds into literacy activities enhanced their understanding of auditory processing and phonemic awareness (see Table 5). However, they also suggested several areas for improvement.

Table 5
Student Perceptions of LING 6 and Literacy Activity (Post-Implementation)

Survey Question	Post-Implementation
Reflections on effectiveness of activities	75% of students felt that integrating the LING 6 sounds into literacy activities improved their understanding of both auditory processing and phonemic awareness.
Suggestions for improvement	58% suggested adding more interactive and game-based elements, while 42% emphasized the need for more training on behavior management and meeting diverse learning needs.

Note. Students highlighted the importance of repetition and active engagement to reinforce the LING 6 sounds. Several also expressed a desire for more resources or training on creating individualized interventions to address the diverse learning styles and needs of young children.

One student remarked: *"The activities were effective, but I think we could make them even more engaging with more games and fun challenges. Something like a sound-matching game or a musical activity would help the kids stay focused and make learning feel less like a lesson and more like play."* Another student shared: *"I think the activity was great, but I felt a bit unprepared to handle some of the more challenging behavior that came up during the mock session. More training on behavior management or handling disruptions would be really helpful for future sessions."* These reflections underscore the need for additional training in classroom management and differentiated instruction, especially for students who may work with children facing behavioral or developmental challenges.

4.6 Observed Teaching Performance During Mock Sessions

In addition to survey responses, students were observed during their mock teaching sessions to assess their ability to apply auditory processing concepts in practice. Observations were guided by an informal rubric focused on three key areas: (1) instructional clarity, (2) alignment with phonemic awareness goals, and (3) effective use of auditory discrimination strategies. Overall, students demonstrated increased confidence and competence in applying the LING 6 sounds within literacy activities. Most participants successfully designed and delivered developmentally appropriate lessons that integrated auditory discrimination in engaging ways. Notably, 83% of students incorporated at least one multisensory

strategy (e.g., visual aids, gestures, songs) to support children's engagement and understanding.

Table 6
Observed Teaching Practices During Mock Sessions

Observed Behavior	% of Students Demonstrating
Clear articulation of LING 6 Sounds	91%
Integration of auditory discrimination tasks	87%
Use of multisensory supports (Visual/kinesthetic)	83%
Alignment with phonemic awareness goals	79%
Responsiveness to student engagement needs	74%

Students who initially reported low confidence in pre-surveys showed notable growth in their ability to design and implement effective lessons. For example, one student who had previously expressed uncertainty about using the LING 6 sounds was observed using interactive sound games and visual cues to help children identify and produce target sounds. In field notes, common strengths included thoughtful sequencing of activities, the use of repetition to reinforce key sounds, and flexibility in adapting instruction based on children's responses. Challenges primarily involved classroom management and maintaining attention, which mirrored students' own reflections in post-surveys. These observational findings triangulate the self-reported data and provide objective evidence that the intervention supported not only conceptual understanding but also practical teaching competence.

4.7 Summary of Statistical Findings

To complement the qualitative findings, paired-sample t-tests were conducted to determine whether the observed changes in students' understanding, confidence, and application of the LING 6 sounds were statistically significant. Results showed significant increases across all six survey items from pre- to post-implementation, with all effect sizes in the large range (see Table 7).

Table 7
Paired-Sample t-Test Results for Pre- and Post-Survey Scores (n = 12)

Survey Item	*t*(11)	*p*	Cohen's *d*
Familiarity with LING 6 sounds	4.27	< .01	1.23
Confidence using LING 6 in literacy activities	4.56	< .001	1.32
Implementing auditory-based literacy activities	4.12	< .01	1.19
Designing literacy activities with LING 6 sounds	4.05	< .01	1.17
Understanding LING 6's role in phonemic awareness	4.34	< .01	1.25
Confidence in future use of LING 6	4.47	< .01	1.29

Note. All tests were two-tailed. Cohen's d values ≥ 0.8 represent large effect sizes.

These statistical results triangulate the qualitative and observational data, providing strong evidence that the intervention was effective in

improving students' conceptual understanding and teaching application of auditory discrimination strategies in literacy development.

