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Using Think-Alouds to Uncover Expert-Novice Gaps in AAC Intervention Planning Skills

Allison M. Sauerwein
Southern Illinois University Edwardsville, ameder@siue.edu

Jane R. Wegner
University of Kansas, jwegner@ku.edu

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Cover Page Footnote

Allison M. Sauerwein, Department of Speech-Language-Hearing: Sciences and Disorders, University of Kansas. Jane R. Wegner, Department of Speech-Language-Hearing: Sciences and Disorders, University of Kansas. Allison M. Sauerwein is now at Department of Applied Health, Southern Illinois University Edwardsville. This manuscript is based on the first author's doctoral dissertation. Correspondence concerning this article should be addressed to Allison Sauerwein, Department of Applied Health, Southern Illinois University Edwardsville, Edwardsville, IL 62026. Email: ameder@siue.edu The authors would like to acknowledge the students and speech-language pathologists who participated in the study; Karleen Walters, Sarah Ginsberg, and Jennifer Friberg for their contributions to this study; and Nancy Brady, Matt Gillispie, Holly Storkel, and Meagan Patterson their service on the first author's dissertation committee.

Improving preservice education in augmentative and alternative communication (AAC) for speech-language pathologists (SLPs) has been an ongoing crusade in recent decades. Survey data published in 2019 revealed that 86% of speech-language pathology programs in the United States (US) had a course dedicated to AAC content, whereas only 73% and 67% of programs had a standalone AAC course in 2008 and 1995, respectively (Johnson & Prebor, 2019; Ratcliff & Beukelman, 1995; Ratcliff et al., 2008). Although more AAC courses appear to be available in the US than ever before, more than half of the programs that responded to a 2019 survey reported fewer than 50% of preservice SLPs in their program obtained AAC clinical clock hours (Johnson & Prebor, 2019; Ratcliff et al., 2008). In addition, only 34% of programs reported that the majority of students in their program (i.e., 76-100% of students) were prepared for AAC service provision at graduation (Johnson & Prebor, 2019).

To our knowledge, few studies have explored preservice SLPs' learning outcomes in AAC coursework and clinical practica (Costigan & Light, 2010; Meder, 2017). Simpson et al. (1997) compared the effects of three instructional modes (e.g., face-to-face instruction, written tutorial, and video) on students' knowledge and skills in programming an AAC device. Based on skills test scores, no student learning differences were observed across instructional modes (Simpson et al., 1997). Robinson and Sadao (2005) used a problem-based learning approach to teaching an AAC course. Preservice SLPs wrote reflection papers, in which student perception data indicated they felt more prepared and knowledgeable to support AAC after completing the course. Thistle and McNaughton (2015) taught preservice SLPs in a clinical methods colloquium about an active listening strategy designed for use with parents of children who use AAC. Students demonstrated the ability to use the active listening skills in a post-test simulation (Thistle & McNaughton, 2015).

Although some student outcomes have been reported in the literature, it is clear further inquiry is needed regarding student learning in AAC coursework and clinical practica. Hutchings' (2000) taxonomy of scholarship of teaching and learning inquiry includes four types of questions: (a) "what works" questions, (b) "what is" questions, (c) "visions of the possible" questions, and (d) questions that develop theory or conceptual frameworks. Because so few student learning outcomes related to AAC service provision have been reported, it is important to begin to shed light on "what is" – or the knowledge and skills preservice SLPs are obtaining related to AAC (Hutchings, 2000).

