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Evaluating the effectiveness of computer-based instruction for training pre-service teachers in simultaneous prompting.

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EVALUATING THE EFFECTIVENESS OF COMPUTER-BASED INSTRUCTION FOR TRAINING PRE-SERVICE TEACHERS IN SIMULTANEOUS PROMPTING

By

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B.S., University of Kentucky, 2011
Ed.S., University of the Cumberlands, 2020

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A Dissertation Approved on

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ABSTRACT

EVALUATING THE EFFECTIVENESS OF COMPUTER-BASED INSTRUCTION FOR TRAINING PRE-SERVICE TEACHERS IN SIMULTANEOUS PROMPTING

Mary Elliott

February 26, 2024

There has been a significant increase in the use of distance education (DE) in institutions of higher education (IHEs) that is leading to a shift in pedagogy and practices. In the fall of 2021, approximately 61% of undergraduate students nationally were enrolled in at least one online course. A growing number of teacher preparation programs, including special education programs, are utilizing asynchronous course and program designs to combat the critical shortage of certified teachers, yet little research has examined which asynchronous teaching methods are effective for the development of critical teaching skills such as evidence-based practices.

One asynchronous teaching method is computer-based instruction (CBI), which uses a combination of written and audio instruction, videos, and/or interactive activities that are completed on the internet. Computer-based instruction has been shown to be an effective method in staff training in applied behavior analysis (ABA), parent training, and professional development (PD); however, there is a need for research investigating the use of CBI in teacher preparation programs.

The purpose of this concurrent multiple-probe across participants study was to examine the effectiveness of CBI for increasing preservice teachers' implementation

accuracy of the teaching procedure simultaneous prompting (SP). This study also measured the duration of CBI needed to pass a recall test on SP procedures and the effectiveness of asynchronous video feedback for any participant that did not meet the implementation criterion after completing the CBI. Participants were four undergraduate education majors at a local university. Results indicated a functional relation between CBI and implementation accuracy of simultaneous prompting for three of the four participants. Additionally, the average CBI duration needed to pass the SP recall test was 32 min and asynchronous video feedback was effective for the one participant who scored below criterion. Limitations, implications for practice, and future research are presented.

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CHAPTER ONE

INTRODUCTION

Background of the Problem

Distance education (DE) incorporates the use of technology to deliver instruction to students who are separated from the instructor typically through internet, wireless communication, and video conference (National Center for Education Statistics [NCES], 2022). While the use of DE was already on a steady incline, the coronavirus pandemic in 2020 abruptly forced many courses and institutions of higher education (IHEs) into online formats, causing a shift in pedagogy and practices. The percentage of undergraduate students taking at least one DE course grew from 36% in fall 2019 to 75% in fall 2020, and undergraduates attending classes exclusively through DE increased from 15% to 44% (National Center for Education Statistics, 2023). Despite the lessening of social distancing regulations post-pandemic, DE enrollment has remained elevated compared to pre-pandemic levels. For fall 2021, the percentage of undergraduate students enrolled in at least one DE course was 61% and the percentage completing courses exclusively online was 28%, which is significantly higher than fall 2019 (National Center for Education Statistics, 2023).

One form of DE is asynchronous instruction. During asynchronous instruction, the instructor and students have delayed communication and learners can access the information and lessons at any given time without required meeting times (Garrison,

2003; Lohmann et al., 2019; Wang & Wang, 2021). This contrasts with DE synchronous instruction, which is online delivery of coursework that takes place in real-time. There has been a large emphasis placed on IHEs to use asynchronous courses to increase efficiency and meet the needs of potential students facing time differences or limited access to reliable internet.

Distance education is not a new approach in teacher preparation programs (TPPs). Xu and Xu (2019) estimated that there are over 3,000 TPPs offered fully online through DE, and in the 2015-16 academic year, over 45% of preservice teachers were enrolled in at least one online class (National Center for Education Statistics, 2018). Special education TPPs were one of the first to implement DE due to the severe shortage of rural special educators (Hager & Fiechtl, 2019). Distance education provides access to TPPs for prospective special educators that are otherwise limited because of geographical isolation. The push for the use of DE, including asynchronous formats, in special education TPPs has continued as the critical shortage of certified special education teachers persists (Hager & Fiechtl, 2019). However, little research or guidance has been provided on effective design and delivery in this format (Scott & Temple, 2017).

With the increasing rates of asynchronous DE in special education teacher preparation programs, it is important to ensure that our future teachers are still receiving a high-quality education and entering the field fully prepared. Research supports that teacher candidates who receive instruction in evidence-based practices are more likely to remain in the field (Karge & McCabe, 2014; Lohmann et al., 2019). Beyond just knowing these practices, teachers need to be able to identify when to use and implement them with high rates of fidelity. Use of evidence-based practices requires a combination of

knowledge and performance skills, and focusing on only one facet may limit fully acquiring the practice (McCoy & McNaughten, 2020). Scott and Temple (2017) assert that special education TPPs should consider effective online models that facilitate skill acquisition in field placements for future special educators. Teacher preparation programs should ensure that the DE instructional strategies being used lead to both knowledge *and* skill development for these vital practices. While there is an abundance of literature investigating asynchronous instruction related to communication styles, engagement, perceptions, and self-reported measures, little is known regarding how effective asynchronous procedures are for increasing preservice special educators' skill acquisition of evidence-based practices (Adams & Wilson, 2020; Garrison, 2003; Koustriava & Chonopoulou, 2022; Lowenthol et al., 2020; Pilotti et al., 2017; Wang & Wang, 2021; Willems et al., 2021).

Literature Review

Asynchronous Instruction

Asynchronous instruction is a form of DE in which learners complete their coursework on their own without the presence of a live instructor. Asynchronous instruction presents many benefits including offering autonomy and pushing students to be self-directed learners (Willems et al., 2021). Another benefit is the flexibility. Students can work at convenient times and students have more "permanent" access to information and resources since content is posted online as opposed to presented in lecture format (Lohmann et al., 2019; Hager & Fiechtl, 2019). This flexibility is especially helpful to overcome obstacles such as time differences and unreliable internet access. Lastly, learners in asynchronous formats can self-pace their instruction. Students can spend more

time on specific content that may be harder to understand while spending less time in areas where they feel more confident.

There also are challenges that arise with the use of asynchronous instruction. This type of learning places more responsibility on the students while offering less structure. Some students, particularly undergraduate students, may not have the self-regulation skills necessary to be successful in planning, organizing, and self-monitoring their instruction (Willems et al., 2021). Instructors need to be aware of the skills necessary for students to be successful in asynchronous environments and be prepared to provide support and scaffolding to help develop these skills.

I conducted a review of the literature to identify research evaluating the effectiveness of asynchronous instruction in teacher preparation programs for skill acquisition from January 2014 - January 2023. The inclusion criteria for studies in this review included (a) published in English, (b) quantitative design, (c) measured effectiveness of an asynchronous method(s) and/or setting, (d) included a performance outcome measure, and (e) participants were enrolled in a teacher preparation program. Four studies met the inclusion criteria (McCoy & McNaughton, 2020; Pollard et al., 2014; Russo-Campisi, 2020; Wang & Wang 2021). Three studies measured skill acquisition of special education practices including system of least prompts (SLP; McCoy & McNaughton, 2020), discrete trial instruction (DTI; Pollard et al., 2014), and writing Individualized Education Program (IEP) goals and objectives (Russo-Campisi, 2020). The fourth study measured teaching a science lesson, a skill that was not specific to special education (Wang & Wang, 2021). The asynchronous independent variables (IVs) in the studies were an asynchronous course (Wang & Wang, 2021), interactive

computer training (ICT; Pollard et al., 2014), online instructional modules (McCoy & McNaughton, 2020), and computer-based instruction (CBI; Russo-Campisi, 2020). All four studies led to overall positive gains in participants' skill acquisition after completing the trainings.

Computer-Based Instruction

Computer-based instruction, sometimes referred to as interactive computer training, is an asynchronous method that consists of a combination of written instruction, audio narration, videos, and/or interactive activities that can be accessed via the internet (Gerencser et al., 2020). In CBI, content is typically presented in modules that require active engagement and responses throughout. This may include reviewing written material, viewing video examples and non-examples, completing embedded checks for understanding, interactive questioning, and practice opportunities. During interactive questioning, positive and corrective feedback are typically embedded to highlight relevant aspects of the targeted skill and increase performance within the CBI (Vladescu et al., 2022). Computer-based instructional modules are often self-paced and require correct answers on questions throughout to advance forward. After completing a CBI, learners typically demonstrate the targeted skill with a confederate or an actual consumer to demonstrate skill acquisition.

Marano et al. (2020) conducted a review of the literature on staff training strategies that minimized trainer involvement and identified 16 studies that evaluated the use of CBI. When examining components present in the training, 100% (n = 16) of the studies had interactive questions/activities, 100% (n = 16) had embedded examples, and 87.5% (n = 14) were self-paced. Only 68.8% (n = 11) of the studies had practice

opportunities built-in throughout, and only 25% (n = 4) of the studies used non-examples in their CBI training. Approximately 63% (n = 10) of the studies had a required training performance criterion to move forward to skill demonstration and 68.8% (n = 11) had a pre-determined mastery criterion for skill demonstration. There were inconsistencies in mastery criterions used across studies (ranging from 80% to 100% required accuracy of the targeted skill) making it difficult to evaluate the effectiveness of CBI overall (Marano et al., 2020). It is important to note that 43.8% (n = 7) of the studies had participants that required feedback to meet mastery, which may lessen the practicality of CBI if in-person support is still necessary to implement the skill with fidelity.

Computer-based instruction is used to teach principles of applied behavior analysis to ABA providers and students including DTI, visual analysis of graphs, preference assessments, backward chaining, and behavioral skills training (BST; Gerencser et al., 2020; Marano et al., 2020). Gerencser et al. (2020) conducted a review of asynchronous training procedures in ABA and identified that 27.3% (n = 6) of studies used CBI. All six studies used self-paced modules that assessed content knowledge through embedded questioning or pre/post-tests, and the majority of the studies had a mastery criterion on post-tests before participants were allowed to proceed. However, only half of the studies (n = 3) set a performance criterion to measure skill acquisition and each study used a different criterion, leading to inconsistencies in evaluating the effectiveness of CBI. Similar to Marano et al. (2020), 50% (n = 3) of the studies required performance feedback and coaching for at least one participant that was delivered in-person.

Computer-based instruction has been used in areas outside of ABA including parent training and school-based PD. For parent trainings, CBI was used to train in parent-child interactions (Blackman et al., 2019) and implementing photographic activity schedules (Gerencser et al., 2017). Professional development for teachers and paraprofessionals has included training in positive interactions with parents (Ingvarsson & Hanley, 2006), detecting antecedents and consequences for problem behavior (Scott et al., 2018), and DTI (Higbee et al., 2016).

While there is research on using CBI to train college students, little research has been conducted on the use of CBI in TPPs. Skills evaluated in TPPs through CBI include SLP (McCoy & McNaughton, 2020), writing IEP goals and objectives (Russo-Campisi, 2020), and DTI (Pollard et al., 2014). These trainings vary not only in skill type, but in the number of required modules, CBI components, and effectiveness, thus making it difficult for replication or comparisons in TPPs.

Pollard et al. (2014) used a multiple baseline across participants design to investigate the effectiveness of CBI to train four preservice teachers how to implement DTI with children with autism. The CBI consisted of four modules created with Adobe Captivate that included PowerPoint slides with written information, audio narration, videos, open-ended questions with immediate feedback, correct and incorrect examples, and self-practice opportunities. In addition, the CBI required a post-test passing score of 80% or better to move forward with role-playing. Participants who did not reach this score were required to repeat the module until criterion was met. Although the CBI was completed online, the researcher was present while each participant completed the training to provide materials and measure duration. Participants took an average of 115

min to complete all four modules. Participants were then asked to role-play DTI with a confederate. A performance criterion of 85% or better was required to advance to the next phase of implementing DTI to a child with autism. All participants' test scores increased from pre-test to post-test and three of the four participants reached the required score criterion on the first attempt. For DTI implementation accuracy, all participants increased from a baseline average of 25% to an average of 93%, demonstrating that CBI was an effective procedure to increase the participants' knowledge and implementation of DTI. However, one participant required a 10 min in-person feedback session to reach criterion.

McCoy and McNaughton (2020) used a pre/post group design with switching replications to determine the effects of CBI on 20 graduate and undergraduate education students' knowledge, planning, and use of SLP to support individuals with autism using augmentative and alternative communication (AAC). The CBI was three modules on the learning platform Canvas that included written text, visuals, video demonstrations of SLP, embedded questions, and interactive exercises. The training took approximately 150-180 min to complete. The dependent variables were measured using a post-test, a SLP planning form, and role-playing SLP with a confederate via teleconference. Participants were able to complete the modules at any point during a 1-week period and the researcher was not present. There were no pre-determined mastery criteria identified in this study. Results indicated that the CBI modules were effective for increasing knowledge and planning. While there was progress observed among participants in the implementation of SLP, the analyzed data did not support the conclusion that progress was directly associated with the CBI training.