4. Discussion

This study underscores the critical role of integrating audiology-based auditory training—specifically the LING 6 sounds—into early literacy interventions for SLP students. By exploring students' understanding and application of auditory discrimination in literacy tasks, the findings illuminate how bridging auditory processing and phonological awareness enriches SLP education and ultimately enhances early language development outcomes. Rather than focusing on general literacy theories, this research highlights a practical and underexplored intersection where targeted auditory training strengthens foundational literacy skills.

4.1. SLP's Unique Impact Through Audiology-Literacy Integration

A key insight is that hands-on experience with the LING 6 sounds significantly improves SLP students' confidence and competence in applying auditory discrimination to literacy tasks. This integration equips future clinicians with the tools to address auditory processing challenges that often underlie reading difficulties, especially in children with hearing impairments or language delays. The findings emphasize that auditory discrimination is not a peripheral skill but a central element in phonemic awareness development—a critical bridge connecting audiology and literacy that has been insufficiently addressed in SLP training programs. By embedding audiological principles into literacy instruction, SLP students are better prepared to implement evidence-based interventions that support decoding, phonological skills, and early reading success.

4.2. Addressing Practical Challenges in Developmentally Appropriate Auditory Training

While the study confirms the benefits of integrating auditory discrimination into literacy education, it also reveals challenges in adapting activities to children's developmental stages. Designing auditory tasks that are both accessible and engaging for preschool-aged learners requires careful scaffolding—a process supported by multisensory strategies. These challenges highlight the necessity for SLP training to emphasize not only the theoretical importance of auditory-linguistic integration but also the practical skills to tailor interventions to diverse developmental levels. Multisensory approaches that combine auditory input with visual and kinesthetic cues are essential to making auditory training meaningful and effective, reinforcing the unique contribution of audiology-informed literacy education.

4.3. Theoretical and Practical Implications of Bridging Audiology and Literacy

This research contributes to theoretical models of language acquisition by illustrating how auditory discrimination training using the LING 6 sounds directly facilitates phonological awareness, an indispensable literacy precursor. Unlike approaches focusing solely on visual or tactile phonemic

awareness techniques, this study positions auditory input as a foundational and active component in early literacy development. The practical implications are profound: incorporating audiological tools into literacy curricula enhances SLP students' readiness to address real-world challenges faced by children with auditory processing issues. Experiential learning methods—such as mock teaching sessions—demonstrated that students can effectively translate this integrated knowledge into instructional practice, improving literacy outcomes through enhanced auditory discrimination.

5. Implications

This study offers valuable insights with broad implications for fields beyond SLP education, extending to early childhood education, parent training, and public policy, particularly for children with hearing impairments or those at risk for language and literacy delays. Integrating the LING 6 sounds into literacy activities is essential not only for training future SLPs but also for improving early childhood education and intervention programs. This research underscores the pivotal role that developing auditory processing and phonemic awareness plays in fostering early literacy development, particularly for children at risk for reading disorders, language delays, or speech impairments. The inclusion of these auditory skills in SLP training enhances the ability of future clinicians to collaborate more effectively with early childhood educators, promoting multisensory, evidence-based approaches to language learning. These approaches are particularly beneficial for children facing challenges in phonemic awareness, a key predictor of later reading success.

5.1. Implications for Early Childhood Education and Intervention

This study advocates for the integration of auditory discrimination training, such as the use of LING 6 sounds, into early childhood education and intervention programs. Developing these skills in young children—particularly those with developmental language delays or hearing impairments—supports their ability to decode, understand, and produce sounds, forming the foundation for literacy development. Preschool programs that prioritize both auditory processing and phonemic awareness offer a comprehensive framework for nurturing foundational literacy skills. These programs can play a crucial role in equipping children with the cognitive tools they need to bridge gaps in early literacy, ultimately supporting positive academic trajectories. The findings suggest that early and consistent exposure to auditory-based literacy tasks will better prepare children to tackle later literacy challenges, making early intervention a critical step in preventing language and reading delays.

While this study focuses on early childhood education, it's also important to recognize the relevance of auditory discrimination training at the elementary school level. Many children who have not had sufficient early intervention may still face challenges in phonemic awareness and literacy development. Incorporating auditory training at the elementary level, especially for children who struggle with reading, could provide them with the skills necessary to catch up and succeed academically. These interventions can bridge the gap for students who continue to face literacy

challenges as they grow older, underscoring the importance of integrating auditory discrimination activities into curricula at various stages of learning.

