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Speech-Language Pathology Students' Perceptions on the use of a Spontaneous Language Sample Analysis as a Diagnostic Tool for Language Disorders in Children

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Introduction

The American Speech-Language-Hearing Association (ASHA) is a professional association for Speech Language Pathologists (SLP) that sets guidelines for the best evidence-based practices, upholds rigorous academic standards, and provides the latest clinical information and resources for service provision (ASHA, n.d.). One of the primary roles of a speech-language pathologist is to thoroughly assess and optimize a patient's overall language abilities to become better communicators in all social environments. According to the ASHA Practice Portal guidelines, the best practices for assessing language in children should include among other things, a detailed screening, formal and informal speech and language assessment measurements, and considerations for special populations (ASHA, n.d.).

A thorough language assessment includes standardized and non-standardized or alternative assessments methods (Caesar & Kohler, 2009). SLPs use non-standardized measures such as questionnaires, observations, checklists, and language sample analyses (Fulcher-Rood et al., 2019). In a study by Ceasar and Kohler (2009), 409 school-based SLPs were surveyed in the United States. Their results showed parent-teacher interviews were used 98% of the time, language sample analyses were used 94% of the time, and informal observations were used 96% of the time. In a later study by Pavelko, Owens, Ireland, and Hahs-Vaughn (2016), results indicated 67% of SLPs in the United States used language sample analyses. However, it is unclear what the SLPs meant by "language sample analysis," as many SLPs write down a few sentences heard and estimate utterance length and syntactic use, rather than performing a formal language sample analysis.

When assessing individuals who are bilingual and/or come from a Culturally and Linguistically Diverse (CLD) background, using both standardized and non-standardized procedures is especially important. A study by Ceasar and Kohler (2007) investigated how often SLPs use standardized tests in comparison to informal, alternative procedures when assessing the language skills of bilingual students. Language sampling was the informal tool most frequently used by SLPs (33%). A language sample analysis can be used with children from CLD backgrounds, and they can be a useful way of documenting change over time or in response to intervention, in addition to providing a unique opportunity to survey pragmatic language skills in a more naturalistic setting (Paul, Norbury, & Gosse, 2018).

A Language Sample Analysis (LSA) is one of the most important diagnostic tools when assessing children with suspected language impairments. Additionally, a LSA serves as a guide for a child's treatment plan because it offers a descriptive detail of their strengths and weaknesses and can also be used for checking language improvement due to intervention. Although many authors have emphasized the importance of using a LSA, there are many SLPs who do not use them because they can be lengthy and challenging. As stated by Kinnane (2019), "best practice" guidelines to get a good LSA include following the child's conversational lead, engaging in parallel talk about familiar household activities, sharing personal anecdotes and experiences, and introducing topics related to past and ongoing events during conversation. An LSA can be conducted using pencil-and-paper or computerized procedures, however both types include measures such as Mean Length of Utterance (MLU), Number of Different Words (NDW), Total Number of Words (TNW), as well as measures of complexity, such as the Complexity Index. Using NDW and TNW, the clinician can calculate the Type=Token Ratio (TTR) , which is a measure of vocabulary diversity achieved by dividing the total NDW by the TNW.

There are several published paper-based procedures that assist in analyzing individual aspects of language. Some recommended references include Brown's *A First Language: The Early Stages* (1973), De Villiers and De Villiers' *A Cross-Sectional Study of the Acquisition of Grammatical Morphemes in Child Speech* (1973), Tyack and Gottsleben's *Language Sampling, Analysis, and Training: A Handbook for Teachers and Clinicians* (LSAT) (1974), and *Language Assessment, Remediation, and Screening Procedure* (LARSP), Crystal et. al, 1976, 1991). In addition, T*he Guide to Analysis of Language Transcripts* by Retherford (1993) is one in particular that combines different procedures into one comprehensive analysis procedure. Computerized analysis procedures use a combination of these earlier published procedures to arrive at the same analysis in a shorter period of time. However, before using these computerized procedures, language samples must be transcribed and coded for computer analysis. Examples of computerized procedures include The Computerized Language Analysis (CLAN) (MacWhinney, 2000); the Systematic Analysis of Language Transcripts (SALT) software (Miller, 2016); and the the Sampling Utterances and Grammatical Analysis Revised (SUGAR) (Pavelko & Owens, 2017) to name a few more popular ones.