The purpose of this study was to explore intervention planning skills used by expert and novice SLPs. The American Speech-Language-Hearing Association's (ASHA; 2016) clinical certification standards provided a framework for analyzing the intervention planning skills data. Four standards particularly relevant to intervention planning include V-B 2a, V-B 2c, V-B 2d, and V-B 2e (ASHA, 2016):

1. Develop setting-appropriate intervention plans with measurable and achievable goals that meet clients'/patients' needs. Collaborate with clients/patients and relevant others in the planning process (V-B 2a)

2. Select or develop and use appropriate materials and instrumentation for intervention (V-B 2c)

3. Measure and evaluate clients'/patients' performance and progress (V-B 2d)

4. Modify intervention plans, strategies, materials or instrumentation as appropriate to meet the needs of clients/ patients (V-B 2e)

AAC course and clinical practica instructors need a solid understanding of the underlying skills to evaluate student learning, and they can be challenging to observe and measure. Further, supporting student learning means meeting students where they are, yet being mindful of the end goal – competent service provision. In expert-novice studies, expert performance can inform a working definition of competency while novice performance helps uncover strengths and weaknesses related to that outcome (Ginsberg et al., 2016). A better understanding of AAC intervention planning skills can be used to support student learning in this area.

Research Questions

1. What intervention planning skills do expert and novice SLPs use when planning AAC treatment for children with developmental disabilities?

2. What were the differences and similarities between experts' and novices' intervention planning skills?

Method

Think-aloud methods, a validated method of data collection, were used to make participants' thoughts and decision-making observable (Ericcson & Simon, 1980; 1993). Think-alouds were preferred over interviews or surveys, which may inadvertently guide participants' responses. Participants' responses during the think-aloud task were transcribed, analyzed using grounded theory methods, and authenticated using two qualitative research quality indicators: peer debriefing and member checks (Brantlinger et al., 2005; Strauss & Corbin, 1998). The study had institutional review board approval and followed ethics procedures and standards governing research involving human subjects.

Participants. Convenience sampling and direct email communication were used to recruit eight novice (i.e., preservice SLPs) and eight expert (i.e., AAC specialist SLPs) participants. Novices were recruited from a cohort of graduate students at a Midwestern university, whereas experts were recruited through the researchers' professional networks. It should be noted that additional potential novice and expert participants volunteered; however, those who completed the inclusion criteria survey and were the first to respond to requests for scheduling were selected for participation.

Novice inclusion criteria were: (a) first-year speech-language pathology master student status (i.e., completed no more than two semesters of study), (b) not yet begun an off-campus externship, and (c) completion of an introductory AAC course and/or clinical practicum with at least one client who used AAC. Novices' ages ranged from 21 to 34, with a mean age of 25.13 years. Because the program that novices were enrolled in offers flexibility as to when they enroll in AAC coursework, these participants' prior AAC experience and whether they had completed an AAC course or

practicum varied. In addition, two novices had previously supported students who used AAC as paraprofessionals. Novice demographic information and experience is reported in Table 1.

Table 1

Novice Participants' Demographic Information and Experience with AAC

Novice	Age in Years	Gender	Race	Completed AAC course	Completed AAC practicum	Number of AAC clients supported in practicum	Experience with children who use AAC
N1	23	Female	White	Yes	Yes	2	No
N2	34	Female	White	Yes	No	N/A	Yes
N3	23	Female	American Indian	Yes	Yes	2	No
N4	22	Female	White	No	Yes	2	No
N5	21	Female	White	Yes	Yes	1	No
N6	33	Female	White	Yes	No	N/A	No
N7	22	Male	Black	Yes	Yes	3	No
N8	23	Female	White	No	Yes	3	Yes

Expert inclusion criteria were based on the AAC Assessment Personnel Framework (Binger et al., 2012). Expert participants (a) held a certificate of clinical competence in speech-language pathology for at least five years, (b) practiced as an SLP for at least five years, and (c) supported children who used AAC for at least 50% of daily work. All eight experts were white females and between the ages of 37 and 64 *(M*=51.00*)*. Experts' mean number of years of practice was 22.00 years and the mean percentage of their daily work related to supporting children who use AAC was 81.88%. See Table 2 for experts' work environment and experience.

