Teaching and Learning in Communication Sciences & Disorders

Volume 7 | Issue 2 Article 2

2023

Establishing Cueing Skills When Treating Bilingual Speech Sound Disorders

Carlos D. Irizarry-Pérez
The University of New Mexico, carlosnye@icloud.com

Mirza J. Lugo-Neris
The University of Texas at Austin, mlugo-neris@mghihp.edu

Andrea Martinez-Fisher
The University of New Mexico, amartinezf@unm.edu

DOI: https://doi.org/10.30707/TLCSD7.2.1690393489.668023

Follow this and additional works at: https://ir.library.illinoisstate.edu/tlcsd

 Part of the Speech and Hearing Science Commons, and the Speech Pathology and Audiology Commons

Recommended Citation

Irizarry-Pérez, Carlos D.; Lugo-Neris, Mirza J.; and Martinez-Fisher, Andrea (2023) "Establishing Cueing Skills When Treating Bilingual Speech Sound Disorders," *Teaching and Learning in Communication Sciences & Disorders*: Vol. 7: Iss. 2, Article 2.
DOI: https://doi.org/10.30707/TLCSD7.2.1690393489.668023
Available at: https://ir.library.illinoisstate.edu/tlcsd/vol7/iss2/2

This Pilot Studies is brought to you for free and open access by ISU ReD: Research and eData. It has been accepted for inclusion in Teaching and Learning in Communication Sciences & Disorders by an authorized editor of ISU ReD: Research and eData. For more information, please contact ISUReD@ilstu.edu.

Establishing Cueing Skills When Treating Bilingual Speech Sound Disorders

Abstract

Purpose: This study sought to train cueing skills in first-year graduate students when working with bilingual children with speech sound disorders to ensure fidelity of intervention of a larger research investigation.

Method: Before explicitly training cueing skills, three students were randomly assigned bilingual clients that had been previously diagnosed with a speech sound disorder and asked to administer trial therapy. During the instructional phase, we gave students a cueing protocol, a scoring template, and feedback. We assessed performance according to challenge-point criteria and adherence to our cueing protocol.

Results: Performance varied per student, but overall scores were higher during the instructional phases than during the baseline phase for all students. Performance was also higher when the students participated in individual conferencing versus group conferencing.

Conclusion: Although the data are limited, the results suggest that a cueing protocol is supportive in establishing cueing skills in first-year graduate students administering speech sound intervention.

Keywords

Supervision, bilingual, speech

Cover Page Footnote

A special thanks to the families that participated in our study and the students that administered the intervention. Our gratitude as well to Alex Rivera and Elizabeth Olivarez for their work in analysis and data collection.

This pilot studies is available in Teaching and Learning in Communication Sciences & Disorders: https://ir.library.illinoisstate.edu/tlcsd/vol7/iss2/2

Introduction

Teaching graduate student clinicians in speech-language pathology to master the procedural aspects essential to promote treatment gains is a challenge many clinical educators face. Clinical educators must implement evidence-based educational practices when teaching graduate student clinicians to treat bilingual clients, which includes explicit teaching of procedural clinical skills, a strategy that has been shown to be effective in training novice bilingual clinicians (Irizarry-Pérez et al., 2021). There is limited research focusing on the treatment of speech sound disorders (SSDs) for Spanish-English bilinguals living in the United States (Kohnert & Medina, 2009), particularly with interventions delivered solely in Spanish (Irizarry-Pérez et al., 2023), and even less on how to prepare graduate students to deliver the intervention. Therefore, the current study addresses a critical clinical education gap in examining the effectiveness of training bilingual graduate student clinicians to use a cueing protocol to facilitate their implementation of procedural and structural aspects of intervention when delivering services to bilingual children with SSDs in Spanish.

Scholarship in the Education of Speech Intervention Skills for Bilingual Clinicians

There has been an increase in studies focused on the scholarship of teaching and learning (SoTL), specifically on teaching student clinicians to implement clinical procedures (Dudding et al. 2017; Wolford et al., 2021). However, many of the studies focusing on teaching clinical decision-making or critical thinking have concentrated on assessment practices (Dudding & Pfeiffer, 2018; Ginsberg et al., 2016), have not presented descriptive effects of clinical education, nor directly reported student outcomes outside of self-reported measures (see Wolford et al., 2021 for review).

Often studies report training outcomes for graduate students participating in clinical research studies (Matthews et al., 2021; Radville et al., 2022), but few have focused on training procedures specific to SSDs or, more specifically, the implementation of those clinical skills.

A goal in speech sound intervention is to facilitate the accurate production of targets to meet behavioral objectives effectively and efficiently. In speech production, accuracy levels of 75% or higher have been shown to promote the acquisition of skills (Gierut & Morrisette, 2010). Therefore, a clinician's skill in successfully manipulating the trial's presentation to promote accuracy appears to be essential to affect the outcomes of treatment. Based on this premise, novice clinicians must learn to modify both the target difficulty and the support provided, while making real-time decisions about each trial over time to promote greater accuracy for their client. It is the clinical educator's task to support the development of these skills.

Clinical educators are instrumental in teaching graduate students how to cue. However, the supervisory process is complex in that educators must simultaneously assess the graduate student's performance on the selection of targets, implementation of cues, monitor the needs of the student clinician, take data on the client's accuracy, monitor the client's behavioral needs and the overall success of the activity, and may even help in time management. Establishing a systematic process for teaching these skills can alleviate some of these challenges by providing a shared framework for graduate students and educators; specifically, graduate student clinicians can implement cueing, and clinical educators can assess their performance and fidelity to principles of intervention.

Added to the tasks of learning how to provide intervention in general, bilingual student clinicians also need to be able to implement this work in a language other than English. SLPs report being underprepared to work with bilingual populations (Santhanam & Parveen, 2018) but do report greater self-confidence when they have had explicit training in working with bilingual clients (Hayes et al., 2022; Narayanan & Ramsdell, 2022). In the United States, only 7.3% of American Speech-Language-Hearing Association (ASHA) certified SLPs identify as bilingual service providers, which ASHA defines as individuals who self-report native or near-native proficiency in a second language (ASHA, 2022.

In recent years, a few studies have begun to describe the demographic and linguistic profiles of bilingual speech-language pathology students who may identify as future bilingual service providers (Alfano et al., 2021; Keshishian & Wisehart, 2015; Medina et al., 2022; Riquelme, 2011; Schwarz et al., 2021). However, the level of experience student clinicians have in using Spanish in professional or academic contexts when they enter graduate programs is unclear. Given the reported trends in related fields, including social work (Arriaza, 2015; Senreich & Saint-Louis, 2022), bilingual education (Gauna et al., 2022), and mental health (Biever & Santos, 2016; Interiano-Shiverdecker et al., 2021), we would expect similar trends in the field of speech-language pathology in terms of the limited availability of educational programs that provide bilingual training for clinicians. Structured opportunities to use Spanish in a professional and formal environment, such as providing speech-sound interventions, are essential for students who will later be bilingual service providers (Pruitt-Lord et al., 2021).