Heilman (2010) states that there is an abundance of information that supports the use of LSA in clinical practice, but many clinicians do not use it regularly because there is a negative stigma surrounding LSA associated with misconceptions about the process. In his study, Heilmann reports some common misconceptions which include: language sampling is hard to learn, time-consuming, inaccurate and unreliable. In Pavelko, Owens, Ireland, and Hahs-Vaughn (2016) study, school-based SLPs completed an electronic survey relating to LSA which examined the practice of LSA in public schools across the United States. The findings of this study indicated that many school-based LSA practices are not following the advised evidence-based guidelines. The study also stated that many SLPs are not using LSA. Limited time was the most frequently identified barrier to LSA use. According to 78% of responders, clinicians who are not using LSA reported they do not have enough time to collect and analyze the language samples. Around 15-25% of respondents indicated that limited training and experience was another barrier to the use of LSA. The three most frequently selected areas of training and support include analyzing language samples (84%), interpreting language sample results (83%), and developing treatment goals (79%). Another concern in the study relates to the limit in variation in tasks used to elicit samples. Conversation is the most frequently used elicitation context across all ages (95%). This is particularly concerning as it demonstrates that SLPs are not using age-appropriate elicitation tasks, which limits the opportunities in which students are able to use age-appropriate, complex language skills (Pavelko et al., 2016). A third concern found in the study is the common practice of transcribing speech in real-time. Real-time transcription is not recommended when the SLP is engaging in conversation with the client and simultaneously transcribing. Recording devices are available to be used to record the interaction so the SLP will be able to be more attentive and actively engaged in a natural way with the client (Pavelko et al., 2016). Lastly, the fourth concern found in the study, relates to the use of self-designed protocols. Results indicated that self-designed protocols are most frequently used (45%) by the respondents. Utilizing self-designed protocols does not follow evidence-based protocol (Pavelko et al., 2016).

In summary, Pavelko et al (2016) found that SLPs are not using sound, evidence-based procedures when conducting a LSA. Though the majority of graduate student programs in speech-language pathology include training on how to properly execute a LSA, there are no studies that examine whether these skills are maintained post graduation nor how confident graduates feel about using LSAs. One study conducted by Ramos et al. (2021) studied retention of SLA procedures by graduate students before graduation. In this study, participants were assigned to two groups, a Comprehensive Analysis group and a Simplified Analysis group, where two different teaching methods were provided. The researchers were able to conclude that retention of most LSA components was very low for both groups 15 months post instruction, and there were no significant differences between teaching methods (Ramos et. al, 2021). Because LSA procedures are a vital part of the diagnostic process, SLP students must graduate from their programs with sufficient confidence to perform, analyze, and incorporate this tool into their diagnostic procedures. 67% of SLPs in the United States report using LSA as a diagnostic tool (Pavelko et al., 2016). This limited percentage has been found to be a result of SLPs believing that LSAs require an excessive amount of time. In addition, SLPs have reported reduced levels of confidence in performing and analyzing LSAs. Those who reported frequent use of LSAs stated that they use a customized protocol when performing them (Pavelko et al., 2016).

Currently, there are no studies of Speech-Language Pathology (SLP) graduate students' perceptions on the clinical relevance of spontaneous language sample analyses or their views on how to make analysis procedures easier to learn and retain.

The current study used a survey questionnaire that was carefully developed and administered to a cohort of first year Speech-Language Pathology graduate students at Florida International University in Miami, Florida. The purpose of this survey was to collect information regarding the students' experiences conducting a spontaneous language sample analysis and their views on the importance of using such analysis. More specifically, the research questions we attempted to answer were:

1) Do SLP graduate students feel confident in their abilities to use an LSA as part of a language assessment?
2) Do SLP graduate students consider an LSA an effective language assessment tool for children?

METHOD

One cohort of first year students in the Master of Sciences program in Speech-Language Pathology at Florida International University (46 students) participated in this study. As part of one class in the first semester in the program, students were taught how to do a semantic and syntactic analysis of children's spontaneous language to use as a tool for aiding in the diagnosis of language disorders. This particular cohort was taught how to do the LSA using an instructor-made Excel spreadsheet which included information on MLU, grammatical morphemes, Complexity Index (CI), development of Noun Phrase (NP) and Verb Phrase (VP) elaborations, and Type Token Ratio (TTR) (as described in Brown, 1973; de Villiers and de Villiers, 1973; Miller & Chapman, 1981; and Templin, 1975). Other qualitative analyses of question forms, NPs, VPs, complex sentences, and areas of weaknesses/strengths were also taught.