Table 2

Expert Participants' Demographic Information and Practice Experience

Expert	Age in Years	Gender	Race	Years SLP practice total	Years AAC experience	Percentage of workload related to AAC	Current work environment	Region
E1	62	Female	White	19	19	100	School-based	Midwest
E2	64	Female	White	40	40	50	School-based	Midwest
E3	59	Female	White	26	26	80	School-based	Midwest
E4	37	Female	White	8	7	95	School-based	Midwest
E5	49	Female	White	25	25	100	Private practice	West
E6	42	Female	White	13	13	75	Private practice	Midwest
E7	52	Female	White	27	12	90	School-based	Midwest
E8	43	Female	White	18	18	65	Private practice	Midwest

Data Collection. The first author conducted Zoom web conference meetings individually with participants, which ranged from 45 to 75 minutes in duration. The case studies developed for the think-aloud tasks were based loosely on cases presented in Metzler-Barrack (2011) and Hart and Wiley (2011), but modified to vary the duration of AAC device use, diagnosis, and impairment type. Christopher (Case Study C) had a primary social impairment (i.e., autism) and was just beginning to use a device (see Appendix A), whereas Sam (Case Study S) had a motor-based impairment (i.e., cerebral palsy) and had used an AAC device for two years (see Appendix B).

Half of the participants in each group were presented with Case Study C first and the other half were presented with Case Study S first.

During webconference meetings, participants first gave informed consent and then completed a warmup think-aloud task. In the two experimental think-aloud tasks participants (a) planned for the first treatment session, (b) described what the first session would look like, and (c) planned for future sessions. Participants planned for private practice therapy in order to reduce context-specific constraints of practicing in the schools. The first author used neutral prompts such as "Tell me more" as needed throughout the tasks to elicit description or explanation. Meetings were video and audio recorded for transcription and analysis. Note that these data were also analyzed related to clinical reasoning skills, which are reported in the companion manuscript (Sauerwein & Wegner, 2020).

Data Analysis. Participants were assigned a number to protect their identity. The first author transcribed the verbal data verbatim and conducted open, axial, and selective coding, consistent with grounded theory methods (Strauss & Corbin, 1998). NVivo 11 (Version 11) was used for data analysis, which began by coding each transcript line-by-line. Data emerged that represented clinical reasoning and intervention skills. The first author created a codebook with definitions and examples of these skills. Peer debriefing and member checks were used to authenticate the analyses (Brantlinger et al., 2005; Creswell & Creswell, 2018). A qualitative researcher with think-aloud methods expertise and an AAC pedagogy expert provided peer debriefing by providing the researcher with feedback and recommendations after reviewing the codebook and a subset of coded transcripts. In addition, member checks allowed participants to correct inaccuracies and provide feedback on coding of their transcript (Guba & Lincoln, 1989; Sandelowski, 2008). All 16 participants provided minimal feedback via email. The first author and a graduate assistant used the codebook to independently code transcripts. The first author and assistant reached 100% intercoder agreement on all transcripts (Campbell et al., 2013). Research memos were used to keep an audit trail throughout analysis. Codes were consolidated into categories and themes, and intervention planning skills are presented below.

Results

Eight subthemes for developing intervention plans emerged from the data, including selecting treatment style, planning activities, selecting or developing materials, planning teaching strategies, selecting targets, goal setting, collecting data, and feature matching. Although all subthemes were present for both groups of participants, qualitative differences were noted across groups. Codebook definitions for subthemes are presented in Table 3.

Table 3
Intervention Planning Subthemes

Subtheme	Codebook Definition
Planning activities	Indicating or describing activities they would use during therapy sessions, or setting up the environment for activities
Selecting or developing materials	Indicating materials that they would create or choose to use during therapy
Planning teaching strategies	Indicating teaching or facilitation strategies they would use during therapy
Selecting targets	Providing examples of targets that would be used during therapy to make progress towards goals
Selecting treatment style	Indicating or describing therapy style or philosophy to approaching therapy
Goal setting	Developing short- or long-term objectives, or broad goal areas, to address during therapy
Collecting data	Planning to obtain information about the case through observation or monitoring/tracking behavior(s) during therapy
Feature matching	Indicating that they would assess or modify AAC system features based on the case's skills and needs

Selecting Treatment Style. All participants described some aspect of their treatment style; however, experts' and novices' treatment styles were considerably different. Novices' treatment styles revolved around time. Novices specifically mentioned session or activity length and/or number of sessions per week, such as 20 minutes or more per activity (N4), one-hour therapy sessions twice per week (N7), or two, forty-five-minute sessions per week (N8). Experts did not mention these time-specific variables. Two novices planned to familiarize themselves with the devices before the first session. A novice indicated:

> I would also like to be prepared and not have to learn on the spot 'cause that could delay… opportunities for Christopher to learn, if I'm spending most of the time just figuring out where words are on the device (N5).