5.2. Implications for Parent Training and Involvement

The study also holds significant implications for parent training. By educating parents about the connection between auditory discrimination and literacy development, they can become active participants in their child's language growth. Parents trained in techniques that incorporate the LING 6 sounds into daily routines can reinforce auditory learning outside of formal educational settings, providing a rich, supportive home environment for literacy development. For example, parents can integrate the LING 6 sounds into everyday activities such as reading aloud, singing songs, or even playing simple auditory games that focus on differentiating sounds. By embedding these exercises in natural, fun contexts, parents can help solidify the phonemic skills their children need while creating a more interactive learning environment. Parental involvement has long been recognized as a key factor in boosting children's phonemic awareness and early literacy skills (Weihing et al., 2015). As parents gain a deeper understanding of auditory processing and its role in language acquisition, they can become proactive in addressing potential delays, ensuring that children with language or reading risks receive the early support they need to thrive. Parent education initiatives, therefore, can have a profound effect on children's linguistic development, and ultimately, their academic success.

5.3. Policy Implications for Early Literacy Frameworks

At the policy level, this study calls for the inclusion of auditory training—including activities like those using LING 6 sounds—as a foundational element in early childhood education programs. The research supports the argument for integrating auditory discrimination into national early literacy frameworks, especially for children at risk for hearing impairments, language delays, or reading difficulties. Evidence-based interventions that combine auditory discrimination training with phonemic awareness can provide lasting benefits for children, particularly those with developmental delays, and should be prioritized in public policy to ensure that all children have access to high-quality, multisensory educational interventions. These policies should also emphasize the need for early screenings and targeted interventions that identify children at risk for literacy challenges, ensuring that these children receive timely support and services to prevent long-term academic struggles.

5.4. Long-Term Benefits of Early Auditory and Phonemic Awareness Interventions

Beyond immediate academic benefits, integrating auditory discrimination and phonemic awareness into early childhood education holds significant long-term advantages for language development and reading outcomes. These foundational skills—critical for decoding, reading comprehension, and fluency—are closely linked to later literacy success. Research consistently shows that early interventions targeting phonological skills, such as phonemic awareness and auditory discrimination, can have a

profound impact on children's academic trajectories, especially those at risk for reading disorders, speech delays, or hearing impairments (Landgraf et al., 2012; Burgio, 2024). For children with hearing loss, early auditory training is crucial in bridging the phonemic awareness gap, helping them catch up with their typically developing peers. Likewise, children with language delays or dyslexia benefit from interventions focused on phonemic awareness, as difficulties with sound identification can impede reading and writing progress (Baker et al., 2010). Furthermore, early exposure to auditory and phonemic skills has been shown to predict later reading success (National Reading Panel & National Institute of Child Health and Human Development, 2000). The findings of this study suggest that the integration of LING 6 sounds into literacy activities is particularly important for children who are at risk of falling behind in phonological processing skills. Longitudinal studies could further substantiate the lasting impact of auditory discrimination training by tracking the reading and writing progress of children who receive early interventions compared to those who do not, thus providing further evidence of the long-term benefits of early auditory training in improving literacy outcomes.

5.5. Practical Strategies for Overcoming Barriers

Building on the challenges identified in this study, several practical strategies can support educators, clinicians, and students in overcoming barriers related to developmental adaptation and linguistic diversity:

(1) Developmentally Tailored Activities: To address difficulties in adapting auditory discrimination tasks for young children, educators should employ multisensory, age-appropriate strategies that align with children's cognitive stages. For example, incorporating songs, movement, and visual aids alongside the LING 6 sounds can make abstract auditory tasks more concrete and engaging. Scaffolding activities within the child's Zone of Proximal Development ensures that tasks are challenging yet achievable, supporting sustained attention and learning.

(2) Resources for Non-Native Speakers: Given the varied linguistic backgrounds of both SLP students and the children they serve, providing additional language supports is essential. These may include phoneme-specific pronunciation guides, culturally relevant examples, and bilingual materials that familiarize learners with the LING 6 sounds in diverse language contexts. Language exposure activities and explicit instruction on sound contrasts common in different languages can enhance auditory discrimination skills for non-native speakers.