After LSA assignments were graded and returned to the students with corrections and comments, the students were anonymously surveyed on this experience using Google Forms. The following questions were asked in the survey:

Question	**Style** *(yes/no, rating, open ended)*
It is important to learn how to do a Language Sample Analysis (LSA).	Rating Scale 1- 5
Did you complete this assignment in a group?	Yes/No
Do you feel like you had the adequate background knowledge necessary to complete this LSA assignment? (i.e., Excel competency, grammar types, identifying clauses, counting utterances, etc.)	Yes/No
If you answered "No" above, please explain.	Short Response
How confident did you feel interpreting the results of the LSA?	Rating Scale 1-5
How confident were you about the content of the LSA which you submitted?	Rating Scale 1-5
In your opinion, do you believe that an LSA is an efficient method of collecting data on a child's language development?	Yes/No
Do you see yourself utilizing an LSA with preschool-aged children as a practicing SLP?	Yes/No
After receiving feedback from your professor, how confident do you feel about completing an LSA?	Rating Scale 1-5
As a grad student, rate how confident you would feel completing this LSA a few	Rating Scale

months post-initial instruction.	1-5
Please take a moment to add any additional information, comments, or concerns either relating to the previous questions or in general: (i.e., what would you incorporate into your learning experience, can you think of an alternative teaching method? etc.)	Short Response

In the following semester (6 months post initial assignment and survey), 38 students from the same cohort were given a short language sample to analyze and immediately after were asked to complete another survey. The short LSA contained 10 child utterances and spaces for students to enter, for each utterance, number of morphemes, number of clauses, whether or not the utterance was complex, and if so to identify the type of complex utterance. They were then asked to calculate MLU, Complexity Index (CI), and identify elaborations of the NPs as well as morphosyntactic strengths and weaknesses. They were not asked to calculate TTR, but were asked how it could be calculated (formula). This task was completed in class and the students were not aware they would be asked to complete it ahead of time (ungraded assignment). The second anonymous survey given right after completion of the short LSA contained the following questions:

Question	**Style** *(yes/no, rating, open ended, multiple choice, checkboxes)*
It is important to learn how to do a Language Sample Analysis (LSA).	Rating Scale 1- 5
Do you feel like you had the adequate background knowledge necessary to complete this LSA assignment? (i.e., Excel competency, grammar types, identifying clauses, counting utterances, etc.)	Yes/No
If you answered "No" to the previous question, please explain which areas/skills you felt least confident in.	Short Response
I felt confident identifying the following when completing the LSA:	Checkboxes
Do you see yourself utilizing an LSA with children as a practicing SLP?	Yes/No
How confident would you feel using an LSA to assess language in children?	Rating Scale 1-5
If you are currently working as an SLPA, or are doing a clinical rotation, do you feel the LSA is better to be utilized with preschoolers, school-age children, or both?	Multiple Choice
If you are currently working as an SLPA, or are doing a clinical rotation, have you seen an LSA being used as part of the assessment procedures?	Yes/No
If you answered "Yes" to the previous question, please specify how often an LSA is utilized and what procedures are used (e.g, how many utterances, is it recorded for later transcription or live transcription, analyzed for MLU or any other features, etc.)	Short Answer
After graduation, as a practicing clinician, do you see yourself utilizing an LSA as an assessment tool with preschool children, and/or school-age children as a practicing	Multiple Choice

clinician?	
Please take a moment to express any of your feelings that were not captured by the questions above as they relate to LSAs in general and your own confidence in using them.	Short Response

The answer key along with clarification on how to complete the short LSA was provided on another day. Students' responses to each question were analyzed and their perceptions of their own confidence level were compared to performance on completion of the short LSA.

RESULTS

Students' responses to the survey questions were gathered and analyzed. The following is a thorough description of the data collected in survey 1 and survey 2.