Experts' treatment styles reflected their therapy references and priorities. They used language like "I always like to" or "I always work on". For example, E3 said, "I like to have a set schedule" and E6 said, "I like to have families involved as much as possible, as they are comfortable and as much as they are willing." Experts who worked in private practice (E5, E8) referred often to their treatment style. E5 mentioned processes specific to her private practice clinic, such as intake

procedures and having two SLPs present in the initial therapy session. The treatment style code was named based on E8's data:

> More my style of therapy is… learning is a hybrid between ABA, natural environment teaching, and follow[ing] their lead. So I'm more a follow their lead type… but wanting to build on and call their attention to certain things as well, so it's a little bit more structured (E8).

Planning Activities. Experts and novices approached planning activities similarly, with the child's interests in mind, and by focusing on fun, engaging, or motivating tasks. E5 stated that she would "start with activities that the kiddo is highly motivated by, and interested in, and competent in doing." Both groups planned play-based therapy for Christopher and conversation-based therapy (e.g., telling jokes, playing a game, or open-ended conversation) for Sam, a ten-year-old child with cerebral palsy. All but one participant, a novice, mentioned literacy activities. Some described a particular curriculum, whereas others planned to embed literacy instruction more generally within activities. Participants in both groups planned to use activities to take data, build rapport, and address therapy targets. Experts were more likely to plan activities specifically for data collection. One expert planned to have an open-ended conversation with Sam so she could take an informal language sample (E4). Three experts said they would use activities that naturally occurred within the child's routines, such as during snack, meal, or bath time. Novices, on the other hand, were more likely to plan rapport-building activities. Activities provided the context for participants to incorporate materials, use teaching strategies, and address therapy targets.

Selecting or Developing Materials. Both experts and novices groups named multiple materials they planned to use in therapy, which were appropriate for the children's age and therapy context. Participants also mentioned preparing alternatives so the child had multiple options during therapy. Materials planned for Christopher's therapy included books, cars, games, bubbles, puzzles, action figures, balls, Play Doh, music, and blocks. For Sam, participants planned to use matching games, bingo, books, reading passages, comic books, and videos. Both experts and novices planned to develop a visual schedule and/or other visual supports for therapy with both children. Five experts mentioned developing an overlay for Christopher's static, low-tech AAC device, but novices did not plan for this. E1 said, "That would be the first thing I would want to make - my overlay for my device" and named word lists she would use to select vocabulary. E2 planned to incorporate both core and fringe vocabulary as well as program phrases like "Hi, my name is Chris". Another approach was to develop the displays for particular activities, such as meal time.

Planning Teaching Strategies. Teaching strategies commonly overlapped with activities, materials, and targets in the data. For example, E4 and N1 both mentioned introducing cars during play (i.e., materials, activity), and using modeling and aided input (i.e., teaching strategies) to target "stop" and "go" (i.e., targets). Both groups planned to use modeling and aided input (i.e., aided language input, partner augmented input, aided language stimulation) frequently. Other strategies included prompting, (E4, N5, N7, N8), recasting (E6, N7), expansion (N2, N7), bombardment (N7, N8), event casting (N8), partner-focused questions (N4), and positive reinforcement (N5, N8). Novices were more likely than experts to explicitly name the teaching strategies they would use during therapy, but participants from both groups gave examples of how

they would use teaching strategies. Two participants, both experts, planned to modify strategy use over time. E6 said:

> I would look to see [Sam's] response based on his… prompt hierarchy, as well as the rate of response, how intensely they needed to be modeled, how frequently they needed to be modeled. That would help me set the rate and frequency for rotating core words for modeling for Sam for his therapy plan for the rest of his sessions.