Russo-Campisi (2020) used a randomized group design to compare an interactive CBI to a video-only training to teach 46 preservice teachers how to write IEP goals and objectives for students with autism. The CBI was created on Adobe Captivate and consisted of three modules with embedded questioning with corrective feedback, drag and drop interactions, and click-to-reveal engagement strategies. The video-only group watched the same modules and content, however there were no opportunities to view or complete any of the learning interactions. All participants were given 10 days to complete the pre-test, the training modules, and post-test with access being contingent on completing the previous requirement (i.e., participants must complete the pre-assessment to gain access to the training modules). The researcher was not present while participants completed the training. For pre- and post-tests, participants were given an example student assessment and told to use the results to write IEP goals and objectives that meet the student's needs. Results showed that both groups had significant improvements in writing from pre- to post-test. While the CBI training led to slightly higher post-test scores, there was not a statistically significant difference when compared to the video-only group. Therefore, a more complex training like CBI may not have been necessary to gain positive outcomes.

Future Research Implications for CBI

Marano et al. (2020) identified several implications for future research after completing their review of the literature. The authors suggest there is a need for more detail when describing training procedures. Oftentimes, necessary information regarding methodology is not included, like treatment integrity (TI) and presence of the experimenter. Treatment integrity refers to the correct implementation of instructional

strategies as they were designed and intended to be implemented (Barton et al., 2018; Oncul, 2022). Experimenter presence can be conflicting when evaluating asynchronous methods as it could change participants' behavior, so future research evaluating CBI should be completed without the experimenter present. To increase consistency across studies, future researchers should consider using already existing training materials when possible. Gerencser et al. (2020) identified inconsistencies in measurement tools used as a limitation in their literature review. For example, one study may use a 10-item implementation accuracy checklist, and another may have a 21-item checklist for the same skill. Future researchers should use existing, validated tools for assessing effectiveness when possible. There is also a need for consistency in performance criterion across studies. Some studies did not have a pre-determined criterion to measure effectiveness and other studies did not report why a specific criterion was chosen. Performance criterion should be based on the level of accurate implementation necessary for the targeted populations' growth. For example, when setting a performance criterion for SLP, researchers should review the literature and determine what percentage of accurate implementation will lead to positive outcomes for students. Low levels of accuracy threaten usefulness of the procedure for the students receiving the intervention.

Another future area of research is examining individual components of CBI. Marano et al.'s (2020) review of the literature found that active responding was the most common training component present, but studies have not evaluated if this component is necessary. Where there is no set format for CBI, it is difficult to assess which components are leading to skill acquisition and which are not needed. This can be done through directly comparing different training features to compare effects. Future research should

also provide more detail in their CBI descriptions, reporting specifics such as how many videos were included, the number of engagement features, and duration of the trainings. This will provide valuable information for consumers on whether CBI is feasible for their needs and learners. McCoy and McNaughton (2020) reported that their CBI training took approximately 150-180 min to complete. This may not be practical for some TPPs where many topics must be covered in a week.

Gerencser et al., (2020) and Marano et al. (2020) both point out that many of the studies using CBI required coaching and/or performance feedback for at least one participant. Higbee et al. (2016) used CBI to teach DTI to undergraduate students and teachers, and five of the eight participants required brief, in-person feedback to reach criterion, and two of the eight participants needed an additional extensive, in-person coaching session to reach criterion. Since in-person feedback may not be feasible in online TPPs, future research should examine asynchronous feedback options, such as video feedback.

Lastly, there is a need to expand CBI to other skills and populations, especially in TPPs. Most of the research on CBI is taking place in clinical settings and on topics related to ABA. Many TPPs are using asynchronous formats but are not examining if their teaching methods are leading to acquisition of skills. While there have been some studies evaluating CBI in TPPs, there is not a consistency in procedures and reporting, making it difficult to determine if this method is effective for the pre-service teacher population. This is especially important for evidence-based practices, which are critical components of TPPs and can lead to higher rates of retention for educators (Lohmann et al., 2019). Additionally, research should examine if CBI is successful for more complex

skills or consider lessening CBI components for easier skills (less intrusive procedures for less complex skills).

Simultaneous Prompting

Simultaneous prompting is a response-prompting procedure that is an evidence-based practice for teaching discrete and chained skills to learners with autism and intellectual disability (ID) across age levels (Collins, 2022; Tekin-Iftar et al., 2017). Academic content that has effectively been taught using SP includes math (Creech-Galloway et al., 2013; Drevon & Reynolds, 2018; Heinrich et al., 2017; Jimenez & Saunders, 2019; Karl et al., 2013), reading (Aldosiry, 2022; Karl et al., 2013; Platt et al., 2022), writing (Nobel et al., 2021; Pennington et al., 2014), and social studies (Britton et al., 2015). Other skills include vocational skills (Collins et al., 2017), and life skills (Atbasi & Pursun, 2020; Britton et al., 2017; Karl et al, 2013; Odluyurt et al., 2014).

Simultaneous prompting consists of two trial types (a) probe trials and (b) training trials (Collins, 2022; Tekin-Iftar et al., 2017). Daily probe trials are used to determine what the learner knows unprompted and take place before training trials if data identifies a deficit in the skill area being assessed. If the learner is not at criterion in the probe trial, a training trial takes place to teach the target skill. Training trials are an errorless form of instruction that use a 0-sec delay and a controlling prompt to direct the student to perform the correct response. A controlling prompt is the least intrusive prompt necessary for the learner to perform the correct response (Collins, 2022). The steps for SP are as follows:

Probe Trials:

1. Deliver the attentional cue to secure the learner's attention.
2. Deliver the task direction.

3. Wait a predetermined number of seconds for the learner to perform the behavior.
4. Go to the next trial without prompting or correcting the errors, regardless of the learner's response.

Training Trials:

1. Deliver the attentional cue to secure the learner's attention.
2. Deliver the task direction.
3. Immediately deliver the controlling prompt for the learner to perform the correct response, praising all correct responses and correcting all errors.
4. Go to the next trial and repeat.

Brown and Cariveau (2022) conducted a systematic review of studies comparing SP and prompt delay procedures and found that both procedure types are equally effective and efficient. The authors recommend considering instructor preferences, learner characteristics and preferences, and TI when choosing which strategy to use. If there is low TI, it may be difficult to determine if a procedure is effective or not. For research studies, TI of 90% or above is considered ideal and TI under 70% threatens effectiveness (Oncul, 2022). Oncul (2022) evaluated TI for SP in preservice teachers that had completed their method courses and received training in SP and found that participants were implementing with only low to moderate TI. Therefore, there is a need to assess correct implementation of the practice and not just knowledge of SP.

Simultaneous Prompting Training

Throughout the literature, effective training procedures have been evaluated for SP across varying participant groups. Participants have included general education

teachers (Fidan & Tekin-Iftar, 2022; Kiyak & Tekin-Iftar, 2022; Tekin-Iftar et al., 2017), special education teachers (Brown et al., 2014; Vuran & Olcay-Gul, 2012), preschool teachers (Tunc-Paftali & Tekin-Iftar, 2021), parents and caregivers (Batu, 2008; Batu, 2014; Tekin-Iftar, 2008), paraeducators (Britton et al., 2017), peer tutors (Britton et al., 2017), and job coaches (Brock et al., 2016, Wenzel et al., 2022).

When examining training settings, the majority of research trained participants to implement SP in 1:1 in-person settings (Batu, 2008; Britton et al., 2017; Brown et al., 2014; Fidan & Tekin-Iftar, 2022; Kiyak & Tekin-Iftar, 2022; Tekin-Iftar et al., 2017; Vuran & Olcay Gul, 2012, Wentzel et al., 2022). Individual, in-person trainings can be time-consuming and may not be a practical option in TPPs. Batu (2014) trained parents to use SP through audio recordings on CDs that were played in their homes followed by in-person role-playing and performance feedback sessions. While the information was originally given asynchronously, this method still required 1:1 coaching in an in-person setting. Brock et al. (2016) and Tekin-Iftar (2008) provided group in-person trainings for SP, however this may not always be feasible for learners with distance limitations. Only one study was identified as using fully asynchronous procedures to train preschool teachers in SP (Tunc-Paftali & Tekin-Iftar, 2021). The authors created an online system in which the participants completed SP modules, uploaded self-monitoring assessments, and received video-feedback and written graphical feedback from the authors within three hours of uploading their videos.

When surveying the literature, most studies used versions of behavioral skills training including written and verbal description, modeling, roleplaying, and performance feedback opportunities to train participants (Kayak & Tekin-Iftar, 2022; Fidan & Tekin-

Iftar, 2022; Wentzel et al., 2022). Britton et al. (2017) used constant time delay (CTD) to teach SP procedures to a classroom peer tutor and paraeducator. Other training methods included coaching sessions, multicomponent training (MCT), and an asynchronous training package (Brown et al., 2014; Kiyak et al., 2022; Tunc-Paftali & Tekin-Iftar, 2021).

Purpose of the Study

Simultaneous prompting is an effective evidence-based practice used to teach a variety of skills to individuals with ID and autism. While SP is successful, it is necessary for teachers to implement the strategy with high levels of TI. Current research shows that training in SP takes place mainly in 1:1 in-person formats that include role-playing and performance feedback. However, many TPPs are moving to online settings that provide training to preservice teachers in asynchronous formats, which does not afford the opportunity for instructor presence and live feedback. Computer-based instruction is an interactive asynchronous method that is effective for skill acquisition for a variety of skills in ABA, parent training, and teacher development. Little research has been conducted to examine the use of CBI in TPPs. To date, there are no studies using CBI alone to train pre-preservice teachers in SP. Therefore, the purpose of this study was to extend the literature to include the use of CBI to train preservice teachers to implement simultaneous prompting.

Research Questions

The research questions for the present study are as follows:

1. Does computer-based instruction (CBI) increase preservice teachers' implementation accuracy of simultaneous prompting measured by percentage of correctly performed steps on a SP task analysis?

1a. What is the average duration of CBI necessary for participants to recall knowledge on simultaneous prompting procedures?

2. If participants fail to meet criteria, does asynchronous video performance feedback increase preservice teachers' implementation accuracy of simultaneous prompting measured by percentage of correctly completed steps on a SP task analysis?

CHAPTER TWO

METHODOLOGY

Study Design

A concurrent multiple-probe design (MPD) across participants was used to evaluate the effectiveness of CBI for training preservice teachers to implement SP. Multiple-probe design is a variation of multiple-baseline design (MBD) in which data are collected intermittently during baseline using a pre-determined schedule of planned absences (i.e., probe data collected every fifth session or upon introduction of the independent variable in other tiers; Gast et al., 2018). This design is beneficial for skills and behaviors in which the participants are not likely to respond correctly prior to the intervention and intermittent data suffices for displaying stability in data (Gast et al., 2018). In concurrent MPD, tiers are synchronized in real-time and baseline logic is shown through the introduction of the IV in a time-lagged fashion. This allows for both within tier and across tier analysis to control internal validity. Across tier analysis was necessary for this study since participants were enrolled in some of the same courses, which increased the likelihood of a history threat.

Participants

Four participants were recruited through two pre-professional education courses at the University of Louisville (UofL): EDSP 240 *Introduction to Exceptional Children* and EDSP 260 *Classroom Behavior Management*. During recruitment, $50 gift card was offered to selected participants upon completion of the study to lessen attrition. The

inclusion criteria were (a) enrolled in a pre-professional education course, (b) no previous training in SP, (c) no previous training in systematic instruction, (d) able to commit to in-person sessions two to three times per week across approximately 4 weeks, and (e) a score of 65% or below on the first baseline session. Email addresses of interested students were collected and a prerequisite survey was sent via Qualtrics to determine if they met the first four eligibility criteria (Appendix A). Seven students were recruited, and two students were excluded due to being enrolled in a course that I was teaching, which was a confound. I predetermined limiting the study to four participants due to time and scheduling constraints so four participants were randomly selected from the remaining five eligible students.

Prior to beginning, participants were assigned aliases to ensure privacy. Demographic and educational information were collected via a self-reported background paper survey completed during the first baseline session. Demographic information of each participant is available in Table 1.

Table 1

Participant Information

Name	Age	Race	Ethnicity	Gender Identity	Educational Major	Grade Level
Sarah	18	White	Not Hispanic or Latino	Female	Elementary education, track in MSD	Freshman
Ben	20	White	Not Hispanic or Latino	Male	Middle and secondary education	Sophomore
Steph	19	White	Not Hispanic or Latino	Female	Elementary education	Freshman
Kendall	18	White	Not Hispanic or Latino	Female	Secondary education, track in mathematics	Sophomore

Note. MSD = moderate to severe disabilities.