Survey 1

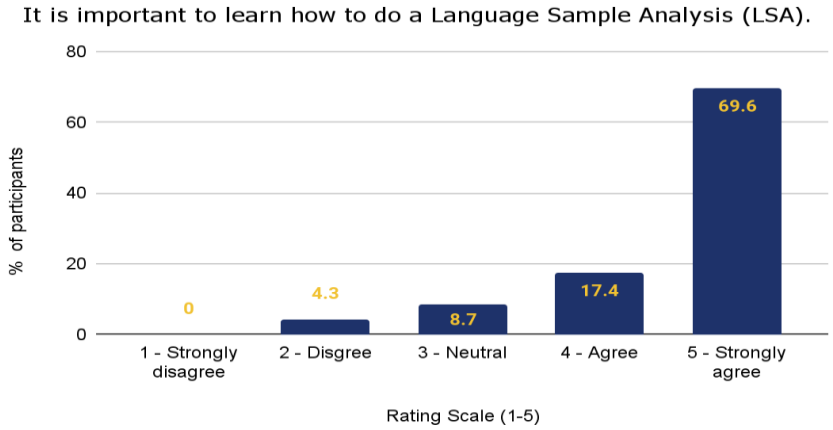

Fig. 1. Students' perceptions on how important it is to learn how to do an LSA

As represented in Fig. 1, when students were asked to rate the importance of learning how to do a Language Sample Analysis, 4.3% did not agree that it is important. 8.7% of them felt neutral, while 17.4% agreed that it was important, and 69.6% felt strongly agreed that it is a useful language assessment tool.

In answer to how confident students were when interpreting the results of an LSA, 6.5% were not confident, 54.3% were neutral, 32.6% were confident, and 6.5% were very confident. These results are represented in Fig. 2.

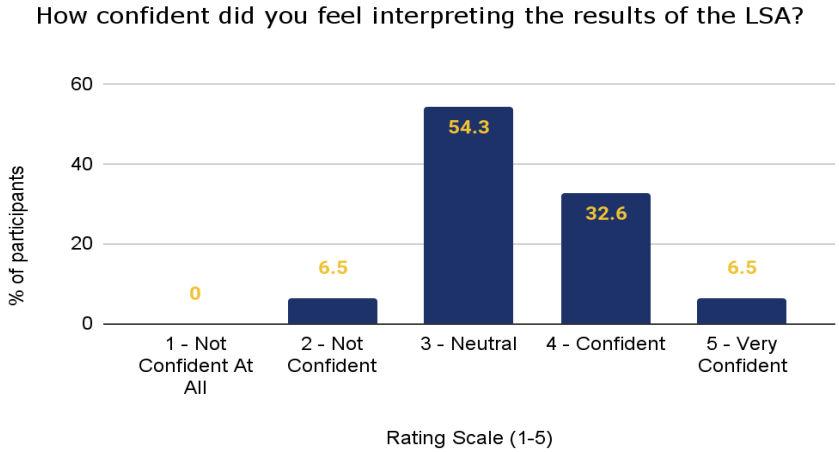

Fig. 2. Students' responses when asked how confident they feel in interpreting the results of an LSA.

In answer to how confident students were about the content of the LSA they submitted, 13% of the students reported they were not confident, 32.6% were neutral, 43.5% were confident, and 10.9% were very confident, as shown on Fig. 3.

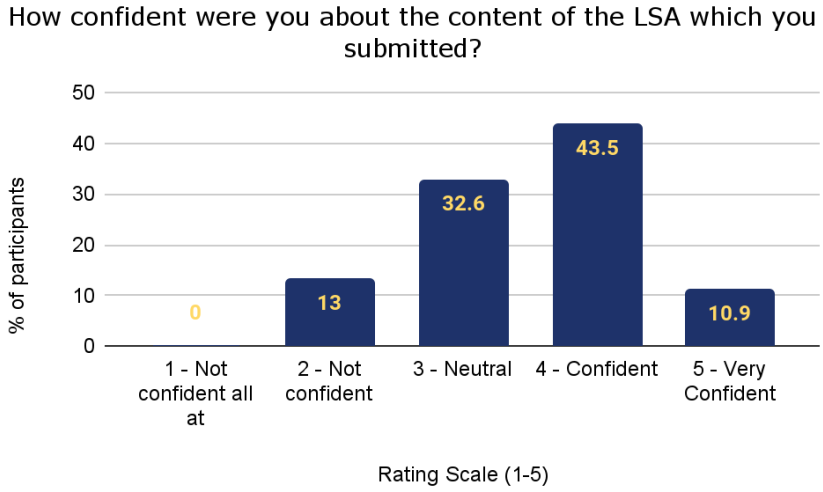

Fig. 3. Students' responses when asked how confident they feel regarding the content of the LSA assignment they submitted.