Selecting Targets. Experts and novices identified similar therapy targets. Core vocabulary was the most frequent target named by both groups. E4 described how core words would help Christopher meet his wants and needs and N1 indicated using core words and expanding utterances could be targeted simultaneously. Some participants gave examples of core target words, while others mentioned core vocabulary more generally. After core vocabulary, social skills were the next most common target. Some experts and novices mentioned only that they would target social skills, whereas others generated specific targets like turn taking, directing, protesting, requesting, or commenting. Of the social skills mentioned, turn taking was most frequently named target. In addition, some experts and novices planned to target utterance length and sentence structure, but these targets were mentioned less frequently as compared to core vocabulary and social skills.

Goal Setting. Goal setting overlapped with selecting targets. Both experts and novices described broad goal areas, but were otherwise vague when planning goals. For example, E4 stated, "I would probably write a plan to work on… expanding use of core words and… expanding utterance length… work on including more pragmatic functions." Some participants noted they would write goals at a later date. Goal areas that were mentioned aligned with the targets listed previously. Most participants planned to write expressive and/or receptive language goals (i.e., by targeting core vocabulary or increasing utterance length) and at least one social goal. Some participants in both groups planned to include a literacy goal in their plan. Overall, both participant groups omitted information regarding context, time, specific behaviors that would be measured.

Collecting Data. Similar to goal setting, experts and novices described their data collection plans broadly. Most data coded in this subtheme were what participants would "look for" (i.e., observe during therapy). Some participants mentioned specific data collection methods like language sampling (E4, E7), checklists (N7), preference assessments (E6), and interviewing (E5, E7, N6), but these were infrequent in the data set. Participants in both groups planned to take data on the words and utterances the children used during therapy. In addition, experts and novices planned to collect data on pragmatic functions, such as initiating, responding, requesting, and commenting. E4 described her plan to inventory the child's utterances and pragmatic functions:

> I would just be trying to get a sense of what those one to two-word utterances are and why [he is] using them. Is he using them to make a request? Is he saying like "I want", or "want more"… almost like taking a language sample. You know, figuring out what the richness of his language is like.

Feature Matching. Feature matching is a process by which a person's skills and needs are matched to AAC system features. Feature matching appeared in expert and novice data. Novices were more likely to program the AAC device whereas experts were more likely to assess or modify

Sam's access methods. Some novices discussed feature matching without developing a specific plan to do so. For example, N8 noted her plan of "making sure that… I can tell in this session and maybe the next few sessions, that this is the appropriate device and program for him." Other novices mentioned programming pages or masking vocabulary. On the other hand, experts expressed concerns about the appropriateness of Christopher's device and considered upgrading to a high-tech system. E6 said:

> To be perfectly honest… the other bit of information that I wondered about was why he was recommended only a low tech static 32 button device when his skills indicated that he had... some of the developing skills that he did.

Experts who planned to feature match mentioned ensuring the eye gaze software was up to date, assessing the mounting system, and how positioning and device placement might impact Sam's ability to access the entire device screen. Three experts planned to evaluate Sam's accuracy, efficiency, and level of fatigue, related to using eye gaze as his access method.

Discussion

In summary, the intervention planning skills used by expert and novice SLPs in the study included selecting treatment style, planning activities, selecting or developing materials, planning teaching strategies, selecting targets, goal setting, collecting data, and feature matching. Although the novices in this study certainly do not represent all preservice SLPs, considering the similarities and differences between experts and novices has implications for AAC courses and clinical practica instruction (Ginsberg et al., 2016).