Confederates

Two doctoral students from the Department of Special Education, Early Childhood, and Prevention Science at UofL served as confederates for role-playing sessions in the study. Each role-playing session consisted of one participant and one confederate. Two confederates were used to allow more flexibility and availability for participant scheduling. Confederate 1 was a female, second semester doctoral student obtaining her degree in Curriculum and Instruction with a focus in Special Education. Previous degrees held included a Bachelor of Science in Early Elementary Education/ Moderate and Severe Disabilities (MSD) and a Master of Education in Teacher Leadership with a concentration in Autism. Prior to the program, Confederate 1 taught MSD in a rural public high school in Kentucky for 2 years.

Confederate 2 was a female, third semester doctoral student obtaining her degree in Curriculum and Instruction with a focus in Special Education. Degrees held included a Bachelor of Science in Special Education with an emphasis in MSD and a Master of Science in Special Education with an emphasis in Teacher Leadership and Autism. Confederate 2 was a licensed Board-Certified Behavior Analyst (BCBA) and taught special education for 9 years in an urban public school district in Kentucky prior to beginning the doctoral program. Both confederates had experience in SP prior to the study.

Since more than one confederate was used in this study, it was necessary to ensure consistency amongst procedures to maintain high rates of procedural fidelity (PF). I provided an in-person group training with both confederates to review and practice the role-playing session procedures. The training followed a BST format and consisted of a

brief PowerPoint, a verbal explanation of the study procedures, modeling role-playing sessions, rehearsal with performance feedback. Confederates took PF data on themselves and each other and roleplaying took place until both confederates reached 100% fidelity for two practice sessions in a row. During the study, confederates used PF checklists that included scripts to ensure they followed the correct procedures throughout. If PF was under 100% for any session, I immediately reviewed the error with the confederate and discussed how to do it correctly.

Generalization Student

Simultaneous prompting is considered an evidence-based practice for teaching skills to learners with autism and ID, therefore it was important to assess if the participants could accurately implement SP with the targeted population. Recruitment took place in a self-contained classroom for students with MSD at a local public elementary school. In the state of Kentucky, teachers certified to teach MSD are qualified to serve students in the following seven IDEA categories: autism, developmentally delayed, intellectual disability, multiple disabilities, orthopedic impairment, other health impairment, and traumatic brain injury (Commonwealth of Kentucky Education Professional Standards Board, 2017).

The eligibility criteria used for generalization students were receiving special education services in a self-contained classroom for students with MSD and the ability to respond vocally in SP sessions. I chose to include only students with oral expression since the roleplaying sessions in all previous conditions used a verbal controlling prompt and the participants were not given extensive training in other response modes. A total of four students in the classroom met the criteria. The classroom teacher sent home consent

forms to the parents/guardians of the eligible students that included a detailed explanation of the study, and one parent provided consent. Once parent consent was obtained, the classroom teacher read a student assent to the potential generalization participant and the student indicated he was willing to participate in the study.

The generalization student, referred to as Cody, was a 10-year-old, multiracial male in the 4th grade served in the MSD classroom. Cody was found eligible for special education services under the category of autism in 2019 and had a total score of 43.5 on the *Autism Spectrum Rating Scale- Second Edition Standard Version* (CARTS2-ST), falling in the category of severe symptoms of autism. Cody primarily communicated through verbal expression and often spoke at a low volume that could be difficult to hear. Cody enjoyed working for skittles or free time on his iPad.

Setting

CBI Setting

Each participant completed the CBI training in a vacant office in the College of Education Building at UofL. The space contained two desks, two chairs, a bookshelf, and a laptop computer. The laptop had the CBI training configured on the screen and was logged into Microsoft Teams to record for TI and duration data. Before each participant's arrival to complete the CBI training, I enabled the screen share feature, turned on the camera and microphone, pressed record, and minimized the Microsoft Screen window to eliminate distractions. Once directions were read, I left the room and each participant completed the training without anyone present. All recordings were stored on the password protected One Drive server.

Roleplaying Sessions Setting

All baseline, post-CBI, and maintenance sessions took place in the same office as the CBI training. One confederate and one participant were present in the room at a time. The participant was seated on one side of the desk with the confederate sitting on the other side directly across from them. An iPhone was used to record all sessions for data collection and reliability purposes. All recordings were stored on the password protected OneDrive server. The researcher was not present in the room while SP sessions took place.

Generalization Setting

Generalization sessions took place in a self-contained classroom for students with MSD at a local elementary school. The classroom consisted of one teacher certified to teach MSD, one classroom paraprofessional, and 10 students. During generalization sessions, approximately four to six students were present at a time and were completing other activities in another part of the classroom with their teacher. The participant and generalization student, Cody, were seated at a kidney table facing across from each other. The participants used Skittles as a reinforcer for Cody based on his teacher's suggestion. A study confederate was present to read directions and provide materials. Since the participants were early on in the education program and had little classroom experience, the confederate was also present in case any needs regarding Cody arose throughout the session. The researcher was not present during the generalization sessions, but was in the school building and present beforehand to introduce the participants to Cody and the teacher. An iPhone was used to record all generalization sessions and the recordings were stored on the password protected OneDrive server.

Asynchronous Video Feedback Setting

Asynchronous video performance feedback was provided to any participant who did not reach the performance criterion for accurate implementation of SP during post-CBI sessions. The asynchronous video feedback was recorded beforehand using Microsoft Teams. The participant received the feedback in the same office that was used for the CBI training and roleplaying sessions. When the participant entered the office, a laptop was sitting on the desk and the feedback video was on the screen and paused. The laptop was logged into Microsoft Teams with the screen sharing, microphone, and camera features enabled and the window was minimized to lessen distractions. The feedback video was shown to the participant directly before the next roleplaying session. The participant was alone in the room while they reviewed the feedback they were instructed to let the researcher know when they were ready to begin the next session by opening the office door.

Materials

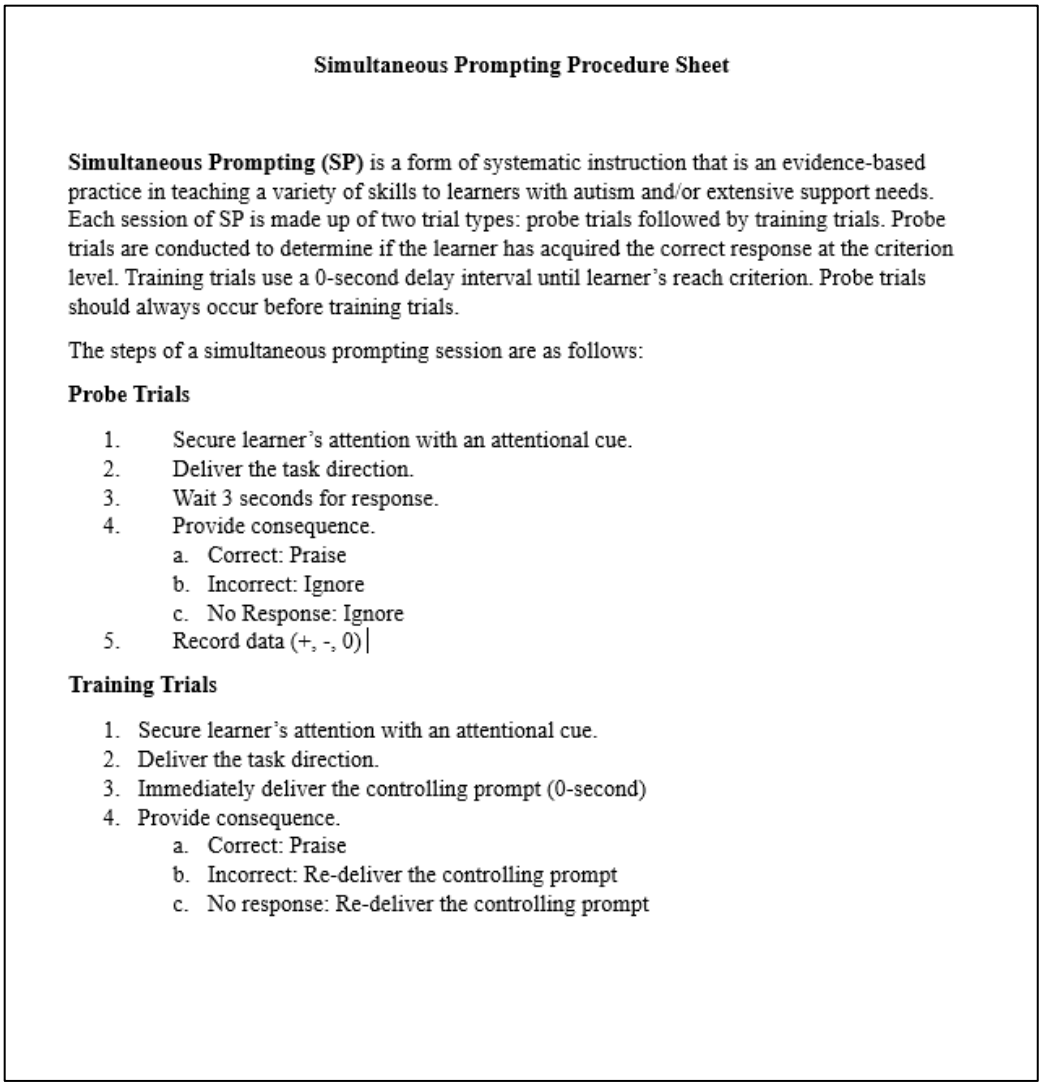
Roleplaying Materials

Participants were provided the same materials for all baseline, post-CBI, and maintenance sessions. The materials included 5 sight word cards, a SP procedure sheet, a data collection sheet, and a pencil. The procedure sheet contained a definition of SP and listed the SP steps (Figure 1). Pollard et al. (2014) provided instructional program sheets for all sessions to ensure that changes in behavior were a result of the CBI and not lack of exposure to the skill. If the participants could perform SP after only reading a program sheet, this would indicate that there is not a need for a CBI training and written

instruction alone is sufficient. The data recording sheet was given to record the confederate's responses during role-playing as they would with a real student.

Figure 1

Simultaneous Prompting Procedure Sheet



Simultaneous Prompting Procedure Sheet

Simultaneous Prompting (SP) is a form of systematic instruction that is an evidence-based practice in teaching a variety of skills to learners with autism and/or extensive support needs. Each session of SP is made up of two trial types: probe trials followed by training trials. Probe trials are conducted to determine if the learner has acquired the correct response at the criterion level. Training trials use a 0-second delay interval until learner's reach criterion. Probe trials should always occur before training trials.

The steps of a simultaneous prompting session are as follows:

Probe Trials

1. Secure learner's attention with an attentional cue.
2. Deliver the task direction.
3. Wait 3 seconds for response.
4. Provide consequence.
   a. Correct: Praise
   b. Incorrect: Ignore
   c. No Response: Ignore
5. Record data (+, -, 0)

Training Trials

1. Secure learner's attention with an attentional cue.
2. Deliver the task direction.
3. Immediately deliver the controlling prompt (0-second)
4. Provide consequence.
   a. Correct: Praise
   b. Incorrect: Re-deliver the controlling prompt
   c. No response: Re-deliver the controlling prompt

Confederate Materials

In all baseline, post-CBI, and maintenance sessions, the confederate was provided a binder, a pen, an answer script, and a PF sheet that included directions to read to the

participants and procedures to follow (Appendix B). Baseline session 1 had a separate PF sheet since there were extra steps that took place (Appendix C). Simultaneous prompting answer scripts were created to ensure a variety of answer responses (correct, incorrect, and no response) were delivered by the confederate so the participants would have the opportunity to display varying consequences and data collection procedures (Appendix D). A total of five different scripts were created and indicated probe responses and training responses. In probe trials, each script had two correct answers, two incorrect answers, and one no response in randomized orders. For training trials, each script contained either all correct responses or one incorrect or no response since training trials are intended to be errorless instruction (i.e., errors are uncommon).

Generalization Materials

Prior to beginning generalization, the researcher met with the classroom teacher to determine sight words to use for generalization that had a mixture of known and unknown words. The teacher provided a list of previously mastered sight words and then the researcher probed Cody on 4th grade high frequency sight words to determine unknown words. Two sets were created of five sight words each. Each set had two mastered sight words and three unknown sight words. The first word set consisted of *mom*, *dad*, *airplane*, *blow*, and *camp*. The second set was *sat, man, people, march,* and *space.* Two sets were created so that Cody would not have exposure to the same words more than twice. Multiple exposure to the words in the short time frame could lead to Cody answering more words correctly and limiting the participants' ability to display a variety of consequences, which could be a testing threat to the study's internal validity (Barton et al., 2018). For each generalization session, participants were provided a set of

5 sight word cards, the SP procedure sheet, a data collection sheet, and a pencil. The confederate used a generalization PF sheet for procedures (Appendix E).