For many bilingual student clinicians, this may be the first time working professionally outside of

the English language. In fact, many bilingual students will have had only informal language practice if they have not had the opportunity to receive academic instruction in their other language. Although these students may receive their graduate education in English, many arrive without the skills to read and write in their home language (Giguere & Hoff, 2020). Professional vocabulary, jargon, and differences in language dominance and dialect, along with possible differences in cultural norms and expectations, may place an additional load on the novice clinician who is learning the task of cueing. Thus, structured and scaffolded approaches are necessary for the clinical educator to implement when teaching bilingual student clinicians to implement SSD interventions with clients in languages other than English.

The Importance of Systematically Teaching Procedural and Structural Aspects of Intervention

It is important for novice clinicians to consider important elements of intervention when working with children with SSDs including target selection, therapy approaches, and the structural and procedural aspects of the therapy session (Furlong et al., 2021). Structural and procedural aspects refer to instructional cues, target stimuli, and intervention activities. Instructional cues refer to stimuli designed to help increase the probability of a correct response. Instructional cues fall within a typical three-step, antecedent, behavioral, and response sequence (Roth & Worthington, 2011). The antecedent includes the stimuli and cues presented to the client, the behavior consists of what the client is expected to do, and the response includes the performance-based feedback contingent to the client's response. Clinical educators must teach all of these elements clearly and efficiently so that graduate student clinicians can implement reliable and effective intervention protocols.

When students are preparing for intervention sessions, their clinical educators may provide some of the intervention variables but not all. For example, the supervisor may guide the intervention targets and the treatment approach based on the client's profile and the students' skill. Students may also have access to previous evaluations that include treatment recommendations. The intervention agenda may prescribe specific activities to complete within a session. However, the student working directly with the client is ultimately responsible for implementing these variables, as well as providing the client with cues and adjustments within and across trials to ensure success. Since fidelity to the structural and procedural aspects of intervention can help to maximize gains, adherence to and consistency with the administration of the therapy components is essential.

Student clinicians must also have the knowledge and skills to implement cueing hierarchies appropriately. Cueing is an integral part of intervention for SSDs. In fact, instructional cues can affect the level at which the client acquires target skills (Kim et al., 2012). The level of cueing can determine the difficulty of an intervention trial. Thus, it is important to have ways to systematically train these skills and evaluate how novice student clinicians implement the intervention elements both for the responsibilities to the client as a stakeholder and the development of the student. Cueing skills are one piece of their development that must be explicitly taught.

Cueing as a Fundamental Tool in Intervention

The practice parameters of cueing can be broken down into smaller components, which are important for clinical educators to explicitly teach student clinicians to support their client's success in intervention. Matthews et al. (2021) give examples of how practice parameters can be

manipulated to adjust functional task difficulty. First, clinicians may manipulate the task difficulty of the stimuli by changing the linguistic context. For example, producing target phonemes in words is typically more complex than producing phonemes in isolation. Conversely, producing target phonemes in syllables is typically easier than in words. Second, clinicians may manipulate the level of support provided to the client before production of the target through use of the integral stimulation (IS) hierarchy (Milisen, 1954). IS manipulates the level of support through the use of target models and the time between the client's production. The client may initially be asked to directly imitate or coproduce the target. Clinicians may add visual, auditory, or tactile cues as needed. For subsequent trials, the clinician may ask the client to produce the target after a delayed model. The clinician may continue to fade this level of support to independent or spontaneous production of the target. Finally, the amount and frequency of feedback may also be used to increase or decrease the level of difficulty. More specific and consistent feedback would be considered more supportive over performance and summative feedback. Structured opportunities in practicing manipulation of these practice parameters are important components of early clinical education.

Manipulating the level of cueing can be combined with manipulating the challenge point of the task. The challenge point separates the ability of the child to do the task with some error versus not at all (Guadagnoli & Lee, 2004), which will affect the overall level of difficulty of the activity and can be measured using a pre-determined cut-off (often of 80% accuracy). Matthews et al. (2021) set a criterion for manipulating the challenge point after five trials. They noted that this resulted in overall accuracy below 80%, though treatment gains were still observed. Introducing

the concept of the challenge-point criteria is another strategy clinical educators may use to facilitate the acquisition of clinical skills when student clinicians treat children with SSDs.

The Relationship between Effective Cueing and Consistent Data Collection

Another essential part of administering intervention that students need to learn is tracking client accuracy to determine the effectiveness of the combination of targets, intervention approach, and cueing strategies. Using internal data to inform treatment decisions is part of evidence-based practice (Higginbotham & Satchidanand, 2019), helping the clinician know whether the client is responding to the treatment program. Trial data helps inform the clinician if the cues and targets chosen result in improved production accuracy. It is also essential for adhering to challenge-point criteria.

Tracking clients' performance across individual trials is a complex skill; however, novice clinicians must learn to balance this along with learning the other procedural aspects of performing intervention. Calculating performance over trials requires mental math. Understanding how to adjust the task's difficulty through cueing requires knowing how to change the target difficulty and how to cue with the right amount of support. Student clinicians must make decisions within and across trial words to ensure client success. All of this occurs while also managing the activity itself, any behavioral needs of the client, and expectations for the setting. Any challenges that may arise in balancing these key intervention components may affect the student clinician's implementation of cueing hierarchies and conversely the accuracy of productions by the client. These components have the potential to overwhelm the student clinician. Clinical educators must

also integrate teaching effective ways to collect data and monitor within-session performance as they prepare students for clinical practice.

Training Cueing

The specific cues needed for any given client may vary based on the target and may require explicit instruction from a clinical educator. However, a shared component of the supervisory process assists in guided practice to mastery (Anderson, 1988; McCrae & Brasseur, 2003). One way to transition students from novice students to independent, expert clinicians is to train them directly on foundational clinical tasks, such as selecting and implementing cueing skills, early on. Clinical educators can actively guide students to develop these skills until they can generalize their use with other clients and implement them independently.

Peña and Kiran (2008) propose a two-dimensional, multi-tier model for supervision in which students are guided to independence based on Anderson's (1988) continuum of supervision model. The first dimension includes development of the skill, and the second includes self-monitoring; however, the two are not mutually exclusive. In the earliest (novice) stage, Peña and Kiran suggest a script or *protocol* is provided in which the intervention instructions are explicitly provided to the student.

Few studies provide clinical educators with specific information on how to systematically teach procedural skills, cueing, and data monitoring during speech sound interventions. Thus, we rely on the findings of studies described below that address components of these skills to develop our protocol. Direct protocol-based training has been effective in teaching three bilingual

undergraduate students to administer oral language screenings with bilingual children in English and Spanish (Irizarry-Pérez et al.,2021). All three student clinicians showed improvement results from baseline performance. Additionally, Matthews et al. (2021) trained second-year master's students to manipulate the target difficulty and the level of support the students gave to the client for monolingual children with SSDs. They used a challenge-point criteria of four out of five trials, after which the students needed to either increase a challenge of the task or decrease the challenge of the task if the criteria were not met. They reported an accuracy of 56% correct trials during intervention using this protocol. However, the authors do not report how they trained the students, as the purpose of their study was not studying the SoTL but rather the client's mastery of the targets. In the current study, we integrate elements of these studies into a novel training protocol.