Considerable Overlap: Targets, Goals, & Data. There was considerable overlap in experts' and novices' plans for target selection, goal setting, and data collection. Both experts and novices selected core vocabulary as a target. Core vocabulary builds linguistic competence for people who use AAC (Beukelman et al. 1991; Light et al., 2003; Witkowski & Baker, 2012). Experts and novices also planned to target increasing utterance length, another component of linguistic competence, and a variety of pragmatic functions, which target social competence (Light et al., 2003). Both groups included general goal areas in their plans, but did not generate specific, measurable goals. The think-aloud instructions did not explicitly prompt participants to write formal goals; however, the goal areas were appropriate for the cases, and could be used as a starting point to generate formal goals by including a specific behavior to monitor, level of clinician support, and accuracy or frequency threshold level. Similar to goal setting, experts and novices described their data collection plans very broadly. Participants in both groups planned to take data on vocabulary, utterances, and pragmatic functions the children used during sessions.

Minor Differences: Activities, Materials, & Strategies. There were many similarities across groups in activity, material, and teaching strategy selection. Participants in both groups planned engaging, age- and setting-appropriate activities. Materials were appropriate for each child's needs and for private practice. The combination of activities and materials provided opportunities for the teaching strategies experts and novices planned to use. Experts and novices planned to use modeling and aided language input most frequently during therapy, as compared to other teaching strategies. This is not surprising, as both teaching strategies are evidence-based (Binger & Light,

2007; Sevcik & Romski, 2002) and AAC clinical specialists in prior research mentioned using modeling frequently during AAC assessment (Lund et al., 2017).

However, differences were noted across expert and novice plans. Experts were more likely than novices to plan activities specifically to take data and to use activities already occurring in the child's day. Novices did plan to take data, but did not incorporate data collection into other activities like experts did. Multiple experts mentioned creating paper overlays for the static low-tech device, whereas novices overlooked this step. Experts in prior research similarly prepared "materials to ensure that the child had a method with which to communicate" during assessment (Lund et al., 2017, p. 64). Novices would likely realize the need for an overlay if Christopher arrived at his first therapy session without one, but they may need assistance in developing that material. Further, novices in the study mentioned more teaching strategies by name than experts did. This may be explained by clinical practica expectations at their university, where novice clinicians are required to develop weekly intervention plans that list and define teaching strategies. On the other hand, it is highly unlikely that experts would engage in a similar level of planning, even though they are likely aware of and are potentially already using the strategies novices named during the think-aloud tasks. Standard V-B 2c reflects the ability to "select or develop and use appropriate materials and instrumentation for intervention" (ASHA, 2016). Although novices in the study planned appropriate materials, they appeared to need support with incorporating data collection into existing activities and with developing static overlays.

Experts were more likely to describe how they would scaffold or modify their use of teaching strategies than the novices; however, only a few experts included this in their intervention planning. Standard V-B 2e focuses on the ability to modify intervention plans, including strategies and materials (ASHA, 2016). Some expert participants, but no novices, considered how they would modifying teaching strategies to meet the client's needs. This may be a result of the task instructions, as they did not explicitly encourage participants to describe how they would modify the intervention plan, including the teaching strategies.

The Expert Novice-Gap: Treatment Style and Feature Matching. The expert-novice gap in this study was most evident in treatment style and feature matching. In the codebook, selecting treatment style was defined as "indicating or describing therapy style or philosophy to approaching therapy". It may not be surprising that experts' and novices' treatment styles differed. Novices focused on the length of activities or session and indicated they would spend time getting familiar with the children's devices. Novices explicitly stated they would be flexible, yet wanted to do more preparation prior to the first session. Experts, on the other hand, demonstrated their flexibility by giving examples of how they could adjust during therapy sessions. Experts were more likely to have developed preferences and priorities over time, which shaped their therapy routines. Using a particular treatment style is not tied to a certification standard; however, it was a common subtheme during the think-aloud tasks. It may be a natural consequence of continued practice and identity development as an SLP. Therefore, it is possible that novices' treatment style would evolve with additional practice and be influenced by instructors, mentors, learning opportunities and clinical contexts.