Independent Variables

CBI Module

The independent variable in the study was the CBI training module. The CBI was developed using Articulate Storyline 360 (2023) and was administered on a MacBook Pro laptop computer with internet access. I originally used Adobe Captivate (2019) to design the CBI but found that it was not user-friendly and difficult to program basic features. The module was sent to two outside professors with experience in SP procedures for feedback regarding accuracy of the content, video examples, pre/post test questions, and overall usability. Changes were made based on the feedback before implementation with participants.

The module included the following components: a five question pre/post-test, six PowerPoint content slides containing text and graphics, 11 video examples of SP components, two video non-examples of SP components, 14 interactive questions, and two data collection practice opportunities. Other navigation and access features were "previous" and "next" buttons on each page, audio narration, and zoom in and highlighting of text that aligned with the audio narration. Content slides were developed using Microsoft PowerPoint and videos were edited using Microsoft Clipchamp. The module was self-paced; however, the participants were unable to choose the next button until the audio narration had played for each slide. Participants were required to complete each slide fully but could spend as much time as they liked reviewing the slides after the

narration ended before moving forward, and participants had the ability to go back to previous slides as well.

The CBI content was developed from the content and procedures of the textbook, *Systematic Instruction for Students with Moderate and Severe Disabilities, 2nd edition* (Collins, 2022) and from reviewing a previous SP didactic training PowerPoint used in a previous study (Tekin-Iftar et al., 2017). The CBI content slides included an overview of SP, an introduction of the two trial types, a full description of probe trials and data collection, a full description of training trials, and complete demonstrations of both trial types. The overview of SP included defining SP, discussing the population in which it is used, and supporting evidence on why to use SP.

The training slides for probe trials included step-by-step directions on how to conduct a probe trial and data collection procedures. The steps were (1) secure learner's attention with an attentional cue, (2) deliver the task direction, (3) wait a pre-determined number of seconds for the learner to perform the behavior, (4) deliver the consequence, (5) and record data. The training narration stated to always deliver an attentional cue at the beginning of a trial set and any time the learner gets distracted. For consequences, participants were told to praise correct responses and ignore incorrect or no responses. It was noted in the training that general praise for behavior may be included if needed. Data collection consisted of a + for correct responses, a – for incorrect responses, and a 0 for no responses. An example data sheet was shown with a verbal explanation of each box.

The training trial description contained the following steps: (1) secure the learner's attention with the attentional cue, (2) deliver the task direction, (3) immediately deliver the controlling prompt, and (4) deliver the consequence. Written and verbal

descriptions were provided on controlling prompts including verbal, gestural, model, and physical. Consequences were praise correct responses and repeat the controlling prompt for incorrect or no responses.

Video examples throughout the training were filmed with me performing SP to two adult confederates, two elementary students in a self-contained classroom for students with MSD, and one student in a home-setting. Five videos used confederates and six used students. Four videos modeled SP probe trial examples, one video showed an SP probe trial non-example, three videos modeled SP training trial examples, one video showed a SP training trial non-example, and two videos modeled a full session of SP (probe and training trials together). All video examples were 1:1 sessions teaching discrete skills including identification of sight words, colors, shapes, and letters. Verbal and model prompts were used for the videos. Parental permission was obtained to use the videos for training purposes (Appendix F).

Interactive questioning was embedded throughout and consisted of five multiple choice questions, two true or false questions, two matching questions, and five yes or no questions. Four of the yes or no questions involved the participants watching an example or non-example of SP components and determining if the example was implemented correctly. If the participant answered "no," a follow-up question was asked to identify the mistake through multiple-choice options. If a participant missed any interactive questions throughout, they were automatically directed back to the content slide containing the correct answer and then were given the opportunity to re-answer the question. Participants were required to pass every interactive question to move forward in the module.

The pre/post-test consisted of three multiple choice questions and two drag and drop sequencing questions regarding SP procedures. Each question was shown individually on the screen and participants were required to submit an answer to move forward. The score for the pre-test was not visible to participants and the post-test score was displayed at the end of the module. The tests were embedded at the beginning and end of module and did not require navigation outside of the program. A score of 80% or higher on the posttest was required to move on to the role-playing portion of the study. If participants did not reach the 80% criterion, they were required to repeat the module.

Asynchronous Video Feedback

A second IV, asynchronous video feedback, was introduced to participants who scored under the criterion of 90% for two sessions in a row during the post-CBI condition. The asynchronous video feedback consisted of showing two PowerPoint slides listing the steps of probe trials and training trials and verbally giving performance feedback on the steps that were performed incorrectly. I then replayed the participant's last session and paused the video after the errors and modeled how to do it correctly. The asynchronous video feedback was created and recorded using Microsoft Teams. I used the screen share feature to display the slides and session video and my live camera was displayed in the bottom right-hand corner of the video. One participant received the asynchronous video feedback and the total duration was 3 min 54 s long.

Dependent Measures

Simultaneous Prompting Accuracy

The primary dependent variable (DV) in the study was accuracy of SP implementation. This was measured by the researcher watching the filmed sessions and

measuring steps completed correctly on a SP task analysis (Appendix G). The criterion for participants was at least 90% accuracy across three sessions. This criterion was chosen to align with the previous research evaluating SP training. Tekin-Iftar et al. (2017) used a 90% accuracy rate for teachers' implementation and had positive student outcomes, demonstrating that 90% accuracy is adequate to lead to positive student results. Participants completed one to two sessions per day for 2 to 3 days per week. If more than one session occurred in the same day, a minimum of 30 min was given between sessions.

The SP task analysis was broken into probe trials and training trials and consisted of nine steps. This was modified from the task analysis used in Tekin-Iftar et al. (2017) but did not include instructive feedback stimulus since it was not being taught in this study. The steps for a probe trial were (1) secure the learner's attention with an attentional cue, (2) deliver the task direction, (3) provide 3 s wait time, (4) deliver the correct consequence, and (5) record data accurately. The training trial steps were (1) secure the learner's attention with an attentional cue, (2) deliver the task direction, (3) immediately deliver the controlling prompt, and (4) deliver the correct consequence.

For data collection on SP accuracy, a + was recorded for steps completed correctly by the participants, a – for steps completed incorrectly or omitted, and a NA could be recorded for step 1 only (attentional cue) if the trial did not require the participant to deliver an attentional cue and the participant did not do so. The percentage of correctly implemented steps was calculated by dividing the number of correct steps by the total of correct and incorrect steps and multiplying by 100. Steps that were marked NA were excluded from the total and overall percentage. There were 25 steps for probe

trials and 20 steps for training trials for a total of up to 45 steps across the 5 trials (sight words).

The first step for both probe and training trials was to secure the learner's attention with an attentional cue. For this, the participant needed to deliver an attentional cue for the first trial of both trial types (probe and training) and then any time the learner was distracted. An attentional cue was defined as a verbal directive letting the learner know that it was time to begin or drawing attention back to the cards and task (e.g., "are you ready?" "look here," "let's get started"). If the learner was making eye contact or looking at the sight word card, the learner's attention was considered secured and did not require an attentional cue, therefore NA was marked. If the learner was looking around the room and the participant did not deliver an attentional cue (i.e., "look here"), it was marked as incorrect. If the learner was distracted and the participant delivered an attentional cue, this was recorded as correct implementation.

Step 2 for probe and training trials was to deliver the task direction. To earn a + for this step, the participant needed to verbally indicate what the learner needed to do in relation to the sight words cards. This step was originally operationally defined as the task direction needed to be specific to word identification such as "what word?" or a direction that led to the learner reading the word aloud. However, during baseline, it became clear that the directions provided to the participants were vague and did not specify that the task direction needed to be specific to word identification. The directions given were, "complete a simultaneous prompting session with the sight word cards." Since the participants had very little context of SP in baseline, some used varying tasks directions such as "spell the word" or "define the word." Since the procedural directions

were not more specific, the operational definition of this step was expanded to include any clear, verbal directive provided to the learner that involved the sight word cards. The task direction could not be a yes or no question such as, “do you know the word?” or vague such as “what’s this?” In addition, the task direction in the probe trials needed to evoke the same behavioral response as the task direction in the training trials. For example, a participant could not ask “what word?” in probe trials and then switch to “define the word” in training trials since identifying words and defining words are two different behaviors. If the participant used a task direction of “what word?” in the probe trials and “say the word” in the training trials, this was considered correct since both task directions led to the same behavior of word identification.

Step 3 of SP is the amount of wait time provided to the learner. For the probe trial, the participant was instructed to provide a 3 s wait time for the learner to respond. If the participant waited 4 s or longer during the probe trial, this was considered incorrect. It was also considered incorrect if the participant moved to the next word after 1-2 s or redelivered the task direction. For step 3 in the training trial, the participant needed to immediately (0 s delay) deliver a verbal controlling prompt by stating the correct word. If there was a delay between the task direction and controlling prompt, this was considered an error.

Step 4 for both probe trials and training trials was delivering the correct consequence. During the probe trial, consequences included praising correct responses and ignoring incorrect or no responses. After correct learner responses, it was considered correct if the participant provided general or specific praise or clearly indicated to the learner that the response was correct. Specific praise was defined as when behavior

warranting praise was explicitly stated (e.g., “Great job, this is the word carry”). General praise was an affirmation delivered without being explicit (e.g., “good job”). Verbal responses that clearly signaled to the learner that they were correct such as, “Yes, that is correct” were counted as a correct consequence. Vague responses such as, “mm-hmm” or head nods were not considered a correct response by the participant. If the learner responded incorrectly or did not respond in a probe trial, it was considered correct if the participant neutrally moved to the next word card without indicating to the learner that the answer was incorrect or providing any form of error correction.

For training trials, consequences included praising correct responses and redelivering the controlling prompt for incorrect or no responses. The same operational definition of correct responses for probe trials was used for training trials. If a learner answered incorrectly or did not respond during a training trial, the participant needed to redeliver the controlling prompt and provide praise once the learner repeated the correct response. It was considered incorrect implementation if the participant repeated the incorrect response (e.g., “Not *cherry,* this is *carry.”)* or failed to deliver the controlling prompt. See Table 2 for operational definitions and examples/non-examples of each step.

An analysis of each step of SP was completed across all participants in baseline, post-intervention, maintenance, and generalization conditions to determine whether CBI was differentially effective across SP steps. For example, CBI may lead to successful implementation of basic steps such as delivering the task direction but be less effective for more complex steps such as determining and delivering the correct consequence. Mean was calculated for each step across participants and conditions for comparison.

Table 2

Operational Definitions of SP Steps for Data Collection

Trial Type	SP Task Analysis Step	Operational Definition	Examples	Non-Examples
Probe Trials	**1. Secure the learner's attention with an attentional cue.**	A clear, verbal directive is delivered indicating it is time to start. Must be given on the first trial and any time the learner is distracted.	"Are you ready?" "Ok, let's get started." "Look here"	Does not deliver on the first trial. Does not deliver when the learner is distracted. Only reviews directions.
	2. Deliver the task direction.	Verbally indicates what the learner should do. Task direction directly references the sight words or cards. Avoids wording that leads to yes/no response from learner.	"What word?" "Say the word on the card." "Read the sight word." "What is the definition of this word?"	Holds up a card without a verbal direction. "What about this?" "Do you know what this is?"
	3. Provide 3 second wait time.	Participant waits 3 s after delivering the task direction for the learner to respond.	Participant moves to the next word if the learner does not respond in 3 s.	Only waits 1-2 s before moving to the next word. Waits 4 s or longer for the learner to respond.
	4. Deliver the correct consequence.	Correct learner response: Provides praise and/or indicates the answer is correct. Incorrect or no response: Moves to the next trial without indicating if the response was correct or not.	"Great job, this word is carry!" "Good job." "That is correct." "Yes!"	Unclear responses such as "mm-hmm" Nodding without a verbal response.
	5. Record data accurately.	Data is marked vertically in the first column. For each word, the participant's data matches the learner's response.	Correct learner response: + Incorrect learner response: - No response: 0 or NA	Data is marked outside the trial column. Recorded response does not match the learner response.

Trial Type	SP Task Analysis Step	Operational Definition	Examples	Non-Examples
Training Trials	**1. Secure the learner's attention with an attentional cue.**	Identical to Step 1 in probe trial. See above.		
	2. Deliver the task direction.	Identical to Step 2 in probe trial definition. Additionally, the task direction in the training trials elicits the same response as the task direction in the probe trials.	Probe trial: "What word?" Training trial: "What word?"	Probe trial: "What word?" Training trial: "What definition?"
	3. Immediately deliver the controlling prompt.	Immediately delivers a verbal prompt by stating the correct word (0-second delay)	"What word? Carry."	Points to correct word. Delays between the task direction and CP.
	4. Deliver the correct consequence.	Correct learner response: Provides praise and/or indicates the answer is correct. Incorrect or no response: Redelivers the CP and praises once the learner repeats correctly.	"Excellent!" "You got it right!" "Yes, the word is carry!"	Unclear responses such as "mm-hmm." After an incorrect answer, the participant moves to the next word without delivering the CP. After an incorrect answer, the participant provides negative feedback to the learner. "No, that's not right."