When asked to rate how confident they would feel about completing an LSA after receiving feedback from their professor. It was found that 10.9% of them did not feel confident, 17.4% were neutral, 52.2% felt confident, and 19.6% were very confident. Fig. 4 shows students' responses when asked to rate how confident they thought they would feel completing the same LSA assignment a few months after initial instruction, 13% said they would not be confident, 23.9% would be neutral, 56.5% would be confident, 6.5% would be very confident.

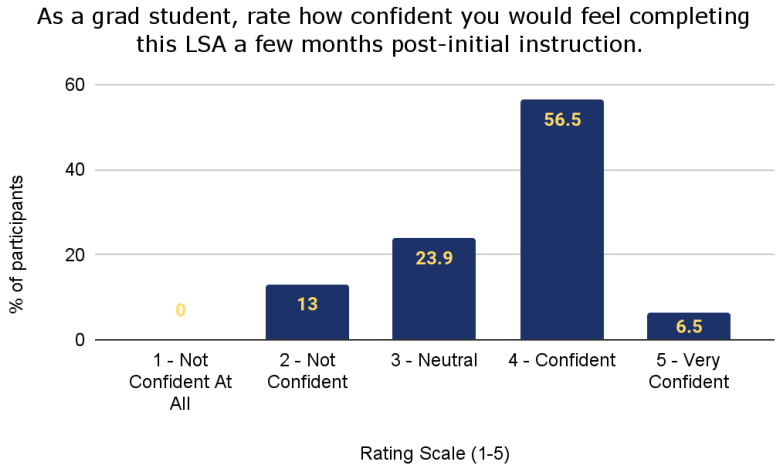

Fig. 4. Students' responses when asked to rate how confident they'd feel completing an LSA a few months post-initial instruction.

The last portion of survey 1 provided valuable information and insight, as students were asked to provide additional feedback and specific concerns. Various students mentioned that they didn't have adequate background knowledge to complete this assignment, which negatively impacted their confidence level. In addition, because completing an LSA is a lengthy process, they explained that this may impact how often they perform one as a practicing clinician. These participants also explained that completing this assignment via Excel was complicated/difficult, which may have affected their performance. Lastly, the majority of the students expressed that they didn't feel confident/prepared to accurately identify components of an LSA (i.e., identifying Brown's Morphemes, complex sentences, types of clauses, etc.) and believed they may have benefited from a mock assignment prior to completing a graded assignment.

Survey 2 (6 months later)

Fig. 5 shows students' responses to rate how important they feel it would be to learn how to do an LSA as part of a language assessment. The students' answers to this question from survey 1 were compared to

their answers in survey 2. In the first survey, 4.3% said it was not important, 8.7% said they were neutral, 17.4% said it's important, 69.6% said it's very important. In the second survey, 6.5% said it's not important at all, 22.6% said they were neutral, 25.8% said it was important, and 49.2% said it was very important.

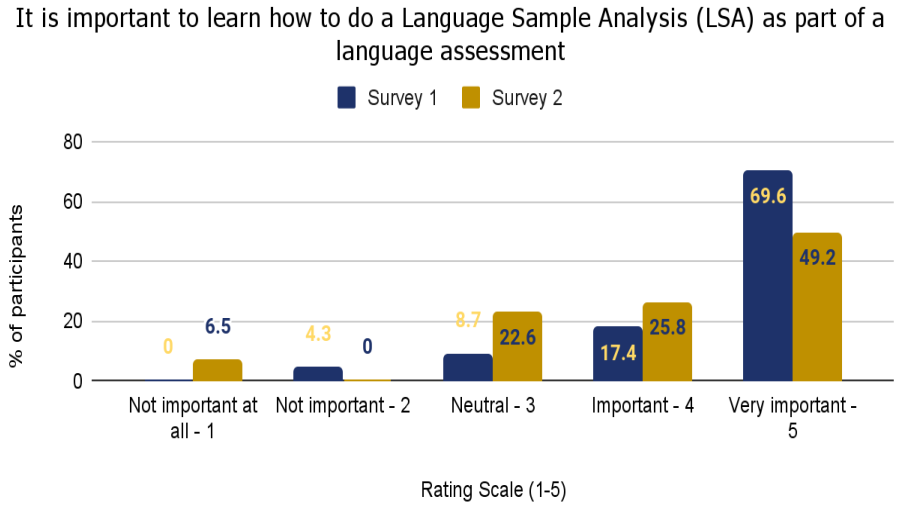

Fig. 5. Students' responses when asked to rate how important it is to learn how to do an LSA as part of a language assessment.