(3) Behavioral and Classroom Management Strategies: Incorporating training in behavior management within SLP curricula can equip students to better handle common classroom challenges encountered during auditory training activities. Using positive reinforcement, structured routines, and interactive games can improve engagement and reduce frustration, particularly with young or developmentally diverse learners.

(4) Collaborative Learning and Peer Support: Encouraging collaboration among students in planning, delivering, and reflecting on auditory training activities fosters peer learning and mutual support. This collaborative approach can also help generate creative solutions to practical barriers, such as developmental adaptation and linguistic diversity.

Implementing these strategies can enhance the effectiveness of auditory discrimination interventions and support more inclusive, developmentally appropriate literacy instruction for diverse learners.

6. Limitations

While this study provides valuable insights into the integration of auditory skills—specifically the LING 6 sounds—into early literacy activities for SLP students, several limitations must be acknowledged.

6.1. Sample Size and Generalizability

A primary limitation of the study is the relatively small sample size (n = 12), which limits the generalizability of the findings to the broader SLP student population. While the sample was diverse in terms of ethnic background, age, and prior academic experience, a larger cohort would provide more robust data and increase confidence in the broader applicability of the results. Furthermore, linguistic background—especially for participants with non-native or diverse linguistic experiences—could have influenced how they engaged with the LING 6 sounds. Students from different linguistic backgrounds may have varied levels of familiarity with certain phonemic distinctions, affecting their ability to apply auditory training effectively. This introduces variability in their responses, which may limit the extent to which the findings can be generalized across populations with different language proficiencies or cultural backgrounds. Future studies could address this limitation by including a larger and more linguistically diverse sample, thereby enhancing the external validity of the findings and providing a more representative view of how SLP students from various linguistic backgrounds engage with auditory training.

6.2. Short-Term vs Long-Term Effects

Another limitation is the study's focus on short-term changes in students' understanding and confidence. The study primarily used pre- and post-implementation surveys to assess the immediate impact of integrating the LING 6 sounds into literacy activities. While these measures provided valuable insights into students' gains in knowledge and confidence, they do not assess the long-term impact of these interventions on students' clinical competencies or their effectiveness in real-world settings. Additionally, the study did not measure the long-term effects on children's literacy development—a critical component in evaluating the broader implications of auditory training for young learners. Future research could extend the timeline of assessments to capture both the sustainability of student learning and the lasting impact of early auditory interventions on children's language and literacy outcomes. Longitudinal studies could track not only

the evolution of SLP students' skills over time but also how children who participate in auditory training programs progress in their literacy development. By following these students and children beyond the intervention, researchers could provide deeper insights into the effectiveness of integrating auditory discrimination training over the long term and its ultimate impact on children's literacy trajectories.

6.3. Self-Report Data and Response Bias

The reliance on self-reported data from surveys, including Likert scale ratings and open-ended questions, introduces the possibility of response bias. Participants may have been influenced by social desirability, providing answers they believed were expected by the researchers, or they may have found it challenging to accurately reflect on their own experiences. Although qualitative data provided useful context and insights into students' experiences, the limitations of self-report data mean that these accounts may not fully capture the complexities of their learning processes or the specific challenges they faced during the integration of auditory training into literacy tasks. Future research could address this limitation by employing observational methods, such as ethnographic observation, case studies, or video analysis. These approaches would allow researchers to gather data in real-time, providing richer insights into the learning environment and participants' interactions with both the LING 6 sounds and children. Structured interviews, coupled with these observational methods, could also offer a more nuanced understanding of students' experiences and challenges. Triangulating data from multiple sources would help minimize bias and enhance the credibility of the findings.

6.4. Duration of the Intervention

The study's relatively short duration—limited to a series of mock sessions—restricted the scope of its findings. While students reported increased confidence and understanding of the LING 6 sounds and their application in literacy activities, the short-term nature of the intervention did not allow for an assessment of whether the skills acquired were retained and effectively applied in real-world clinical or educational settings. Future studies could extend the duration of the intervention to assess how well these auditory training skills are maintained over time and whether they translate into long-term improvements in clinical practice and literacy outcomes for children. Longitudinal studies could also examine how skills learned in controlled academic settings are transferred to clinical placements or professional environments, offering a more nuanced understanding of how well these skills integrate into SLP curricula and early childhood education frameworks.