Both experts and novices described feature matching processes by "indicating that they would assess or modify AAC system features based on the case's skills and needs"; however, experts

were more specific and more likely to evaluate the child's ability to access to the device. Novices planned to program the device, but otherwise planned to feature match without precise details. These findings are similar to those of Dietz et al. (2012) in which AAC specialist SLPs evaluated access methods as part of their AAC assessments, whereas general practice SLPs did not. Determining an efficient and effective mode for an individual to access his or her AAC device is a component of a comprehensive AAC evaluation (ASHA, 2019; Lund et al., 2017). In the case studies, Christopher accessed his device with direct physical touch using his finger, a form of direct selection. Sam used eye gaze, another form of direct selection. While direct physical touch was an efficient access mode for Christopher, several experts wondered if switch scanning, a form of indirect selection, might be more appropriate for Sam. Experts mentioned specific system features they would monitor during treatment, such as input type and mounting, which suggests they would target operational competence, or the clients' ability to use selection techniques to operate the AAC system (Light et al., 2003). Further, a few experts indicated they would target strategic competence by teaching Sam to use a recorded statement to explain AAC to unfamiliar communication patterns or teaching him to work collaboratively with the therapist or family member(s) to repair communicative breakdowns.

It was clear novices needed additional knowledge and skills to match the clients' needs to AAC system features. Experts revealed the mental actions they would take to evaluate access, among other AAC system features. Similar to the findings of Dietz et al. (2012), experts are likely to consider alternative access and incorporate multiple modalities. Of the intervention planning skills observed in the data, feature matching is the most unique to AAC service provision. Recall that two of the eight novice participants had not completed an AAC course at the time of participation. Because feature matching would likely be discussed in an AAC course, these participants were at a disadvantage during the think-aloud tasks. Novices who had supported clients who used AAC were not asked to report their client(s) access method. If they supported a client who used direct selection, they may not have experience with or background knowledge of more complex access methods.

It is important that novice clinicians have knowledge of system features, understand that feature matching can be ongoing after an AAC evaluation, and the ability to match clients' needs to AAC system features. Thus, novices would benefit from being challenged to conceptualize feature matching more comprehensively, and certainly beyond programming alone. Overall, specific instruction on system features, access methods, and feature matching principles could improve novices' knowledge and skills in this area. Novice SLPs in the study would also benefit from instruction and opportunities to practice targeting operational and strategic competence in therapy. For example, novice clinicians can learn to support their clients' access modes and support their client in using word prediction and repairing communication breakdowns, among other skills (ASHA, 2019; Light et al., 2003).

Conclusion. Overall, performance on the think-aloud task suggested that novices' knowledge and skills were similar to those of experts for multiple aspects of intervention planning. Novices in the study appeared to have foundational skills related to selecting targets and developing activities, materials, and strategies. The minor differences observed across expert and novice performance in these areas could be useful for instructors to keep in mind when supporting novices. An expert-novice gap was evident for selecting treatment style and feature matching. Particularly for feature

matching, the experts' think-aloud data revealed a level of competence that novices did not match. This appears to be an important intervention planning skills for the novices in the study. They would likely benefit from additional instruction and learning in this area.

Limitations and Future Directions. Limitations of the study include sampling, peer debriefing, and authenticity and generalization of think-aloud data. The study had a small sample size. Participants were convenience sampled and there was a lack of diversity among participants. Peer debriefing methods are described in the methods section. In addition, it is important to note that the results reported here represent these particular participants' intervention planning skills (i.e., results may not be representative of other SLPs' or novices' skills).

Think-aloud methods may have limited the scope of the data obtained in this study. In particular, the tasks in this study revealed how participants plan for intervention, but may not correspond with actual implementation. This caveat is particularly relevant for intervention planning skills because it is important to explore how SLPs implement intervention plans. Observing participants implement an intervention plan would increase the ecological validity of the results. An additional limitation is that the participants' descriptions of goal writing and data collection were vague. As a result, it was challenging to detect differences across group performance. This limitation is likely due to the nature of and the instructions for the think-aloud tasks. Without additional detail from participants, it is unclear exactly what knowledge and skills they have related to goal writing and data collection. It also should be noted that novice participants provided less detail than experts with regards to feature matching. This may be the due to the nature of the think-aloud task. Additional assessment of novice SLPs' abilities in these areas would be useful. Future research should address these limitations by including diverse participants. It is also important to consider how planning for intervention translates to implementation.