The current study examines one potential solution to address challenges in training students to manipulate trial difficulty by simplifying the task for both student and clinical educator through what we refer to as a *cueing protocol*, which could provide a systematic way to track data and guide decision-making choices during speech sound intervention trials. Our cueing protocol consisted of trial-by-trial scoring, operationally defined practice parameters, a predetermined challenge-point criterion coupled with a scoring template. Benefits of a cueing protocol include providing students with direction in making cueing decisions, incorporating scoring to actively monitor client accuracy, and providing steps to ensure the high level of accuracy they need to deliver optimal levels of learning with sufficient repetitions. It is a concrete, explicit way to teach fundamental intervention skills.

Summary

There needs to be more data on how to train cueing skills in graduate or novice clinicians. Understanding what techniques facilitate this learning benefits multiple stakeholders, which include the student, their client, and the clinical educator. This information may also generalize to speech-language pathology assistants who begin with similar levels of skills. Importantly, it is also directly in line with the ASHA's (2008) supervisory standards.

In this pilot study, we investigated how to train cueing skills with bilingual graduate students for treatment fidelity, while administering intervention in Spanish for bilingual children with SSDs. We asked, "What are the effects of using a cueing protocol to train intervention skills for speech targets with bilingual graduate students?" To date, we are unaware of any research investigating *how* to train graduate students to implement cueing skills for speech sound intervention. We were also curious about the clients' accuracy rate during intervention when using this protocol. Ultimately, we want a protocol that teaches students and results in successful trials for their clients.

We hypothesized that a cueing protocol with a visual scoring template would simplify the complex task of hierarchical cueing for the student and clinical educator. We predicted that students would show increased accuracy of cueing decisions when using a guided protocol to increase target productions of their clients coupled with general instructional feedback. Alternatively, a cueing protocol could add an additional layer of complexity if designed poorly, making the task of cueing more difficult than it already is. In such a case, the cueing accuracy could stay the same or decrease.

A more refined challenge-point criteria could result in a higher level of accuracy. While Matthews et al. (2021) demonstrated that high levels of accuracy are not necessarily needed to achieve goals

for speech targets, understanding these variables is beneficial to our knowledge of general clinical intervention. It is also helpful for clinical educators to understand the relationship between clinical skills and trial accuracy.

Methods

Participants

This study was approved by the Institutional Review Board of the University of New Mexico. This study was also conducted during the COVID-19 pandemic and met all safety guidelines outlined by the review board. Graduate student clinicians were recruited via email, flyers, and social media postings. Students met inclusionary criteria if they were first-semester Spanish-English bilinguals, had no more than 10 hours of intervention experience, and no greater than 35 hours of intervention observation. Students also needed to be assigned to a bilingual track for clinical rotations.

Three students responded to the announcement and signed informed consent. Student 1 was a male, first-year graduate student and second-language(L2) learner of Spanish. Student 2 was a female, first-year graduate student, and heritage speaker of Spanish. Student 3 was also a female, first-year graduate student, and heritage speaker of Spanish. All students identified as being conversationally fluent in both Spanish and English, which was confirmed informally by the first author via an interview in Spanish. All students had previously taken an undergraduate course in the treatment of phonological disorders in children. None of the students were seeing other clients with speech or language delays.

The clients receiving intervention were part of a larger study investigating the effects of speech sound intervention in Spanish for Spanish-English bilingual children. These children had a mean age of 5;2, and each presented with a SSD. Each graduate student clinician was randomly paired with one of the bilingual children. Client 1 (with student clinician 1) presented with an inconsistent phonological disorder, and Clients 2 and 3 (with student clinicians 2 and 3) presented with phonological delays. The clients had treatment targets in Spanish and generalization targets in both languages.

Table 1. *Client Demographics*

Participant	Client Diagnosis	Baseline Target	Intervention Targets	Generalization Targets
1 (age 4;10)	Inconsistent phonological disorder	/s/	Spanish Functional Words	English Cognates
2 (age 5;4)	Phonological delay & Articulation Disorder	/s/	Spanish /fɾ/	Spanish /ɾ/ clusters
3 (age 5;5)	Phonological delay & Articulation Disorder	/s/	Spanish /fl/	English /fl/

Positionality Statement

The clinical educators were the first and third authors. All authors held their certificate of clinical competence in speech-language pathology from ASHA, had completed a minimum of nine months of practice post-certification, had completed at least two hours of professional development in supervision, and met ASHA's criteria for identifying as Spanish-English bilingual service providers (ASHA, n.d.). Additionally, the third author held her New Mexico speech-language pathologist state license.

Measures.

Scoring Template.

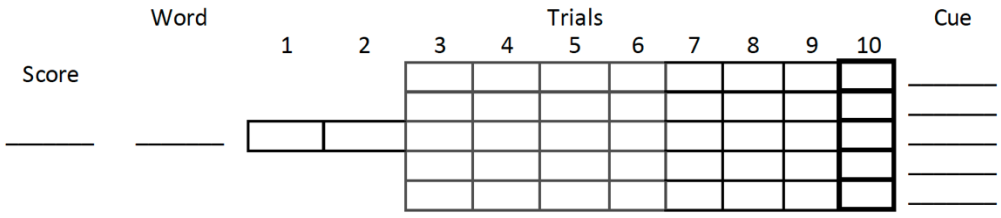


Figure 1. Scoring Template Form

We created a novel scoring template for the study, displayed in Figure 1. We gave the students 10 treatment words that were consistent with their client's targets and goals. A horizontal line before the boxes provided a place to write the word stimuli. This scoring template was designed to track word productions over 10 groups of trials for any given word. Thus, each word was trialed 10

times. We provided each student with a sheet that then allowed them to track up to 10 words within a session to aim for 100 trial productions per session.

Vertical boxes prompted students to assess the client's productions during the trial series and make cueing decisions. Each student needed to make nine decisions for any given word since a decision was not needed for the last trial. The number of decisions the students made correctly was their score out of nine for a given trial series. The bolded box of the last cell served as a prompt for the students to end practice for that word with a correct production. Finally, the students were instructed to tally the correct trials after each word and place the score at the left margin. We included this part to prompt students to track accuracy across words.