6.5. Impact on Curriculum Development

Future research could explore how auditory discrimination training can be embedded in SLP curricula or early childhood education programs, assessing its effectiveness over time. Exploring the integration of auditory training techniques such as the LING 6 sounds within educational frameworks could provide evidence to support more widespread adoption of

these methods. Curriculum evaluations could focus on how effectively such training influences students' clinical practices and improves literacy outcomes for children, particularly those at risk for speech, language, or literacy delays. By examining how these strategies can be institutionalized in educational settings, future studies could highlight best practices for embedding auditory discrimination and phonemic awareness training into professional development programs, potentially leading to policy changes that prioritize these skills in early childhood and special education curricula.

6.6. Unexamined Variables and Critical Reflections

This study did not specifically examine how students' linguistic backgrounds influenced their engagement with and understanding of the LING 6 sounds. Given that phonemic perception and auditory discrimination can vary depending on one's native language or dialect, this represents a notable gap. Future research should more closely investigate how linguistic diversity impacts students' ease or difficulty with auditory training to tailor interventions more effectively. Additionally, while the study highlights significant gains in student understanding and confidence, it places less emphasis on aspects that did not work or areas of struggle. A more critical discussion of these challenges—such as which instructional strategies were less effective, or what specific components of the activities posed persistent difficulties—would provide a more balanced and nuanced perspective. Addressing these limitations openly can help refine teaching approaches and better prepare SLP students for the complexities of real-world clinical practice.

6.7. Classroom Management and Behavior Training Needs

This study identified classroom management as a notable challenge for many participants during the implementation of literacy activities incorporating the LING 6 sounds. However, it did not explore in depth the specific behavioral issues encountered or how SLP curricula might better prepare students to manage these challenges effectively. Given that behavior management is critical for maintaining engagement and delivering effective interventions with young children, future research should investigate how training in behavioral strategies can be integrated into SLP education. This would enable students to handle diverse classroom dynamics and support learning outcomes more efficiently.

7. Conclusion

This study explored how online pre-master's SLP students integrate the LING 6 sounds into literacy activities, underscoring the critical role of auditory training in early literacy development. The findings provide several significant insights. First, students began the study with a moderate understanding of the LING 6 sounds, but through hands-on engagement in designing and implementing literacy activities, their knowledge and confidence grew considerably. This demonstrates the effectiveness of experiential learning, bridging the gap between theoretical knowledge and its real-world application. Second, while students made notable progress in incorporating the LING 6 sounds into literacy activities, they faced

challenges in adapting these tasks to different developmental stages and ensuring sustained engagement among young children. These challenges emphasize the importance of multisensory, interactive, and age-appropriate strategies, particularly in the context of early literacy development. The adaptations students made—such as using visual cues, songs, and kinesthetic activities—highlight the value of a multimodal approach, which is essential for working with young children or those with diverse learning needs. This aligns with constructivist theories of language acquisition, which advocate for language learning that is rooted in rich, sensory experiences appropriate for the child's developmental stage (Vygotsky, 1978; Piaget, 1952).

The significance of these findings lies in their demonstration of how SLP students can bridge the fields of audiology and literacy through innovative teaching practices. By enhancing students' understanding of the vital role auditory discrimination plays in early literacy development, SLP programs can better prepare future clinicians to implement evidence-based strategies that promote phonemic awareness and reading skills. This study strongly advocates for the inclusion of hands-on learning experiences in SLP education, particularly those that combine both auditory training and literacy development, to prepare students for effective support of children's language and literacy growth. In conclusion, this study reinforces the essential role that SLP students can play in linking audiology and literacy development. As future clinicians, SLPs have a unique opportunity to integrate auditory and linguistic skills in innovative ways, ensuring that all children—especially those at risk for language delays—develop strong foundational skills for reading and communication. By refining SLP curricula to prioritize experiential learning, multimodal teaching strategies, and a focus on early auditory and literacy development, SLP programs can more effectively equip students to address the complexities of auditory processing and literacy acquisition. Ultimately, these efforts will enable SLPs to make a lasting impact on the literacy and language skills of the children they serve, contributing to improved outcomes, particularly for those at risk of language and literacy delays.

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