Note. CP = controlling prompt

CBI Duration

The CBI training duration was assessed for each participant and recorded to the nearest minute. Since all CBI sessions were recorded, the researcher computed duration by subtracting the start time from the end time. The training began once the participant hit the play button on the screen and ended once the post-assessment score was displayed on the screen.

SP Recall Test

A SP procedure recall test was administered to each participant three times throughout the study: (a) during baseline session 1 (pre-test 1), (b) at the beginning of the CBI module (pre-test 2), and (c) at the end of the CBI module (post-test). This measured any changes in the participants' knowledge of SP procedures based on the materials they had reviewed throughout the study. Prior to pre-test 1, the participants were not provided any information or instructions on SP. Pre-test 2 occurred after participants had reviewed the SP procedure sheet in baseline role-playing sessions that contained a written explanation of SP implementation. The post-test was given after the participants had completed the CBI training, thus had exposure to the written instruction of SP from baseline roleplaying sessions and the CBI module. The test consisted of five questions on implementation of SP to determine whether participants were able to recall the steps and procedures (See Appendix H). There were three multiple choice questions and two sequencing questions in which the participants were asked to put the trial steps in the correct order. Answer choices were automatically shuffled via the software program. Data were recorded on the SP Test Score Sheet and consisted of recording (+) for correct answers or (-) for incorrect or no responses (See Appendix I). An overall percentage was

calculated by dividing the number of correct responses by the total number of questions and multiplying by 100.

Procedures

Baseline Sessions

Baseline sessions took place to assess the participant's ability to use SP to teach the discrete task, sight words. Baseline sessions took place 1:1 with one confederate and one participant. During the first baseline session, each participant was asked to complete a survey to collect educational and demographic information (Appendix J) and to complete the SP recall test on the computer prior to receiving any materials. The computer was logged into Microsoft Teams with the screen share feature and recording enabled to collect data on the scores and ensure the participant did not use any outside materials.

Before each session, a SP answer script was randomly chosen out of a choice of five to ensure that the participants received varied answer responses. The script was provided to the confederate and the confederate was given time to practice before the session. Before the participant entered the office, video recording was enabled. Once in the office, the participant was given the set of materials (SP procedure sheet, data collection sheet, pencil, and 5 sight word cards) and told they would be conducting a roleplaying session for SP. The confederate then explained to the participant that they would be given time to review the materials alone and to not use their phone or computer to do any outside research during the review time or outside of the study. If the participant was finished reviewing the materials before the time limit ended, they were instructed to let the confederate know by opening the office door.

The confederate left the room and shut the door and provided the designated time for the participant to review the SP sheet and materials alone. The participants were given 10 min for the first baseline session and 5 min for all following sessions. The confederate waited outside the room until the time limit elapsed or the participant indicated they were ready. The confederate then read the following script, “Pretend that I am a student and complete a simultaneous prompting session with the sight word cards. You will use a verbal prompt and a 3 second wait time. You may begin whenever you’re ready.” If the participant asked any questions regarding SP, they were told that they cannot answer questions at this time and to try their best. The participants then attempted to complete a SP session and the confederate followed the answer script provided.

Data were collected on the first 10 trials completed by the participant since a typical SP session for five words would consist of five probe trials and five training trials. Data were not collected for any additional teaching that the participants did in the session since it was considered outside the scope of one SP session, which is what participants were instructed to complete. The confederate followed the script order that designated probe responses before training responses, regardless of the order in which the participants completed the session. If a participant completed more than 10 trials, the confederate began the script over and continued the roleplaying session, however data were not collected past this point. For example, a participant in baseline session 1 conducted a mini lesson with the sight word cards and instructed the confederate to complete several different tasks including saying the words, defining the words, and putting the words in alphabetical order. The confederate would give a correct, incorrect,

or no response based on the script for all tasks, but data on SP accuracy were only recorded for the first ten trials for the first task.

Baseline data were collected for a minimum of three sessions or until stable baseline data were demonstrated. Stable data refers to the consistency and predictability of data values within a condition, including level and trend (Barton et al., 2018). Session 1 data were collected for all participants concurrently and data were collected concurrently for all participants still in the baseline condition each time the IV was introduced in a tier. Baseline took place across approximately 3.5 weeks for all participants. No participants completed more than one baseline session per day. Participant Sarah was in the baseline condition for 1 week, Bryan for 2 weeks, Steph for 2 weeks and 5 days, and Kendall for 3 weeks and 3 days.

CBI

Introduction of the IV to each participant was staggered and the first participant was randomly selected. The IV was introduced to the following participants based on who displayed stable data first. If more than one participant was displaying stable data in baseline, the next participant was also randomly selected using a number generator. This took place until all participants were introduced to the IV.

Prior to the participant entering the room, the CBI was loaded on the laptop displaying a large “Play” button in the center of the screen. I brought the participant into the office and provided them with paper, a pencil, and a data sheet along with a brief explanation of the materials. The SP program sheet that was provided for roleplaying sessions was not provided since it listed the steps of SP and could impact the recall test results. I then read the following script:

> Today you will be completing a computer-based instructional module on simultaneous prompting. This will include a short pre-test, an interactive training with videos and questions throughout, and a post-test. A score of 80% is required on the post-test to move to the next phase of role-playing. If a score less than 80% is obtained, you will be asked to repeat the training in your next session. You may take notes throughout the training if you wish but please do not use any outside sources such as your cell phone or the computer to find answers. You will use the mouse and the "next," "previous," and "submit" buttons to navigate through the training. If you have any technical problems, please use the phone number provided. The computer is currently logged into Microsoft teams and is recording your screen and you as you complete for data collection purposes. After you have completed the post-test, please leave your score displayed on the screen.

Participants were then asked if they had any general questions. If the participants asked any specific questions regarding SP, they were told that they could not answer those questions at this time and to do their best. I left the room, and the participant was free to begin the training. Once the participant completed the post-test at the end of the CBI, they were instructed to open the office door. If the participant scored under 80% on the post-test, they were informed that they would complete the CBI training again in their next session. However, all participants scored the required 80% or higher on their first attempt.

Post-CBI

Upon scoring 80% or higher on the CBI posttest, participants immediately conducted their first post-CBI role-playing session with a confederate. Post-CBI sessions

were identical in procedures to baseline sessions. The criterion in the post-CBI condition was 90% or higher for three consecutive sessions.

Post-CBI sessions for all participants took place across 2.5 weeks with one to two sessions occurring per day. If a participant completed more than one session in a day, a minimum of 30 min was required between the sessions. Sarah completed five post-CBI sessions across 8 days with two sessions occurring on the same day. Ben completed three sessions across 2 days with two sessions occurring on the same day. Steph completed three sessions across 2 days with two sessions occurring on the same day, and Kendall completed three sessions across 2 days with two sessions occurring on the same day.

Asynchronous Video Performance Feedback

Asynchronous video feedback was provided to any participant who scored under the criterion of 90% for two consecutive sessions. This was provided directly before the participant's next session. When the participant arrived, the confederate informed them that they would be reviewing feedback given by the researcher before their session. A laptop was on the desk with the video feedback on the screen and paused. The confederate left the room and the participant reviewed the feedback alone. No in-person performance feedback was given. After reviewing the feedback, the participant completed their next post-CBI session following the regular procedures.

Maintenance

Maintenance data were collected approximately 2 weeks after each participant reached criterion in the post-CBI condition to determine if the participants had maintained their SP implementation accuracy. Procedures were identical to baseline and post-CBI sessions and were conducted in the same setting using the same materials. Each

participant completed two maintenance sessions. For each participant, both sessions were completed on the same day with 30 min between sessions. All maintenance sessions were recorded for data collection purposes.

Generalization

One generalization probe was conducted for each participant approximately 1 month after completing the maintenance condition to measure if participants could accurately implement SP to a student receiving special education services in the MSD classroom setting. Generalization sessions were conducted on 3 separate school days across 1 week. Two participants completed generalization sessions on the same day and the other two participants completed their sessions on separate days. I originally intended to complete two generalization probes per participant but lessened it to one probe for ethical considerations since permission was only obtained from one student. I did not feel it was in the best interest of Cody to be removed from his regular instruction and routine for eight sessions compared to four sessions in such a short period of time. Since the study was conducted at the end of the university semester, there was not a possibility to spread generalization sessions across a longer period of time. It was determined that the benefit to the study did not outweigh the potential risk to the student.

Generalization probes took place in a self-contained classroom for students with MSD in a rural public school district in Kentucky. I consulted with the classroom teacher to determine times of the day that would be less intrusive to the classroom schedule and students. During generalization sessions, the classroom teacher and students completed their normal routine on one side of the classroom and the SP sessions took place at a kidney table on the other side of the classroom.

I brought each participant into the classroom and introduced them to the teacher and Cody. Before beginning, I asked Cody if he would be willing to do some work with the participant today. Cody verbally indicated permission before each session. Cody completed his regular classroom activities while the generalization session was set up to minimize the time removed from instruction, and the classroom teacher resumed her regular duties. After introductions and set-up, I left the room and was not present for the generalization sessions.

The confederate provided the participant with the materials (SP program sheet, data collection sheet, pencil, and sight word cards) and told the participant they could have up to 5 min to review the procedure sheet and materials before beginning. The confederate moved to another spot in the classroom to allow the participant space to review the materials. It was determined for the confederate to stay present in case any concerns arose for Cody since the participants had little to no previous experience working with students with MSD, or specifically Cody. The confederate did not answer any specific questions regarding SP but did answer any questions asked about Cody. For example, one participant asked if they should still complete training trials if Cody scored 100% during the probe trial and the confederate responded to do what they think is best. Another participant asked if she could give Cody skittles and the confederate said yes, she could give them sparingly throughout or at the end of the session.

When the participant indicated that they were ready after reviewing the materials, Cody was brought to the kidney table and the confederate explained to him that he would be working with the participant to earn skittles. The confederate then read the following instructions, “Complete a simultaneous prompting session for sight word identification

with Cody. You will use a verbal prompt and a 3 s wait time. You may begin whenever you're ready." The researcher consulted the classroom teacher prior to beginning to determine the amount of wait time for Cody and to confirm that a verbal controlling prompt was appropriate. The participant then conducted a SP session with Cody with the confederate present but standing away from the table. Upon completion of the session, Cody was given skittles by the participant and returned to his classroom teacher. Each generalization session took approximately 5 min.

Validity and Reliability

Social Validity

A social validity questionnaire was sent via email using a Qualtrics secure link to each participant upon completion of the study to gain their perceptions of CBI for learning the SP procedure (Appendix K). Participants were informed that the survey results were anonymous. I modified a previously used social validity scale for CBI from Gerencser (2016). It consisted of 8 Likert scale questions ranging from *Strongly Disagree* to *Strongly Agree* and three open-ended questions. Likert questions included if the module was (a) informative about how to implement SP, (b) easy to navigate, (c) maintained the participant's attention, (d) explained the content clearly, (e) videos clearly demonstrated SP components, (f) there were enough video examples, (g) if there was enough information in the module to learn SP, and (h) if they would recommend CBI as a way to learn SP. Open-ended questions asked what features of the module contributed most to their learning, what content they found hard to understand, and any comments or suggestions for future use.

Interobserver Agreement

Interobserver agreement (IOA) on accuracy of SP implementation was assessed for 40.0% of baseline sessions, 35.7% of post-CBI sessions, 50.0% of maintenance sessions, 100% of generalization sessions, and 100% of the CBI sessions measuring duration. Confederate 2 served as a secondary observer and I provided a training overviewing the operational definitions of each step and practice opportunities until 100% agreement was met. Confederate 2 independently completed IOA from video recordings of sessions and immediate analysis took place after each session to determine if additional training was needed or if any operational definitions were too vague.

CBI Duration. Interobserver agreement for duration data was collected using the CBI Training TI and Duration form (Appendix L). Both observers independently reviewed the video recording and recorded the CBI start time and end time and calculated the total duration rounded to the nearest minute. The total durations were then compared for analysis. If both observers had the same duration to the minute, it was considered an agreement and if they were different, it was considered a disagreement. Therefore, IOA could only be 0% or 100% for each CBI session. The IOA for duration was 100% for all four participants.