Dependent Variable. We measured student clinician *attempts* at cueing as the dependent variable using a challenge point cut-off of either three sequential correct trials or two sequential incorrect trials. After three sequential trials in which the client accurately produced the target, the student clinician was expected to *increase* the difficulty of the subsequent trials. If the client made two sequential inaccurate productions, then the student clinician was expected to *decrease* the difficulty of the next set of trials. Once a shift in cueing challenge occurred, the trial count for this criterion started over. A trial counted as more difficult if the clinician manipulated the level of support to increase the length of time between the model and the client's production and asked the client to produce a target phoneme in a higher level of linguistic context (i.e., syllables, words, phrases), reduced or removed a cue. A trial counted as less difficult if the clinician decreased the length of time between the model and the client's production, asked the client to produce a phoneme in a lower level of linguistic context (i.e., phrases, words, syllables), or added a cue. The student clinician could obtain a score out of nine, given challenge decisions occurred between

trials (i.e., between trials 1 and 2, 2 and 3, etc.) across 10 possible trials per word. Importantly, regardless of the target that the client was working on, the student clinicians received a score based on their fidelity to the protocol. That is, it was not tied to the accuracy of the client's production since this was not in their control. We set the challenge-point criteria to aim for at least 80% accuracy across the 10 word trials.

Figure 2 provides an example for the word *flaca* ("skinny"). The word is presented initially with a delayed model. At trial eight, the client has produced three sequential productions accurately in a row. As such, the clinician was expected to increase the difficulty of the next attempt at trial nine. For trial 10, the clinician decreased the difficulty to aid in ending trial practice with an accurate production for that word. In this example, the student would receive a fidelity score of 9/9.

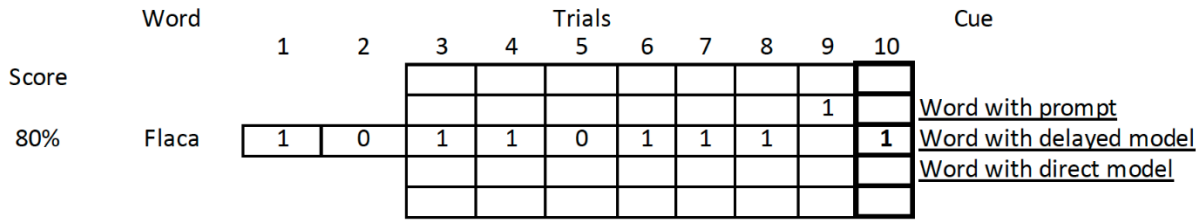


Figure 2. Example Scoring Template Completed

Procedures

All intervention sessions were conducted via a HIPPA-compliant Zoom link to maintain the safety of student clinicians and clients due to the COVID-19 pandemic. Telepractice has been shown to provide equivalent outcomes as face-to-face therapy for SSDs (Grogan-Johnson et al., 2013). Weekly conference sessions between students and supervisors occurred online and were

video recorded. All clients were bilingual; however, the intervention protocol for the larger study focused on the cross-language effects of intervention provided in Spanish, and we required the clients to produce the targets and trials in Spanish. We also encouraged student clinicians to follow the client's lead if the client code-switched between languages during other activities. Thus, both intervention and conference sessions contained bilingual elements.

Design. This study utilized a single-subject, ABC case design. Student clinicians completed a baseline (A), an instructional phase that consisted of group conferencing (B) followed by individual conferencing (C). The baseline (A) phase allowed us to measure student clinician's cueing before we administered instruction and served as a control among the student clinicians. The instructional (B) phase allowed us to measure student clinician cueing after instruction had been given, in this case, the implementation of our cueing protocol coupled with feedback (see *Instruction* below). The (C) phase allowed us to measure student clinician cueing when receiving feedback individually in comparison to receiving feedback as a group. This particular design allowed us to measure our results with a smaller set of student clinician participants as a pilot study and for each student clinician to serve as their own control.

Baseline. During baseline, student clinicians were given the treatment target /s/, which was a common error phoneme across all children but not a research target for the larger project. This selection was made to preserve the intervention targets of the larger study that were in baseline but provide student clinicians (unrelated) targets to assess their initial cueing performance.

During baseline, we gave student clinicians the scoring template but no guidance on how to treat their targets (i.e., intervention approaches), how to use the scoring template, manipulate task difficulty, or the purpose of the project. We informed them that they would receive instruction once baseline had concluded for their client's research targets. Students did have access to their client's evaluation reports. Conference sessions occurred 24-hours after the session and we only gave feedback on general skills, such as organization of the session and timing of activities. If a student clinician asked for help on cueing or strategies, they were redirected to give their best attempt at treating the speech sound error.

Instruction. After a stable baseline of three sessions for cueing skills had been achieved for each student clinician, training began. Instruction consisted of (a) orientation to the treatment targets, (b) orientation to the concept of scaffolding, (c) orientation to the concept of challenge-point criteria, (d) demonstration of modifying task difficulty, and (e) demonstration of specific approaches and techniques to teach target phonemes. These concepts were continuously reviewed during conference sessions.

During the instructional phase, all student clinicians met together with the clinical educators during a one-hour training session. First, we reviewed the client targets and stimuli that they would be expected to use. Second, we reviewed the concept of scaffolding, defined as supporting your clients to achieve accurate trial productions. Third, we gave students a copy of the scoring template (Figure 1) and introduced our challenge-point criterion. We gave instructions on how to increase the difficulty of the trials if the client produced three trials correctly in a row and how to decrease the difficulty of the trial if the client produced two trials incorrectly in a row. Specifically, we

trained Student 1 to modify the amount of support moving from co-productions to spontaneous productions when accurate. For phonological targets (i.e., student clinicians 2 and 3), we focused on the task difficulty by embedding the targets in more or less complex linguistic contexts (e.g., words versus phrases), and the amount of support, by moving from co-productions to spontaneous productions. Finally, we taught specific treatment techniques. We taught student clinician 1 to use letter-phoneme cues to program productions for their client and we taught student clinicians 2 and 3 how to shape targets by blending two singleton consonants (e.g., /f/ and /l/) into one (e.g., /fl/).

Before each session, we asked student clinicians to present their cueing plans and place them into their session agenda. We approved lesson plans via email before intervention sessions. We resolved any potential problems immediately before the session. Student clinicians then used their scoring template and predetermined plan during their intervention session, which lasted 60 minutes. One hundred percent of the intervention sessions were supervised by one or both clinical educators.

Clinical educators gave feedback after each session with a 24-hour delay to allow student clinicians to complete a reflection on their performance (not presented in this data). Feedback was delivered verbally via Zoom sessions and consisted of three parts: general feedback on behavioral management skills and session organization, adherence to the cueing protocol, and review of the student clinician's plan for the next treatment session. These conferences lasted 30 minutes. We initially held conferences as a group but later transitioned to individually-held sessions, as we noted that the feedback given during group was no longer specific enough for each client after the general concepts had been established.

Feedback on behavioral management primarily consisted of suggestions for selecting engaging activities as breaks based on the interests of the client, implementing positive reinforcement for participation, and appropriate pacing of activities to complete session objectives. To review the accuracy of cueing, the clinical educators selected one word, and both the student clinician and the clinical educators reviewed trial data. We noted that student clinicians made errors in counting trials and adjusting the difficulty of their trials in the moment during their sessions. Often student clinicians stated that they were making trials more or less difficult but there was no perceived change by the clinical educators. Finally, we asked the student clinicians to propose a lesson plan for their next session based on the comments given during the feedback session. We noted that we primarily gave feedback on selecting the appropriate next steps in the intervention process to accomplish their goals. Finally, we provided the student clinicians with the vocabulary in Spanish as needed for their sessions.