The students were asked if they felt like they had the adequate background knowledge necessary to complete the LSA assignment. The students' responses from survey 1 were compared to their responses from survey 2. In survey 1, 69.6% of the participants reported "yes" and 30.4% reported "no." Whereas in survey 2, 51.6% of the students reported "yes" and 48.4% reported "no." This data is shown on Fig. 6. If the respondents reported "no," they were asked to explain. The respondents continued to report a lack of background knowledge comparable to that found in Survey 1. Specifically, difficulties with grammar, identifying clauses, Brown's Morphemes, and complex sentences were still noted. However, results from Survey 2 demonstrated that students also felt decreased confidence with calculating index of complexity (CI), and TTR.

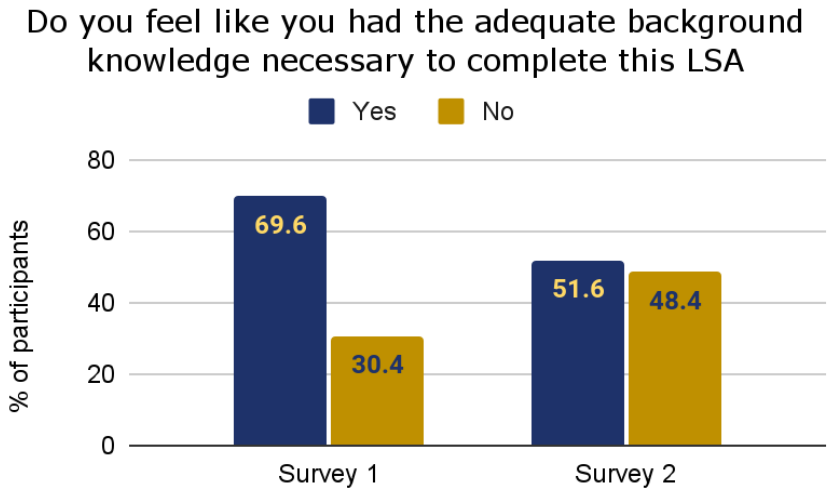

Fig. 6. Students' responses when asked if they felt like they had the adequate background knowledge necessary to complete the LSA assignment.

In the first survey, students were asked to rate how confident they were in identifying each factor of the LSA. In the second survey, the accuracy of students' identification of each factor of the LSA was calculated, allowing for comparison between the students' confidence and their accuracy. This comparative data that was collected is represented in Fig. 7.

In the first survey, 96.8% of students were confident in identifying number of morphemes, 74.2% were confident in identifying the number of clauses, 9.7% were confident in identifying the types of complex sentences, 93.5% were confident in calculating MLU, 35.5% were confident in calculating the index of complexity, 48.4% were confident in identifying the child's strengths & weaknesses, 16.1% were confident in identifying noun phrase elaborations, and 64.5% were confident in calculating the TTR. In comparison, 100% of the students accurately identified the number of morphemes, 74% accurately identified the number of clauses, 40.5% accurately identified the types of complex sentences, 73% accurately calculated the MLU, 2% accurately calculated the index of complexity, 77% accurately identified the child's strengths and weaknesses, 13.5% accurately identified noun phrase elaborations, and 67.5% accurately calculated the TTR.