SP Accuracy. Interobserver agreement for baseline, post-CBI, maintenance, and generalization sessions were collected using the SP task analysis. The point-by-point interobserver agreement method was used and IOA was calculated by dividing the number of agreements by the total number of agreements and disagreements and multiplying by 100. An agreement was defined as when both observers recorded the same response for the participant (correct, incorrect, or not applicable). It was considered a

disagreement any time the two observers recorded different responses for a component. Each time after IOA was assessed, the two observers had a discrepancy discussion to review any disagreements and came to a consensus on what the correct response should be to reduce errors (Ledford et al., 2018). After baseline session 1, the operational definition for "task direction" was re-examined due to low levels of agreement for this specific step and the unanticipated wide variety of task directions used by participants. The definition was expanded to include any task direction related to the sight words as opposed to only task directions related to word identification. It was also clarified that yes/no questions such as, "Do you know what this is?" would be marked as incorrect since it does not explicitly tell the learner what to do.

The mean IOA across all participants and conditions was 95.1% (range, 84.4%-100%) The mean IOA for baseline sessions was 90.4% (range, 84.4%-97.8%), post-CBI sessions 97.8% (range, 93.3%-100%), maintenance sessions 97.25% (range, 95.6%-100%), and generalization sessions 96.7% (range, 91.1%-100%). IOA in post-CBI sessions and after were consistently higher than baseline as the participants' behaviors and responses were more predictable and in alignment with the training and original operational definitions. See Table 3 for IOA across individual participants.

Table 3

Mean Interobserver Agreement Across Participants and Conditions

Participant	Baseline IOA (%)	Post CBI IOA (%)	Maintenance IOA (%)	Generalization IOA (%)
Sarah	88.9	98.9	100	100
Ben	84.4	100	95.6	95.6
Steph	91.1	93.3	95.6	91.1
Kendall	93.4	97.8	97.8	100

Note. IOA = interobserver agreement; CBI = computer-based instruction.

Procedural Fidelity

Procedural fidelity was assessed for the confederate's behavior for 100% of baseline, post-CBI, maintenance, and generalization sessions to ensure the experimental conditions were implemented as intended. A checklist was developed consisting of "yes," "no," or "NA" response options to measure if the confederate (1) turned on the camera and began filming, (2) gave the background info survey for participants to complete (baseline session 1 only), (3) administered the pre-test with Teams recording (baseline session 1 only), (4) read the direction script, (5) provided the designated time to review the procedure sheet without the confederate present, (6) read the scripted prompt to conduct a SP session, (7) followed the answer script, and (8) refrained from answering any questions or providing information on SP. The PF checklist was listed on the bottom of the SP task analysis form and was calculated by dividing the number of "yes" responses by the total number of items and multiplying by 100. The mean PF for all participants was 98.4% (range, 83.3%-100%). Five procedural errors were made

throughout the study. Four of the errors were deviating from the answer script (e.g., the confederate gave an incorrect response when the script said to give a correct response) and one error was failure to record the session (session 25 with Kendall). For the session that was not recorded, the confederate repeated the session with the camera on and both the participant and confederate reported that the participant completed the session identical to the unrecorded session.

Interobserver agreement for PF was conducted by Confederate 2 for 40.0% of baseline sessions, 35.7% of post-CBI sessions, 50.0% of maintenance sessions, and 100% of generalization sessions. The point-by-point IOA method was used, and it was considered an agreement if both observers circled the same response (yes, no, NA) for each item in the checklist. The overall IOA for PF was 97.8% (range, 83.3%-100%). See Table 4 for mean PF across participants and conditions.

Table 4

Mean Procedural Fidelity Across Participants and Conditions

Participant	Baseline PF (PF IOA) (%)	Post-CBI PF (PF IOA) (%)	Maint PF (PF IOA) (%)	Gen PF (PF IOA) (%)
Sarah	100 (100)	97.5 (93.75)	100 (100)	100 (100)
Ben	100 (100)	100 (100)	100 (100)	100 (100)
Steph	96.9 (93.8)	100 (100)	100 (100)	100 (100)
Kendall	94.2 (100)	100 (100)	93.8 (83.3)	100 (100)

Note. PF = procedural fidelity; IOA = interobserver agreement; CBI = computer-based instruction; Maint = maintenance condition; Gen = generalization condition.

Treatment Integrity

Treatment integrity was measured for 100% of CBI sessions and 100% of asynchronous video feedback sessions to determine if the intervention was conducted as intended. The TI for the CBI consisted of a 7-question "yes" or "no" checklist (Appendix L). Items included (a) the Teams meeting was recording with the screen shared and camera/microphone turned on prior to the participant entering, (b) materials were provided with a brief explanation, (c) the researcher read the script of directions, (d) participants were asked if they had any general questions, (d) the researcher refrained from answering questions specific to SP, (e) the researcher left the room, and (f) the participant completed the entire training. A percentage was calculated by dividing the number of yes responses by the total number of items and multiplying by 100. The mean TI for all participants was 100%. Confederate 2 conducted IOA for TI for all CBI sessions. Point-by-point agreement was used and it was considered an agreement if both observers circled the same response for each item on the TI checklist. Interobserver agreement for TI was 100% for all sessions and participants.

The TI measure for asynchronous video feedback consisted of a 6-item "yes" or "no" checklist with the following items: (a) provided performance feedback on errors, (b) used participant's session video(s) to show mistake(s), (c) modeled how to do it correctly, (d) feedback was given prior to next session, (e) the researcher or confederate were not present when the participant watched the feedback, and (f) in-person feedback was not provided (Appendix M). A percentage was calculated for each session by dividing the number of yes responses by the total number of items and multiplying by 100. The TI for the one session of asynchronous feedback provided was 100%.

Visual Analysis

Line graphs were used to make formative decisions throughout the study and to display overall outcomes. This allowed organization of the data and a detailed overview of the behavior over time (Spriggs et al., 2018). Visual analysis was used since it is the preferred approach in single case design due to the practicality and reliability of the method. Formative visual analysis was conducted within conditions to identify level, trend, and stability of data. Across tier analysis of adjacent conditions was conducted to evaluate for behavior change (Barton et al., 2018). This looks for changes in data patterns, immediacy of change, overlapping data, and consistency of data patterns across conditions (Barton et al., 2018). Summative visual analysis was conducted upon completion of the study to determine if there were enough demonstrations of behavioral change to determine if a functional relation existed between the CBI training and implementation accuracy for the given participants. In addition to visual analysis, data were analyzed for accuracy of each step of SP across the four participants and conditions to determine if certain steps of SP were acquired more than others through CBI.

CHAPTER THREE

RESULTS

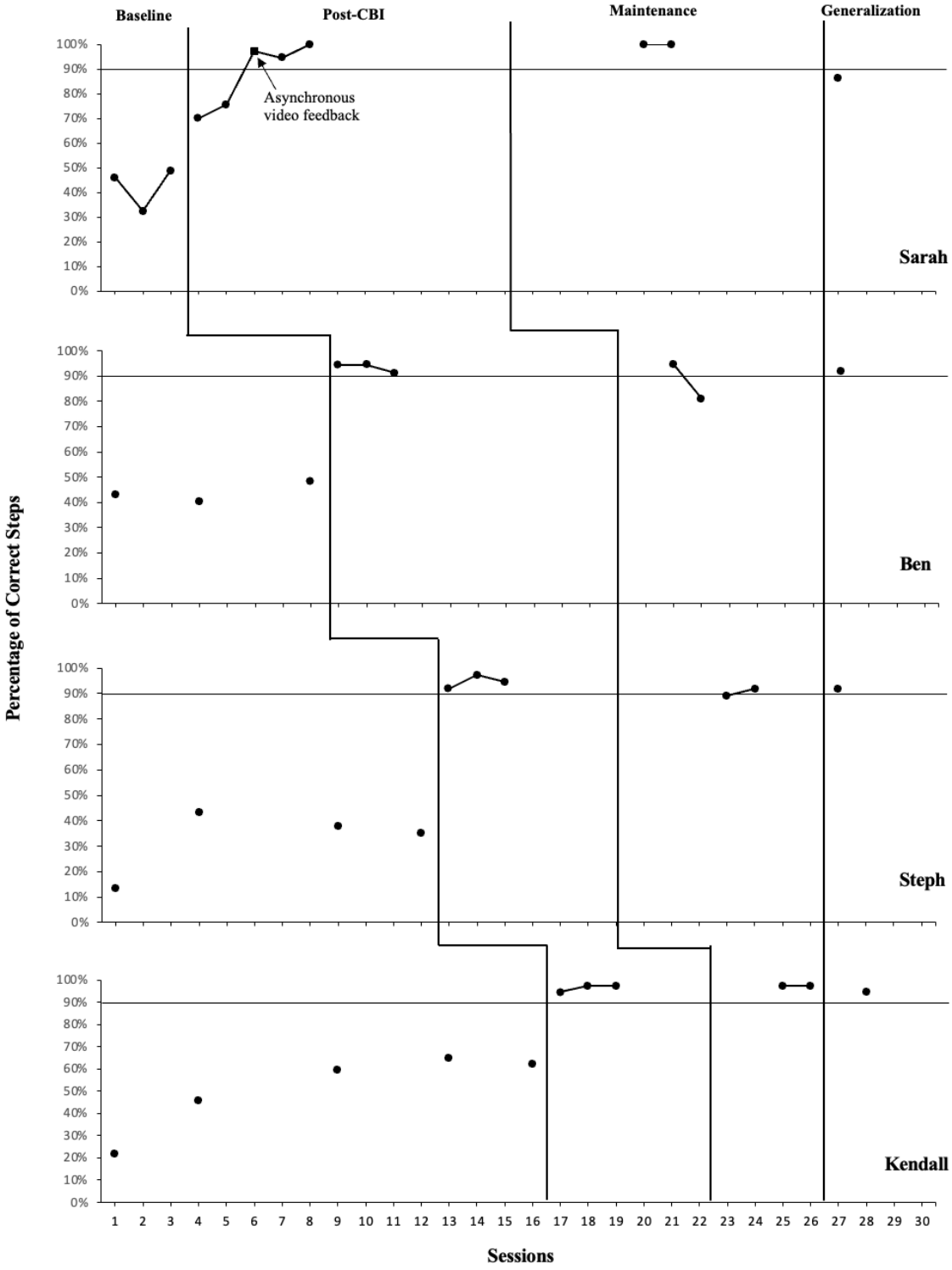
The study addressed two main research questions. The first question examined if CBI was effective at teaching four preservice teachers to implement SP and the duration required to pass a SP recall test. The second question assessed the use of asynchronous video feedback for any participants that did not meet the criterion for implementation accuracy after the CBI alone. Data were collected on SP procedural knowledge, SP implementation accuracy, and CBI duration. Simultaneous prompting implementation accuracy was further broken down to look for patterns across steps to see if some steps of SP may be easier to acquire via CBI than others. Lastly, social validity data were collected to gain participants' perceptions on using CBI to learn SP. Individual participant results and overall participant results are reported by research question.

Research Question 1: Does Computer-Based Instruction (CBI) Increase Preservice Teachers' Implementation Accuracy of Simultaneous Prompting (SP) Measured by Percentage of Correctly Performed Steps on a Task Analysis?

The first research question examined if CBI increases preservice teachers' implementation accuracy of SP as measured by the percentage of correctly performed steps on a SP task analysis. Data were collected on four participants across four conditions. Figure 3 displays the percentage of SP steps accurately implemented during baseline, post-CBI, maintenance, and generalization conditions for each participant.

Figure 3

Implementation Accuracy of Simultaneous Prompting



Sarah

The first tier of Figure 3 displays Sarah's data across the four conditions. Sarah's baseline data displayed low to moderate levels of implementation accuracy (range, 32.4%–48.7%) and showed some variability within the condition. When using visual analysis alone, this variability may have constituted the need to continue in the baseline condition until stability was established; however, when examining Sarah's individual SP step data and anecdotal records, the decision to introduce the IV was warranted (Table 5). Sarah did not complete four of the nine steps of SP (44%) during the baseline condition. For all three of Sarah's baseline sessions, she scored 0% for correct implementation of the following steps: secure the learner's attention with an attentional cue (probe trial), secure the learner's attention with an attentional cue (training trial), deliver the task direction (training trial), and immediately deliver the controlling prompt (training trial). Variability arose between her use of the correct consequence and data collection.

Data also did not capture Sarah's actions after data recording stopped in each baseline session. As described in the method, data were only recorded on the first 10 trials taught in a session. However, Sarah's baseline sessions often continued and looked like mini lessons where she would teach the words, definitions, contexts of the words, and complete trials where she provided "hints." Ledford et al. (2023) recommend flexibility in single-case design rules when authors provide rationales supporting their decisions. Since it was evident that Sarah did not know how to implement the procedures of SP when I collectively analyzed her data and observations, I chose to implement the IV even with variability in the baseline condition detected through visual analysis.