Research is needed to further investigate the expert-novice gap in intervention planning. In particular, analyzing the range of novice performance within the think-aloud tasks would be useful in identifying novices who are in need of focused instruction, and in which areas. It would also be informative to study how additional novices plan to write goals and collect data, since data in this study related to these skills were largely unspecific. Novices were different from experts in the present study in their development of a treatment style and their plan to engage in feature matching. Related to treatment style and feature matching, data from additional novices could be used to further explore novices' knowledge and skills. Overall, a deeper understanding of the expert-novice gap in AAC intervention planning is crucial for AAC coursework and clinical practica instructors, as pinpointing novices' strengths and weaknesses is essential to modifying learning opportunities to meet students' learning needs.

Disclosures

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Case Study C

Christopher is a 4 year, 0 month old male who has a diagnosis of Autism Spectrum Disorder (ASD). Christopher's vision and hearing were recently screened and judged to be within normal limits. He achieved some developmental milestones within normal limits; for example, he rolled over at 4 months, crawled at 9 months, and walked at 13 months; however, he said his first word at 18 months and his expressive vocabulary is limited Christopher indicates his wants and needs by using contact gestures and speech approximations. Christopher lives at home with his mother, father, and two older sisters.

During a recent evaluation, the speech-language pathologist noted that Christopher typically uses jargon with a few real words. Based on standardized assessment, his receptive language skills are at the 18-21-month level and his expressive language skills are at the 15-18-month level. He has some skills that are above age expectations, including identifying (by pointing) all letters of the alphabet and some shapes and colors. Overall, Christopher presents with marked impairments in his nonverbal behaviors, ability to form peer relationships, and lack of social and emotional reciprocity. He also has a delay of spoken language and lack of varied make-believe and symbolic play. Christopher attends an early childhood center, and participates in speech/language therapy and occupational therapy at school.

As a result of an AAC evaluation, it was recommended that Christopher obtain a low-tech static speech-generating device with 32 buttons per page. He received the device yesterday. He has demonstrated initial interest in the device, and has explored the device by selecting each of the buttons and attending and listening to the speech output. Christopher is ambulatory and is able to carry the device independently. He uses his right index finger to access the device independently.

Appendix B

Case Study S

Sam is a 10-year old male who was born with a form of spastic cerebral palsy, and as a result, is unable to walk or speak intelligibly and has severely limited use of his hands. Sam lives at home with his mother, father, and younger sister. He uses a manual wheelchair, and he requires assistance for mobility. Sam's vision is satisfactory, with a recent examination indicating 20/20 acuity, and his hearing abilities are within normal limits.

Prior to an AAC assessment at age 8, Sam communicated by responding to yes/no questions by turning his head to the right to indicate "yes" or to the left to indicate "no." He used this strategy to meet his basic wants and needs and to participate in the modified curriculum he participated in a self-contained room at school. The speech-language pathologist who conducted the AAC assessment recommended a high-tech speech-generating device with dynamic display with eye gaze access. Sam has now used the recommended device for the two years since the assessment. The device is mounted to his wheelchair.

Currently, Sam spends half of his school day in the general education classroom. In the last two years, he has learned to: 1) navigate to 12 pages within the device consistently, 2) adjust volume and on/off controls, 3) initiate basic greetings and farewells with peers and caregivers, and 4) extend turn-taking during a conversation with caregivers and peers to 2 comments on the same topic. However, he uses approximately only 25% of the core vocabulary on the device's main page, which has 48 buttons. The majority of his utterances are 1-2 words in length. Sam's parents, teachers, and therapists report that he is very social and eager to communicate.

Although Sam's cognition has not been formally evaluated, he exhibits good ability for new learning and good attention to task. His receptive language skills are a relative strength, as Sam demonstrates understanding of conversation, multi-step directions, and humor. He is currently in the early stages of literacy development. Using eye gaze with letters placed in the four quadrants of the device screen, Sam demonstrates letter-sound knowledge for 13/26 lowercase letters.