Analysis. Accuracy of cueing, defined as the student clinician's ability to adjust the level of difficulty of each trial, and measured by accurate attempts at following the +3/-2 protocol out of nine opportunities. We reported accuracy across trials per session; that is, the number of times the student clinician followed the +3/-2 protocol. We summed the total number of accurate attempts over the total number of attempts and multiplied by 100 to determine the percent accuracy. Since number of trials varied per session, the data are reported as percentages to allow for visual comparison across sessions.

Data for each student clinician were graphed for visual analysis. We used visual analysis guidelines from Kratochwill et al. (2013) and Cook et al. (2014) to identify trends or patterns in the data.

Specifically, we examined the initial baseline data to determine if the baseline values demonstrated a concern that would necessitate intervention, increased with the introduction of the intervention variable, showed an immediacy of effect following the introduction of our intervention, identified the magnitude of change, and any degrees of fluctuation within and across phases. We used these analyses to help determine the likelihood that our instruction was the cause for any changes in the students' cueing skills.

Reliability. We measured reliability by comparing judgement scores between clinical educators across the nine cueing opportunities for each student clinician for a randomly selected sample of 30% of all intervention words and their respective nine intervention trials. We compared scores between clinical educators using an exact-agreement approach, which required a match at each cueing opportunity for any given trial for agreement. Total reliability was 84% between clinical educators across all student clinicians and their intervention trials for the sample collected.

Results

Overall, at baseline, the student clinicians showed low accuracy of cueing as measured by clinical educator ratings. We noted that student clinicians were making no adjustments based on trial accuracy. This performance rose during the training phase, as we noted that student clinicians began making accurate choices to cue in the direction of difficulty with the trained cueing protocol. We saw highest performance for all student clinicians during the individual conference phase. Skills for all student clinicians increased over the course of the semester and within the nine sessions. However, we noted that in general student clinicians required practice developing their skills to differentiate between accurate and inaccurate productions, and strategies to increase and

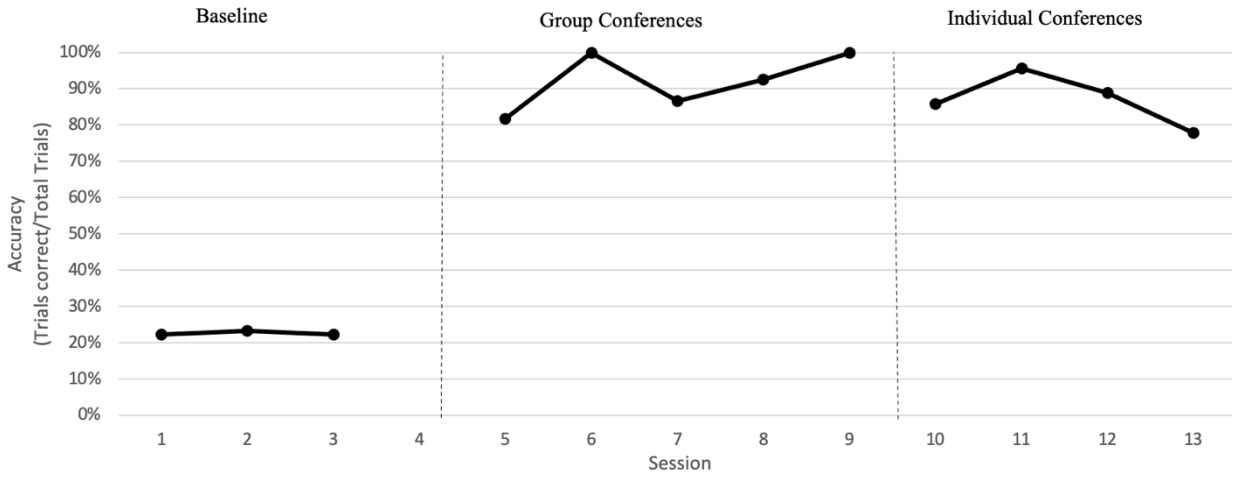
decrease the difficulty of the trials often occurred after the sessions versus online. In addition, our complex targets were targets that were non-stimulable, which were particularly challenging to establish for student clinicians 2 and 3. Trial accuracy for all targets increased from baseline performance. We discuss the specific performance for each student clinician below:

Student Clinician 1. Student Clinician 1 showed an accuracy of 22% of cueing opportunities during the baseline phase (see Figure 3). This was due to the nature of the protocol in which the first two cueing opportunities (between trials one and two, and two and three) required the student to maintain the present level of difficulty if the client was accurate on the first two trials (2/9). We noted that Student Clinician 1 had a client that was showing 100% accuracy at the word level, and Student Clinician 1 made no adjustments across the rest of the 10 trials, or seven additional cueing opportunities, which would have required an increase in difficulty of the trials.

During the instructional phase, we gave Student Clinician 1 their research targets, which were multisyllabic cognates. We saw cueing skills sharply increase and maintain accuracy within the 89% - 100% range. This student clinician began modifying target difficulty and levels of cues per trials. Importantly, Student Clinician 1 did so within the criteria we had established. These skills were maintained during both group and individual feedback conferencing.

Student Clinician 1 averaged 54 trials per session and the average accuracy for their client was 71% across all intervention trials, demonstrating an increase in production accuracy during intervention from a 0% baseline.

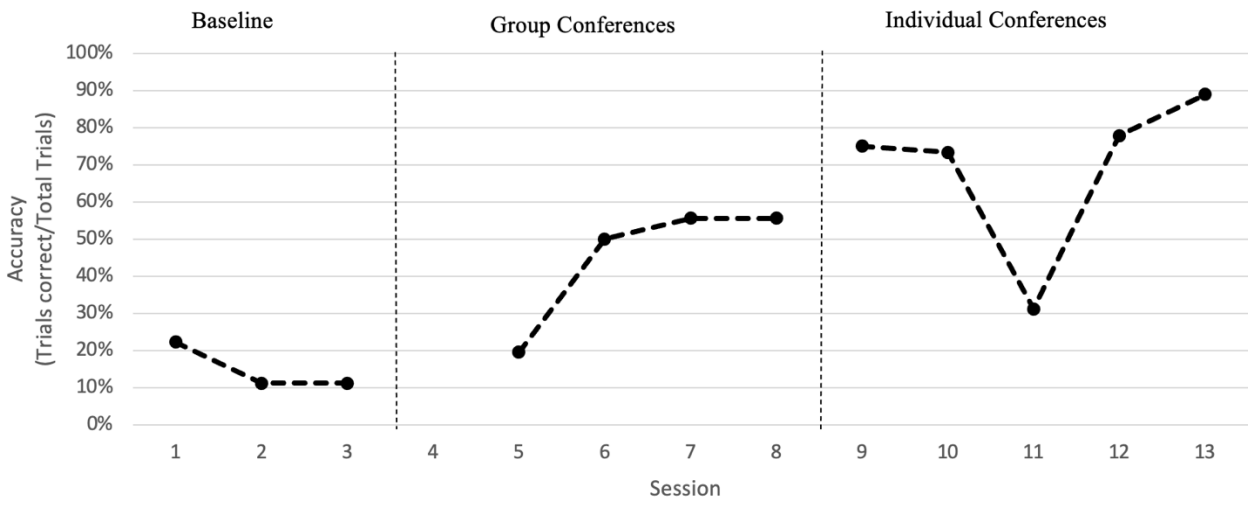
Figure 3. *Student Clinician 1 Cueing Performance*