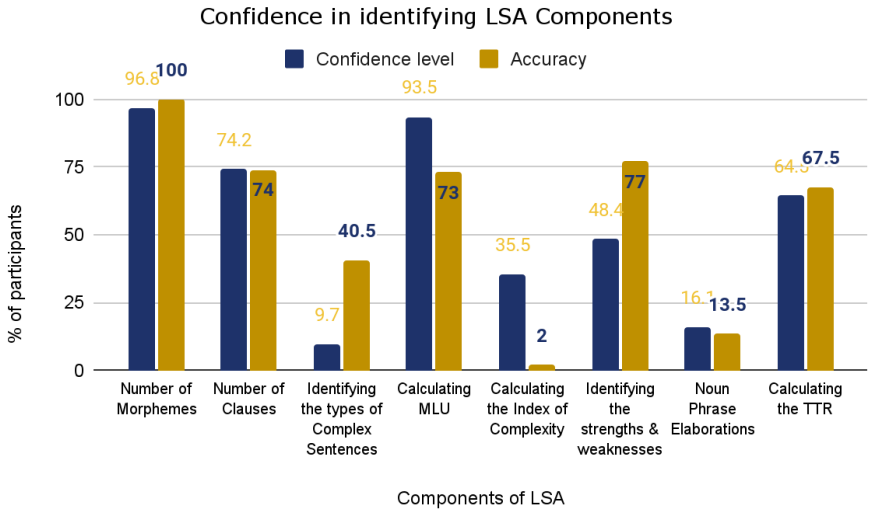

Fig. 7. Students' responses when asked to rate how confident they were in identifying each factor of an LSA.

In addition, the participants were asked if they see themselves utilizing an LSA with children as a practicing SLP. The students' responses from survey 1 were compared to their responses from survey 2. In survey 1, 73.9% of them reported "yes" and 26.1% reported "no." Whereas in survey 2, 66.7% of them reported "yes" and 33.3% reported "no.
"

The participants were also asked to rate their confidence level when using an LSA to assess language in children. 3.2% of participants reported feeling not confident at all, 22.6% were not confident, while the majority (48.4%) felt neutral. 19.4% felt confident, and 6.5% felt very confident.

In survey 2, the students were asked the following question: "If you are currently working as an SLPA, or are doing a clinical rotation, do you feel the LSA is better to be utilized with preschoolers, school-age children, or both?" 25% of the students stated that an LSA is better utilized with preschoolers, 8.3% stated school-aged children, 29.2% stated both populations, and 37.5% stated neither population. The students were also asked if they were currently working as an SLPA, or doing a clinical rotation, if they had seen an LSA being used as part of the assessment procedures. 4% of the students reported "yes" and 96% reported "no." The student who answered yes to this question explained that he or she has observed an LSA being utilized every time they "help with assessments."

Fig. 8 shows students' responses to the following question: "After graduation, as a practicing clinician, do you see yourself utilizing an LSA as an assessment tool with preschool children, and/or school-age children?" 16.1% stated that they'd see themselves using an LSA for preschoolers, 3.2% stated school-age children, 45.2% stated both populations, and 35.5% stated neither population.

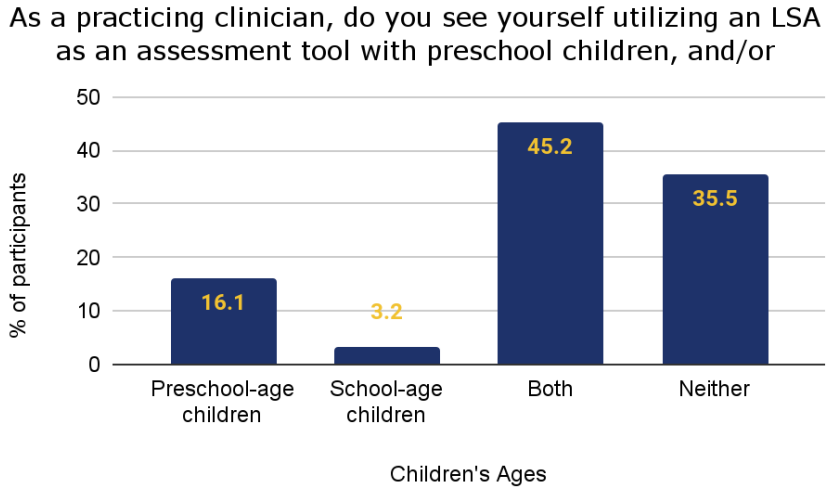

Fig. 8. Students' responses when asked if they see themselves utilizing an LSA as an assessment tool with preschool children, and/or school-aged children as practicing clinicians.

Although graduate students expressed that they feel an LSA is a useful assessment tool, they reported that they still lack confidence in their administration and/or interpretation skills. Moreover, students explained that they feel as though it is too time-consuming and therefore can be impractical in the clinical setting.