Table 5

Sarah's Mean Accuracy Per Step Across Conditions

Simultaneous Prompting Steps		Baseline *M* (%)	Post-CBI *M* (%)	Post-Video FB *M* (%)	Maint *M* (%)	Gen *M* (%)
Probe Trials	Secure the learner's attention-attentional cue	0.0	100	100	100	100
	Deliver task direction	20.0	10.0	100	100	100
	3 s wait time	100	100	100	100	100
	Consequence	86.7	100	100	100	100
	Record data	73.3	100	100	100	100
Training Trials	Secure the learner's attention-attentional cue	0.0	50.0	100	100	100
	Deliver task direction	0.0	0.0	100	100	0.0
	Immediately deliver controlling prompt	0.0	100	100	100	100
	Consequence	33.3	100	80.0	100	100
0%–49%	50%–69%	70%–89%	90%–100%			

Note. M = mean; CBI = computer-based instruction; FB = feedback; Maint =maintenance condition; Gen = generalization condition. Post-CBI represents the average of sessions 4 and 5 before Sarah received asynchronous video feedback. Post-Video FB represents the average of sessions 7, 8, and 9 after asynchronous video feedback was delivered.

Immediately upon receiving the IV, Sarah's implementation accuracy increased from 48.7% to 70.2%. While there was an immediate change in level, she did not meet the 90.0% implementation accuracy criterion. Sarah was not delivering a task direction and was inconsistently securing the learner's attention during the training trials. Sarah would hold up or lay out the sight word card, however, she did not give a verbal directive

such as “What word?” when doing so. After two post-CBI sessions below criteria, Sarah was provided brief asynchronous video feedback prior to her next post-CBI session (session 7), and immediately exceeded criteria for three consecutive sessions.

Two maintenance probes and one generalization probe were conducted upon reaching criteria post-CBI. Sarah averaged 100% during maintenance roleplaying sessions with the confederate and 86.5% during the generalization probe with Cody. For the generalization probe, Sarah did not deliver a task direction during the training trials and only held up the card. However, Cody correctly responded and the lack of a verbal task direction did not negatively impact his performance.

Ben

Ben’s implementation accuracy of SP across conditions is displayed in tier 2 of Figure 3. During the baseline condition, Ben displayed low to moderate implementation accuracy of SP with an average of 44.1% (range, 40.5%–48.6%). Like Sarah, there were specific steps of SP that Ben did not complete during baseline including securing the learner’s attention (probe trials), delivering a task direction (probe trials and training trials), and immediately delivering the controlling prompt (See Table 6). For the task direction in baseline, Ben would often give unclear yes/no task directions such as, “Do you know this?” or give broad directions at the beginning such as, “I am going to show you cards and I want you to say each word three times in a row.”

Table 6

Ben's Mean Accuracy Per Step Across Conditions

Simultaneous Prompting Steps		Baseline *M* (%)	Post-CBI *M* (%)	Maint *M* (%)	Gen *M* (%)
Probe Trials	Secure the learner's attention- attentional cue	0.0	33.3	0.0	100
	Deliver task direction	0.0	93.3	70.0	100
	3 s wait time	100	100	100	100
	Consequence	86.7	100	100	80.0
	Record data	86.7	100	100	80.0
Training Trials	Secure the learner's attention- attentional cue	33.3	33.3	50.0	100
	Deliver task direction	0.0	100	70.0	80.0
	Immediately deliver controlling prompt	0.0	93.3	100	100
	Consequence	40.0	93.3	100	100
0%–49%	50%–69%	70%–89%	90%–100%		

Note. M = mean; CBI = computer-based instruction; Maint = maintenance condition; Gen = generalization condition.

Upon receiving the CBI, Ben had an abrupt change in level, indicating an immediate demonstration of effect. Ben's post-CBI average was 94.6% (range, 91.9%–94.6%) displaying high levels of stability. When examining individual steps of SP, Ben reached above criteria consistently on all steps except for securing the learner's attention with an attentional cue. This step is required for the first trial in each trial type, and Ben would often review directions and go straight to delivering the task direction without

delivering an attentional cue such as, “Are you ready to begin?” Ben averaged 33.3% for this step in both probe and training trials.

During the maintenance condition, Ben averaged 94.6% for the first probe session and 81.1% for the second probe session, showing variability in correct implementation of SP. On the first maintenance probe, Ben’s only error was failing to secure the learner’s attention on the first trial in both the probe and training trials. On Ben’s second maintenance session, he did not secure the learner’s attention on the probe trial and used vague task directions for six of the 10 trials.

Ben completed one generalization session with the generalization student Cody and scored 91.1%. Ben had three errors for this session. During one of the probe trials, Cody hesitated and then stated the word correctly right as Ben was putting down the card. Ben considered this a no response since it was technically outside the 3 s time frame and recorded data as a 0 and did not provide praise. In applied situations with real students, instructors would still consider Cody’s response as correct since it was so close within the time frame, and it was evident that Cody knew the word. Due to this, Ben’s consequence (ignoring and moving to the next word) and data collection (0 for no response) were both considered errors. The third implementation error in the generalization session was a vague task direction during a training trial, however, Cody still responded correctly. While Ben did not consistently secure the learner’s attention during previous roleplaying conditions, he scored 100% for this step with Cody in the classroom during generalization.

Steph

Tier 3 of Figure 3 represents Steph's SP implementation accuracy across the four conditions. During baseline, Steph displayed a sharp accelerating trend between her first and second probe sessions that then stabilized at a low to moderate level across three probe sessions. Her overall baseline mean was 32.4% (range, 13.5%–43.2%). When looking at individual steps of SP during baseline, Steph did not complete three of the steps for any of the baseline sessions: secure the learner's attention (probe trials), secure the learner's attention (training trials), and immediately deliver the controlling prompt (See Table 7). Steph also displayed low implementation accuracy for delivering the task direction with an average of 40.0% in probe trials and 5.0% in training trials. This was often due to Steph changing the task direction between trials (e.g., "Say this word" then "Spell this word"), or using vague task directions such as "Try this one." Most often, her task directions in training trials did not elicit the same behavioral response as the task directions in probe trials. For example, Steph would ask the confederate to say the word in the probe trials and then would ask the confederate to use the word in a sentence for the training trials.

In baseline, Steph averaged 40.0% for delivering the correct consequence during probe trials and 70.0% in training trials. If the confederate answered incorrectly during probe trials, Steph would often give a hint or say encouraging comments like, "Don't worry, you will get it next time" instead of providing a neutral response and/or moving to the next word. During both probe and training trials, her praise was often unclear such as a head nod while muttering "mhmm" with a neutral facial expression. Steph averaged 70.0% on providing 3 s wait time in probe trials. If the confederate did not answer, she

would often wait a few seconds longer to see if the confederate would eventually respond.

Table 7

Steph's Mean Accuracy Per Step Across Conditions

Simultaneous Prompting Steps		Baseline *M* (%)	Post-CBI *M* (%)	Maint *M* (%)	Gen *M* (%)
Probe Trials	Secure the learner's attention- attentional cue	0.0	66.7	0.0	0.0
	Deliver task direction	40.0	93.3	100	100
	3 s wait time	70.0	100	100	80.0
	Consequence	40.0	100	90.0	100
	Record data	15.0	100	100	100
Training Trials	Secure the learner's attention- attentional cue	0.0	0.0	0.0	0.0
	Deliver task direction	5.0	100	100	100
	Immediately deliver controlling prompt	0.0	100	100	100
	Consequence	70.0	93.3	80.0	100
0%–49%	50%–69%	70%–89%	90%–100%		

Note. M = mean; CBI = computer-based instruction; Maint = maintenance condition; Gen = generalization condition.

After receiving the CBI training, Steph showed an immediate and significant change in level and her overall implementation accuracy post-CBI was 94.6% (range, 91.9%–97.3%). Steph averaged 100% in the post-CBI condition for five of the nine SP steps. For the step to secure the learner's attention with an attentional cue, Steph averaged 66.7% in probe trials and 0.0% in training trials. Steph would give directions for training

trials and immediately deliver a task direction without giving an attentional cue on the first trial.

Steph completed two maintenance probes and averaged 90.6% (range, 89.2%–91.9%) for implementation accuracy. Similar to previous conditions, she failed to secure the learner's attention on the first trial (average 0% in probe and training trials). Her delivery of the consequence slightly decreased as well to 80.0% due to providing unclear reactions to correct answers such as head nodding. Steph next completed a generalization probe with Cody and reached criteria at 91.9% accuracy. During this session, she failed to deliver an attentional cue for the first trials and provided extra wait time on a word because she stated the word was longer and may take a few more seconds to read.

Kendall

The final tier on Figure 3 displays Kendall's implementation accuracy of SP across conditions. Kendall's baseline data showed a gradual accelerating trend that lessened and stabilized for the last three baseline sessions. Kendall's baseline level was moderate and the highest of the four participants with an overall mean of 50.8% (range, 21.6%–64.9%). When examining individual steps of SP, Kendall averaged 92.0% for providing 3 s wait time and 88.0% for delivering the correct consequence in probe trials, showing high levels of implementation accuracy (See Table 8). Kendall averaged 0.0% for four of the SP steps: secure the learner's attention (probe trials), secure the learner's attention (training trials), deliver the task direction (training trials), and immediately deliver the controlling prompt. Throughout baseline, Kendall consistently altered her task directions including, "Choose the word that has 5 letters" or "Which word ends in the

letter B?" Kendall would also lay out all five sight word cards on the table and give directives instead of holding up one card at a time, which was unique to the participants.

Upon receiving the IV, Kendall showed an abrupt and significant increase in level. Kendall's average implementation accuracy in post-CBI was 96.4% (range, 94.6%–97.3%). Kendall scored 100% for six of the nine steps. Kendall averaged 66.7% accuracy for securing the learner's attention during probe trials and 33.3% accuracy during training trials. She did not consistently deliver an attentional cue on the first trials.

During the maintenance condition, Kendall averaged 97.3% for correct implementation. She had an average of 100% for all steps except securing the learner's attention with an attentional cue for training trials, which she averaged 0.0%. Kendall next completed one generalization probe and exceeded criteria at 94.7% accuracy. When examining individual steps, Kendall failed to deliver an attentional cue to Cody for both probe and training trials and completed all other steps with 100% accuracy.

Table 8

Kendall's Mean Accuracy Per Step Across Conditions

Simultaneous Prompting Steps		Baseline *M* (%)	Post-CBI *M* (%)	Maint *M* (%)	Gen *M* (%)
Probe Trials	Secure the learner's attention-attentional cue	0.0	66.7	100	0.0
	Deliver task direction	76.0	100	100	100
	3 s wait time	92.0	100	100	100
	Consequence	88.0	100	100	100
	Record data	68.0	100	100	100
Training Trials	Secure the learner's attention-attentional cue	0.0	33.3	0.0	0.0
	Deliver task direction	0.0	100	100	100
	Immediately deliver controlling prompt	0.0	100	100	100
	Consequence	52.0	93.3	100	100
0%–49%	50%–69%	70%–89%	90%–100%		

Note. M = mean; CBI = computer-based instruction; Maint = maintenance condition; Gen = generalization condition.

Overall Participant Implementation Accuracy of SP by Step

Table 9 shows the average percentage of correct implementation for each step of SP across all participants and conditions. The baseline condition consisted of 15 probe sessions for the four participants. During baseline, the highest implementation accuracy means were for providing 3 s wait time (*M* = 89.3%) and for providing the correct consequence in probe trials (*M* = 74.4%). While these levels are higher than other steps, they still did not meet the implementation criteria of 90.0% that was determined for the

study. Participants' overall mean in baseline had low to moderate levels of accuracy for recording data correctly (*M* = 58.7%), providing the correct consequence during training trials (*M* = 50.7%), and delivering the task direction during probe trials (*M* = 40.0%). Low levels of accuracy were shown for securing the learner's attention with an attentional cue in training trials (*M* = 6.7%), delivering the task direction in training trials (*M* = 1.3%), securing the learner's attention with an attentional cue in probe trials (*M* = 0.0%) and immediately delivering the controlling prompt (*M* = 0.0%).

Table 9

Overall Mean Accuracy Per Step Across All Participants and Conditions

Simultaneous Prompting Steps		**Baseline** *M* **(%)**	**Post-CBI** *M* **(%)**	**Maint** *M* **(%)**	**Gen** *M* **(%)**
Probe Trials	Secure the learner's attention-attentional cue	0.0	71.4	50.0	50.0
	Deliver the task direction	40.0	84.3	92.5	100
	3 s wait time	89.3	100	100	95.0
	Consequence	74.7	100	97.5	95.0
	Record data	58.7	100	100	95.0
Training Trials	Secure the learner's attention-attentional cue	6.7	42.9	37.5	60.0
	Deliver task direction	1.3	85.7	92.5	70.0
	Immediately deliver controlling prompt	0.0	98.6	100	100
	Consequence	50.7	91.4	95.0	100
0%–49%	50%–69%	70%–89%	90%–100%		

Note. M = mean; CBI = computer-based instruction; Maint = maintenance condition; Gen = generalization condition.