Student Clinician 2. Student Clinician 2's performance showed a stable trend during baseline of 10% - 20% accuracy in cueing decisions (see Figure 4). Similar to the other student clinicians, Student Clinician 2 showed few modifications to the presentation of trials for their client.

During the intervention phase, Student Clinician 2 was given a complex cluster as a target that matched the phonetic inventory of the client. Upon implementation of the cueing protocol, coupled with group feedback, we observed an increase in cueing performance to 56% accuracy. We transitioned to individual feedback conferences to facilitate individualized feedback and promote higher accuracy in implementation of cueing skills. Cueing performance increased further to a high of near 90% accuracy when provided with individual feedback conferences.

Figure 4. *Student Clinician 2 Cueing Performance*

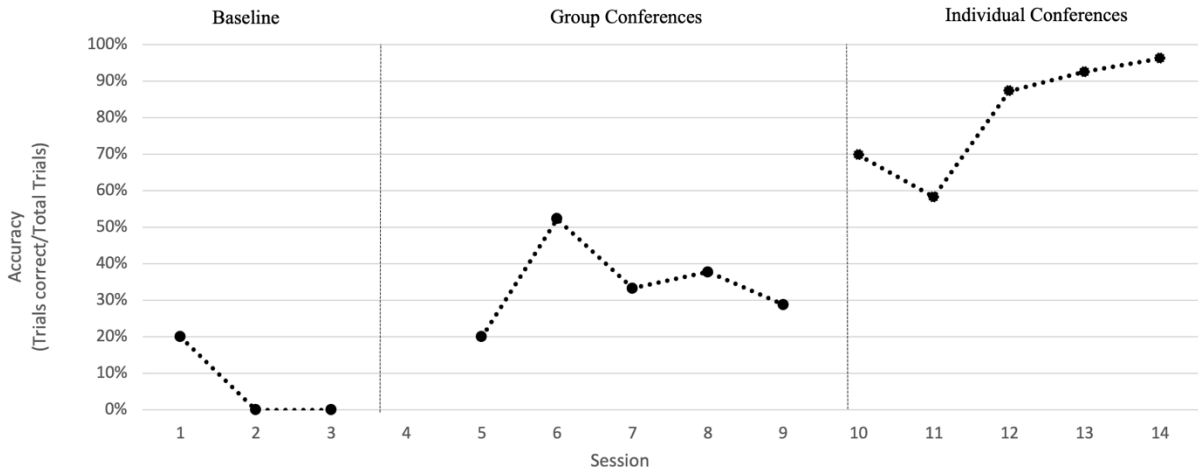


Student Clinician 2 averaged 34 trials per session, and the average accuracy for their client was 38% across all intervention trials, an increase from a 0% baseline. We noted that despite appropriate attempts at cueing, they struggled with the behavior management of the client, which may have affected overall trial performance.

Student Clinician **3.** Student Clinician 3's performance showed a stable trend during baseline of 10% - 20% accuracy when cueing for /s/ (see Figure 5). Similar to peer clinicians. Student Clinician 3 showed few modifications to the presentation of trials for their client.

We noted that Student Clinician 3's cueing performance increased upon use of our cueing protocol coupled with feedback but to a lesser degree than with the other student clinicians, averaging between 30-40% adherence to the protocol. With the transition to individual conferencing for their target and client, we saw an increase in performance that eventually reached above 90%.

Figure 5. *Student Clinician 3 Cueing Performance*



Student Clinician 3 averaged 60 trials per session and the average accuracy for their client was 66% across all intervention trials, an increase from a 0% baseline.

Discussion

The ability to effectively cue clients is an important skill for student clinicians to acquire as they learn to implement speech sound interventions. The ability to teach student clinicians these skills is equally important for clinical educators. This pilot study sought to examine the effects of training bilingual student clinicians to use a cueing protocol when treating bilingual children with SSDs. Our graduate student clinicians entered the study with little to no deviation in how they presented their treatment stimuli to their clients. The lack of sub-skills, such as the ability to judge trials as accurate or inaccurate, or knowledge of the strategies to shape productions, likely contributed to their difficulty to cue their own clients in the moment, or "online." The results of this study suggest utilizing a cueing protocol is an effective way to train intervention skills to improve trial accuracy when treating SSDs.

Our results support prior research in providing students with systematic and explicit instruction on carrying out clinical tasks (Irizarry-Pérez et al., 2021; Matthews et al., 2021; Peña & Kiran, 2008). The greatest benefit of our approach may have been to consolidate pieces of the larger tasks in a visual manner and create guidelines to prompt online decision-making skills. As Peña and Kiran (2008) suggest, in the early stages of learning, it may help to explicitly outline the steps needed to complete the clinical task. Our scoring template, coupled with group and individual conferencing meetings to support student clinicians' implementation of strategies, likely aided in accomplishing that task. Our educational approach limited the overall cues the student clinicians could provide in the template.

In addition, we noted that adjustments in conferencing styles aided our student clinicians differentially. Specifically, we found individual conferencing more supportive for both Student Clinicians 2 and 3. This may have been due to the fact their intervention targets were complex phonological targets that were later-developing and not stimulable. Thus, while using a script and systematic explicit instruction for implementing the cueing protocol was effective, the role of the clinical educator in providing individualized feedback and support was also an essential component of the intervention. As applied to treating SSDs in this study, clinical educators may need to provide more specific training for speech targets that are not stimulable and more difficult to train, as these targets require more complex clinical skills.

The findings also support the use of the challenge-point criteria as a medium to train graduate student clinicians to effectively implement therapy for SSDs. Matthews et al. (2021) used a criterion of four out of five trials to make an adjustment in the antecedent. In contrast, we used a

criterion of three consecutive trials correct or two consecutive incorrect trials to make an adjustment in the antecedent. In both cases, these criteria supported treatment fidelity and supported client gains. Matthews et al. (2021) also focused on treatment outcomes, we focused on student learning and the supervision process. However, our findings are similar in that we found student clinicians could learn to utilize such strategies as well, and document that training process.