Discussion

The purpose of the current study was to explore SLP graduate students' perceptions on the clinical relevance and their confidence in administering a spontaneous language sample analysis (LSA). The results from this study indicate that although most students believe that knowing how to administer an LSA as part of a language assessment is important, 71% reported feeling "neutral" or "not confident" in doing so. Something noteworthy is that the number of participants who felt it was "not important at all" to learn how to do an LSA increased from 0% to 6.5% from Survey 1 to Survey 2. This may be because at the time of Survey 2, several subjects were already enrolled in clinical rotations, where they were probably exposed to different methods and/or assessment tools in various pediatric clinical settings which impacted their perceptions of effective language assessment tools. This is supported by the 96% of participants who stated that they do not witness an LSA being utilized in their clinical rotations or in their SLPA jobs, if applicable.

When comparing the subjects' confidence levels at the time of the initial LSA assignment with the accuracy in identifying components of the LSA 6-months post initial instruction, findings suggest that subjects' performance was typically comparable. More than half of the participants stated they would feel "confident" in completing the same LSA a few months post initial instruction. Nonetheless, results from the second LSA did not entirely support this claim. One noticeable discrepancy was in calculating the Index of Complexity, in which 35.5% reported feeling "confident", yet only 2% demonstrated proficiency. Another area where participants overestimated their confidence was calculating MLU, demonstrating reduced retention of this skill. One more obvious difference was in identifying the types of complex sentences; only 9.7% indicated feeling "confident", however, almost half of the participants were able to correctly identify these. Furthermore, participants were able to accurately identify at least 2 weaknesses and 1 strength, though almost half of them described not feeling confident about this skill.

Participants were asked to explain whether they felt they had the adequate background knowledge to complete the LSA and to identify which areas impacted their performance the most (e.g., Excel competency, grammatical morphemes, identification of clauses, counting utterances, etc.). Although students' perceptions of their necessary background knowledge increased from Survey 1 to Survey 2, they continued to report a lack of understanding. Specifically, difficulties with grammar, identifying clauses, Brown's Morphemes, and complex sentences were still noted.

The current literature has found that the SLPs who utilize an LSA tend to use a customized protocol due to decreased confidence (Pavelko et al., 2016). This decreased clinical self-efficacy is likely secondary to the low retention rate of LSA procedures as supported by Ramos et al. (2021).

It is important to note that the number of students who said they see themselves utilizing an LSA as a practicing clinician remained significantly higher than the number of students who did not foresee its use, across both surveys. This suggests that students continue to recognize an LSA's effectiveness, but may require more extensive instruction and practice to become competent administrators of an LSA. Participants also expressed concern with the amount of time it took them to complete the assignment, suggesting that this assessment tool may not be time-efficient in the clinical setting. Research stating that only 67% of SLPs in the United States report using LSA as a diagnostic tool reinforces this notion (Pavelko et al., 2016). Overall, findings from this study indicate that there is a need to better prepare SLP graduate students to perform LSAs effectively and reliably.

Limitations

One limitation of this study was the time in which skill retention was measured post initial instruction. Measuring the subjects' ability to retain LSA procedures 6 months post instruction may have been too long of a duration between the instruction of LSA and the assessment of retention. Another possible limitation may have been the discrepancy in the number of respondents for Survey 1 compared to Survey 2. There were 46 participants who responded to the first survey, but only 31 responded to the second. One last limitation could be that the LSA was presented electronically via an instructor-made Excel spreadsheet. Some participants reported that insufficient familiarity with the software could have impacted their performance.

Future Research

Further research is needed to devise an alternative teaching method for LSA procedures that is more meaningful and easier to learn and retain. When information is easily retained, it increases one's confidence level and in turn also the likelihood of utilizing said information. It is not clear whether the simplified language sample analysis utilized was still too complex, or if the students lacked sufficient background knowledge, if they were influenced by their preconceived stigma about the LSA, or if it was a combination of these plus other factors. Nonetheless, increasing retention of these skills is necessary to ensure SLP students enter the field feeling confident in their ability to use an LSA when assessing children's language. Further research should explore graduate SLP students' confidence level in administering an LSA when they are given more frequent and explicit instruction on specific aspects of LSA (i.e., grammar, identifying clauses, Brown's Morphemes, complex sentences, etc.), as well as when they are exposed to supplementary hands-on practice with LSA procedures.

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