An important outcome of the study, which was not a direct research question of ours, were the trial data for the clients that our student clinicians treated. While we did not judge student clinicians on the outcome of their cueing attempts, all the clients showed an increase in trial accuracy from baseline performance. Thus, the training protocol not only supported student clinicians' implementation of cueing, but also client's overall gains in speech sound therapy. Importantly, neither the cueing skills of the student clinicians nor the trial accuracy of their clients needed to achieve 100% accuracy with their clients to make gains. That is, instructors do not need to seek perfection of skills in the early learning stages with their student clinician's speech intervention goals. Future studies should assess the relationship between student clinicians' fidelity of implementation and client performance.

The current study adds to the limited amount of SoTL research that exists in the education of speech intervention skills. Specifically, we measured specific student clinicians behaviors and outcomes, which has been a limitation of prior literature (Wolford, et al., 2021). The study also adds to the even smaller body of research in the education of bilingual speech-language pathology students. Irizarry-Perez et al. (2021) focused on assessment skills, and here we focus on intervention skills. In both studies, the aspects of working in Spanish presented additional

challenges for the student clinicians. Student clinicians may benefit from being provided language models and vocabulary to support the acquisition of skills in their own clients. Part of the educational experience may need to support this clinical vocabulary.

Limitations. This study was a pilot study and, due to external constraints related to the larger study, a more rigorous experimental design was not possible. Ideally, a multiple-baseline design would provide better experimental control. This study was also not comparative in nature. There may be alternative approaches to teaching cueing skills. Our study does not tease apart which pieces might have been the most effective, either.

Since the client's treatment targets during baseline were not the same targets used in the intervention phase, we cannot directly compare performance across targets. It is possible, although unlikely based on the low level of cueing knowledge presented by the student clinicians initially, that they may have presented the treatment targets differently than their baseline targets. However, given we did not see any behaviors at attempting to cue differently during baseline, we believe our data is an accurate representation of those skills across phases.

Conclusions

Future Studies. Future work could extend the current work in several ways. First, replicating our training with a multiple-baseline design would strengthen the findings. Since time is often limited when using university calendar schedules, we would recommend a multiple-baseline design across behaviors. Second, extending the same training to other speech targets would replicate the

approach we took. In addition, we offer only one way to approach training cueing that worked for our intervention needs. Finally, we later altered our scoring criteria to allow student clinicians to make transitions quicker with different treatment targets. We also expanded the requirements of student clinicians to consider trials across words within a session. A more refined challenge-point criterion ultimately proved successful after having learned the original version of our score sheet but should be documented with necessary data. Examining ways to train more advanced skills and student clinicians at later stages of learning is equally important.

Financial Disclosures. This work was supported indirectly by the ASHA's Advancing Academic Research Careers Award.

Non-Financial Disclosures. All authors are members of the ASHA.

References

Alfano, A. R., Medina, A. M., & Moore, S. (2021). Preparing culturally and linguistically diverse students to work with culturally and linguistically diverse populations: A program design and student outcomes study. *Teaching and Learning in Communication Sciences & Disorders*, *5*(3), 2. https://doi.org/10.30707/TLCSD5.3.1649037688.612332

American Speech-Language-Hearing Association. (2022). 2021 *Demographic profile of ASHA members providing multilingual services*. www.asha.org.

American Speech-Language-Hearing Association. (2008). *Clinical Supervision in Speech-Language Pathology* [Technical Report]. www.asha.org/policy

American Speech-Language-Hearing Association (n.d.). *Bilingual Service Delivery* (Practice Portal). www.asha.org/Practice-Portal/Professional- Issues/Bilingual-Service-Delivery/.

Anderson, J. L. (1988). The supervisory process in speech-language pathology and audiology. *Ear and Hearing, 9*(4), 223. https://journals.lww.com/ear-hearing/Citation/1988/08000/The_Supervisory_Process_in_Speech_Language.19.aspx

Arriaza, P. (2015). Spanish language self-efficacy beliefs among Spanish-speaking social workers: Implications for social work education. *Journal of Social Work Education, 51(3),* 550-565. https://doi.org/10.1080/10437797.2015.1043204

Biever, J. L., & Santos, J. (2016). Ofreciendo terapia en el idioma de preferencia del cliente: El modelo de preparacion profesional calificada en dos idiomas de OLLU. In *Family Therapy in Global Humanitarian Contexts* (pp. 51-63). Springer, Cham. https://link.springer.com/chapter/10.1007/978-3-319-39271-4_5

Cook, B., Buysse, V., Klingner, J., Landrum, T., McWilliam, R., Tankersley, M., & Test, D. (2014). Council for exceptional children: Standards for evidence-based practices in special education. *Teaching Exceptional Children, 46*(6), 206 - 212. https://exceptionalchildren.org/sites/default/files/2021-04/EBP_FINAL.pdf

Dudding, C. C., McCready, V., Nunez, L. M., & Procaccini, S. J. (2017). Clinical supervision in speech-language pathology and audiology in the United States: Development of a professional specialty. *The Clinical Supervisor, 36(2),* 161-181. https://doi.org/10.1080/07325223.2017.1377663

Dudding, C. C., & Pfeiffer, D. L. (2018). Clinical decision-making in speech-language pathology graduate students: Quantitative findings. *Teaching and Learning in Communication Sciences & Disorders, 2(1), 2.* doi.org/10.30707/TLCSD2.1Dudding

Furlong, L. M., Morris, M. E., Serry, T. A., & Erickson, S. (2021). Treating childhood speech sound disorders: Current approaches to management by Australian speech-language pathologists. *Language, Speech, and Hearing Services in Schools, 52*(2), 581-596. https://doi.org/10.1044/2020_LSHSS-20-00092

Gauna, L. M., Beaudry, C., & Cooper, J. (2022). The leaking Spanish bilingual education teacher pipeline: Stories of PK-20 challenges told by Latinx becoming bilingual teachers in the US. *Journal of Latinos and Education*, 1-15. https://doi.org/10.1080/15348431.2022.2057989

Guadagnoli, M. A., & Lee, T. D. (2004). Challenge point: A framework for conceptualizing the effects of various practice conditions in motor learning. *Journal of Motor Behavior*, *36*(2), 212-224. https://doi.org/10.3200/jmbr.36.2.212-224

Gierut, J. A., & Morrisette, M. L. (2010). Phonological learning and lexicality of treated stimuli. *Clinical Linguistics & Phonetics*, *24*(2), 122–140. https://doi.org/10.3109/02699200903440975

Giguere, D., & Hoff, E. (2020). Home language and societal language skills in second-generation bilingual adults. *International Journal of Bilingualism*, *24*(5-6), 1071-1087. https://doi.org/10.1177/1367006920932221

Ginsberg, S. M., Friberg, J. C., & Visconti, C. F. (2016). Diagnostic reasoning by experienced speech-language pathologists and student clinicians. *Contemporary Issues in Communication Science and Disorders, 43*, 87-97. https://doi.org/10.1044/cicsd_43_S_87

Hayes, E. J., Mathews, L. A., & Cloud, S. J. (2022). Perspectives Relating to Multicultural Training With Speech-Language Pathologists. *Perspectives of the ASHA Special Interest Groups*, 1-10. https://doi.org/10.1044/2022_PERSP-22-00041

Grogan-Johnson, S., Schmidt, A. M., Schenker, J., Alvares, R., Rowan, L. E., & Taylor, J. (2013). A comparison of speech sound intervention delivered by telepractice and side-by-side service delivery models. *Communication Disorders Quarterly, 34*(4), 210-220. https://doi.org/10.1177/1525740113484965

Higginbotham, J., & Satchidanand, A. (2019). From triangle to diamond: Recognizing and using data to inform our evidence-based practice. *ASHA Journals: Academy. https://academy.pubs.asha.org/2019/04/from-triangle-to-diamond-recognizing-and-using-data-to-inform-our-evidence-based-practice*

Keshishian, F., & Wiseheart, R. (2015). Bilingual and monolingual students' perceptions of the CSD major: A qualitative study. *Perspectives on Issues in Higher Education*, *18*(1), 16-31. https://doi.org/10.1044/ihe18.1.16

Kratochwill, T. R., Hitchcock, J. H., Horner, R. H., Levin, J. R., Odom, S. L., Rindskopf, D. M., & Shadish, W. R. (2013). Single-case intervention research design standards. *Remedial and Special Education*, *34*(1), 26-38. https://doi.org/10.1177/0741932512452794

Interiano-Shiverdecker, C., Robertson, D., Zambrano, E., Morgan, A., & Cantu Contreras, J. (2021). Development and implementation of a bilingual counseling certificate program. *Teaching and Supervision in Counseling, 3*(3), 1-10. https://trace.tennessee.edu/cgi/viewcontent.cgi?article=1157&context=tsc

Irizarry-Pérez, C. D., Lugo-Neris, M. J., Bedore, L. M., & Peña, E. D. (2021). Establishing diagnostic skills in novice bilingual clinicians: A scaffolded approach. *Teaching and Learning in Communication Sciences & Disorders, 5*(1), article 6. https://doi.org/10.30707/TLCSD5.1.1624982519.487027

Irizarry-Pérez, C. D., Fabiano-Smith, L., & Martinez-Fisher, A. (2023). A Complexity Approach

to Promoting Within-and Cross-Language Generalization in Bilingual Children With Phonological Delays. *Language, Speech, and Hearing Services in Schools*, 1-16. https://doi.org/10.1044/2023_LSHSS-22-00128

Keshishian, F., & Wiseheart, R. (2015). Bilingual and monolingual students' perceptions of the CSD major: A qualitative study. *Perspectives on Issues in Higher Education*, *18*(1), 16-31. https://doi.org/10.1044/ihe18.1.16

Kim, I, LaPointe, L. L., & Stierwalt, J. A. G. (2012). The effect of feedback and practice on the acquisition of novel speech behaviors. *American Journal of Speech-Language Pathology, 21*(2), 89–100. https://doi.org/10.1044/1058-0360(2011/09-0082) https://doi.org/10.1044/1058-0360(2011/09-0082)

Kohnert, K., & Medina, A. (2009). Bilingual children and communication disorders: a 30-year research retrospective. *Seminars in Speech and Language, 30*(4), 219-233. https://psycnet.apa.org/doi/10.1055/s-0029-1241721

McCrea, E. S., & Brasseur, J. A. (2003). *The Supervisory Process in Speech-Language Pathology and Audiology.* Allyn & Bacon.

Matthews, T., Barbeau-Morrison, A., & Rvachew, S. (2021). Application of the challenge point framework during treatment of speech sound disorders. *Journal of Speech, Language, and Hearing Research, 64*(10), 3769-3785.

Medina, A. M., Alfano, A. R., & Moore, S. (2022). Considerations for addressing the needs of culturally and linguistically diverse speech-language pathology Praxis test takers. *American Journal of Speech-Language Pathology, 31(2),* 601-612. https://doi.org/10.1044/2021_AJSLP-20-00358

Milisen, R. (1954). A rationale for articulation disorders. *Journal of Speech and Hearing Disorders, 4*(Monograph Suppl), 6-17.

Narayanan, T. L., & Ramsdell, H. L. (2022). Self-reported confidence and knowledge-based differences between multilingual and monolingual speech-language pathologists when serving culturally and linguistically diverse populations. *Perspectives of the ASHA Special Interest Groups,* 7(1), 209-228. https://doi.org/10.1044/2021_PERSP-21-00169

Peña, E. D., & Kiran, S. (2008). In defense of cookbooks: From novice to competent clinician. *Topics in Language Disorders, 28*(3), 242-258. *DOI:* 10.1097/01.TLD.0000333599.30468.9d

Pruitt-Lord, S., Escobedo, A., Paz, J., & Robinson-Zañartu, C. (2021). Building a pipeline of bilingual SLPs to serve dual language learners: An inclusive model of interprofessional education. *Teaching and Learning in Communication Sciences & Disorders*, *5*(3), article 8. DOI: https://doi.org/10.30707/TLCSD5.3.1649037688.673503

Radville, K. M., Larrivee, E. C., Baron, L. S., Kelley-Nazzaro, P., & Christodoulou, J. A. (2022). Online Training Modules for Teaching Assessment Skills to Graduate Student Clinicians. *Language, Speech, and Hearing Services in Schools, 53*(2), 417-430. https://doi.org/10.1044/2021_LSHSS-21-00068

Riquelme, L. F. (2011). Diminishing barriers to the Praxis examination in communication sciences and disorders. *Perspectives on Global Issues in Communication Sciences and Related Disorders, 1*(2), 64-71. https://doi.org/10.1044/gics1.2.64

Roth, F. P., & Worthington, C. K. (2011). *Treatment Resource Manual for Speech-Language Pathology (4th ed.).* Delmar.

Santhanam, S. P., & Parveen, S. (2018). Serving culturally and linguistically diverse clients: A

review of changing trends in speech-language pathologists' self-efficacy and implications for stakeholders. *Clinical Archives of Communication Disorders, 3*(3), 165-177. https://doi.org/10.21849/cacd.2018.00395

Schwarz, A. L., Resendiz, M., Herrera, L. C., & Gonzales, M. D. (2021). A novel approach to assessing language proficiency in adults: A pre-pilot classification accuracy study. *International Journal of Bilingualism, 25(3),* 812-832. https://doi.org/10.1177/1367006921999452

Senreich, E., & Saint-Louis, N. M. (2022). Students' experiences of participating in a dual-language English–Spanish MSW program component: A qualitative study. *Journal of Social Work Education*, 1-16. https://doi.org/10.1080/10437797.2022.2050867

Wolford, G. W., Fissel Brannick, S., Strother, S., & Wolford, L. (2021). Clinical education outcomes and research directions in speech-language pathology: A scoping review. *Teaching and Learning in Communication Sciences & Disorders*, *5*(2), article 3. *https://doi.org/10.30707/TLCSD5.2.1624983591.656565*