The post-CBI condition consisted of 14 probe sessions. When examining the overall implementation accuracy by step across all participants, criteria were exceeded for five of the nine steps: provide 3 s wait time (*M* = 100%), provide the correct consequence in probe trials (*M* = 100%), record data correctly (*M* = 100%), immediately deliver the controlling prompt (*M* = 98.6%), and deliver the correct consequence in training trials (*M* = 91.4%). Moderate levels were reached for delivering the task direction during training trials (*M* = 85.7%), delivering the task direction during probe trials (*M* = 84.3%), and securing the learner's attention with an attentional cue during probe trials (*M* = 71.4%). The least accurately performed step in the post-CBI condition was securing the learner's attention with an attentional cue in training trials (*M* = 42.9%).

The maintenance condition consisted of eight probe sessions. The overall participants' accuracy mean maintained or exceeded criteria for seven steps: providing 3 s wait time (*M* = 100%), recording data accurately (*M* = 100%), delivering the controlling prompt (*M* = 100%), providing the correct consequence in probe trials (*M* = 97.5%), providing the correct consequence in training trials (*M* = 95.0%), and delivering the task direction in probe trials (*M* = 92.5%) and training trials (*M* = 92.5%). Participants were below criteria for securing the learner's attention with an attentional cue during probe trials (*M* = 50.0%) and during training trials (*M* = 37.5%).

Lastly, the generalization condition consisted of four sessions total. The overall percentage of correct implementation met or exceeded criteria for six of the nine steps: deliver the task direction in probe trials (*M* = 100%), immediately deliver the task direction (*M* = 100%), deliver the correct consequence in training trials (*M* = 100%), provide 3 s wait time (*M* = 95.0%), provide the correct consequence in probe trials (*M* =

95.0%), and record data accurately (M = 95.0%). Overall, participants delivered the task direction in training trials with 70.0% accuracy, secured the learner's attention with an attentional cue during training trials with 60.0% accuracy, and secured the learner's attention with an attentional cue during probe trials with 50.0% accuracy. Across all four conditions, the participants were consistently under criteria for securing the learner's attention with an attentional cue in both trial types.

Summative Analysis

Data collected to answer research question 1 were used to analyze if CBI increased the four preservice teachers' implementation accuracy of SP as measured by the percentage of correctly performed steps measured on a SP task analysis. To determine if there was a functional relation between SP implementation and the CBI training, there must be at least three demonstrations of effect showing consistent changes in data upon condition change while demonstrating sound methodological design and control for threats to internal validity. History threats were controlled for by using a concurrent design that allowed for across-participant analysis. Attrition and testing threats to internal validity were controlled by using a multiple probe design instead of a multiple baseline design to lessen the frequency of data collection for participants during baseline. Based on the results, there was a clear demonstration of effect for Ben, Steph, and Kendall, indicating a functional relation between the CBI training and SP implementation accuracy.

Research Question 1a: What is the Average Duration of Computer-Based Instruction Necessary for Participants to Recall Knowledge on Simultaneous Prompting Procedures?

CBI duration was recorded to determine the length of training needed for participants to score 80% or higher on the post-test on SP procedures. The average CBI duration was 32 min (range, 29 min–35 min). The test was administered at three points in the study: before receiving any training (baseline session 1), after completing the baseline condition with the written SP direction sheet (embedded pre-test at the beginning of the CBI module), and immediately upon completion of the CBI training (embedded post-test at the end of the CBI module). See Table 10. Ben and Kendall (n = 2) were able to reach or exceed the 80% criteria with written instructions alone and Sarah and Steph (n= 2) reached the 80% criteria upon completion of the CBI module.

Table 10

CBI Duration and Simultaneous Prompting Recall Test Results

	Pretest 1 No Instructions	**Pretest 2 Written Instructions**	**Pretest 3 CBI Training**	**CBI Duration**
Sarah	20%	40%	80%	32 min
Ben	20%	100%	100%	35 min
Steph	20%	60%	80%	32 min
Kendall	40%	80%	80%	29 min
Average	**25%**	**70%**	**85%**	**32 min**

Note: CBI = computer-based instruction

Research Question 2: If Participants Fail to Meet Criteria, Does Asynchronous Video Performance Feedback Increase Preservice Teachers' Implementation Accuracy of Simultaneous Prompting Measured by Percentage of Correctly Completed Steps on a SP Task Analysis?

The purpose of research question 2 was to investigate if asynchronous video performance feedback would increase SP implementation accuracy for any participant that failed to meet criteria. One participant, Sarah, did not reach criteria for two consecutive sessions after completion of the CBI module, therefore asynchronous video feedback was delivered. The feedback was approximately 4 min in duration and provided feedback on her specific errors: delivering a verbal task direction and securing the learner's attention with an attentional cue for the first trial. Sarah's implementation average increased from 75.7% to 97.2%, displaying an immediate change in level that remained stable across three sessions. For delivering the task direction, Sarah's mean in probe trials increased from 10.0% to 100% and 0.0% to 100% in training trials. Her average for securing the learner's attention with an attentional cue in training trials increased from 50.0% to 100%. Sarah averaged 80% accuracy for delivering the correct consequence after post asynchronous video feedback, which was a step that she had averaged 100% accuracy on before.

Social Validity

Upon completion of the study, participants completed an anonymous social validity survey to gather their opinions of the CBI module. The participants rated seven statements using a 5-point Likert scale ranging from *Strongly Disagree* (1) to *Strongly Agree* (5) and three open-ended questions. Likert scale results were as follows: easy to

navigate (*M* = 4.75), maintained attention throughout (*M* = 5.00), explained content clearly (*M* = 5.00), video examples clearly demonstrated components of SP (*M* = 4.75), there were enough video examples to learn the procedure (*M* = 5.00), there was enough information on how to implement SP (*M* = 5.00), and I would recommend CBI to learn SP (*M* = 5.00). See Table 11 for complete results.

Table 11

Social Validity Likert Scale Results (N = 4)

Rate the following statement from strongly disagree (1) to strongly agree (5).	**Mean**	**Min**	**Max**
1. The module was easy to navigate	4.75	4.00	5.00
2. The module maintained my attention during the training.	5.00	5.00	5.00
3. The module explained the content clearly.	5.00	5.00	5.00
4. The video examples clearly demonstrated the components of simultaneous prompting.	4.75	4.00	5.00
5. There were enough video examples of simultaneous prompting to learn the procedure.	5.00	5.00	5.00
6. I felt there was enough information in the module to learn how to implement simultaneous prompting.	5.00	5.00	5.00
7. I would recommend computer-based instruction as a way to learn simultaneous prompting.	5.00	5.00	5.00

Note. Min = minimum score; Max = maximum score.

Results of open-ended survey questions are displayed in Table 12. When asked what features contributed most to their learning, participants stated the active practice

sessions, the self-paced feature of SP, and two participants stated the video examples. Participants were asked what content they found hard to understand and three of the participants stated none and one participant indicated understanding the order of SP. Lastly, when asked if the participants had any comments or suggestions to share regarding future use of the training, two stated none, one stated the training was very helpful, and one participant suggested a visual checklist showing the exact order of SP.

Table 12

Social Validity Open-Ended Question Results

Open-Ended Question	Participant Responses
1. What features of the module contributed most to your learning?	• The active practice sessions that allowed us to train and remember how to do SP with less thinking. • The module could be done at your own pace. • Video examples helped me to understand what to do. • The videos were most helpful in learning how to properly implement simultaneous prompting.
2. What content did you find hard to understand?	• Everything made sense once we watched the videos. • None. • I did not find any content hard to understand. • The order of simultaneous prompting was a bit confusing to me because I thought that I put them in the right order but got that section wrong.
3. What comments or suggestions do you have for the use of the training in the future?	• None. • I thought the training was very helpful. • It might be useful to have a visual checklist of sorts to look at the exact order.

CHAPTER FOUR

DISCUSSION

The purpose of this study was to evaluate if CBI was effective for increasing four preservice teachers' implementation accuracy of SP as measured by a SP task analysis. Other variables measured included the duration of CBI required to pass a SP recall test and the effectiveness of asynchronous video performance feedback for increasing implementation accuracy for one participant who did not reach criterion after CBI alone. Based on the results, there was a functional relation (three demonstrations of effect) between the CBI training and SP implementation accuracy. The average duration needed to pass the SP recall test was 32 min. In addition, one 4 min session of asynchronous video performance feedback increased a participant's implementation accuracy of SP. Social validity results indicate that the participants viewed the CBI module as an effective and efficient way to learn SP, especially the video examples.

CBI for Skill Acquisition of SP Procedures

The current study addresses the need to expand CBI to other skills and populations (Gerencser et al., 2020 & Marano et al., 2020). Similar to prior research, the results of this study suggest that CBI can be effective for skill acquisition in teacher preparation programs (Pollard et al., 2014 & Russo-Campisi, 2020). In addition, the study extends research investigating training procedures for SP. Previous studies investigating the effectiveness of SP have mainly occurred in 1:1, in-person settings, which is not feasible for online TPPs (Batu, 2008; Britton et al., 2017; Brown et al., 2014; Fidan &

Tekin-Iftar, 2022; Kiyak & Tekin-Iftar, 2022; Tekin-Iftar et al., 2017; Vuran & Olcay Gul, 2012, Wentzel et al., 2022). Tunc-Paftali & Tekin-Iftar (2021) created a fully asynchronous online system to train preschool teachers to implement SP, however, the system included several components such as SP modules, self-monitoring assessments, written feedback, and video feedback. While their study was successful, the results of this current study show that SP may be possible to teach to fidelity with only one module and brief asynchronous video feedback if needed.

Simultaneous Prompting Step Analysis

Performance accuracy for each step of SP showed that the effectiveness of CBI may vary based on the step. While the participants were able to reach or exceed criterion for most of the SP steps in the post-CBI condition, there were steps in which the overall accuracy mean were still below criterion. One step was securing the learner's attention with an attentional cue. In both trial types, participants consistently scored lower for this step, particularly in the training trials. This step was below criterion in baseline, post-CBI, maintenance, and generalization conditions. Another step that was below criterion after completing the CBI was delivering the task direction.

There are two things to consider when determining why participants may have scored lower on these steps than the others. First, it is possible that these steps were not stressed enough during training since they can seem relatively simple and self-explanatory to someone who has experience in SP. While the CBI listed and taught the steps and provided written examples during CBI, there were no explicit non-examples related to these components or questions targeting the correct delivery of those steps. In all video examples shown throughout the CBI, these steps were always performed

correctly and not highlighted as much as steps that were considered more difficult such as delivering the controlling prompt and determining the correct consequence. Since the participants in this study were early in their TPPs, they may have required more explicit instruction on what is considered correct or incorrect for securing the learner's attention with an attentional cue and delivering the task direction.

Another possibility for the lower percentage could be the operational definitions of the steps. For "securing the learner's attention with an attentional cue," participants were required to deliver a verbal attentional cue (e.g., "Are you ready?") for the first trial in both probe and training trials. However, the confederates and generalization student were making direct eye contact with the participants, thus it may appear an attentional cue was not warranted and the operational definition was too stringent. In addition, the confederates and generalization student completed the correct behavioral response (i.e., stating the word) without the delivery of the attentional cue, which could have further indicated to the participant that their attention was secured and did not require a verbal directive.

The same can be examined for the step, "deliver the task direction." The operational definition required the participants to deliver a verbal task direction telling the learner what they needed to do in relation to the sight word cards. Sarah gave directions at the beginning of the sessions that they would be reading the sight words and then only held up the sight word cards throughout the sessions without the verbal task direction being delivered. However, the confederate still gave correct behavioral responses, which may have implied to the participant that the confederate understood the direction. In the generalization session, Cody showed the correct behavioral response

(stating the word) when Sarah held up the card without delivering the verbal task direction. Holding up the sight word card alone may have served as a discriminative stimulus. If the confederates or Cody had exhibited an incorrect behavioral response, this may have cued the participant to deliver the verbal task direction. The same argument can be made for participants who used vague task directions such as, "What about this?" While the question did not meet the operational definition since it did not explicitly indicate the use of the sight words, many learners are able to generalize this after receiving the same clear task direction several times in the same session (e.g., "What word? What word? What's this?"). These considerations should be taken into account when measuring SP accuracy in the future, especially in applied settings with learners that are familiar with the patterns of SP.

Written Instructions Versus CBI

Participants were administered the SP procedure recall test three times throughout the study (a) before any SP instruction, (b) after receiving written SP instruction, and (c) after completing the CBI module. Two of the participants were able to pass the SP recall test with written instructions alone, but when examining their implementation fidelity of SP for that given session, both were still significantly below the 90% performance criterion. These participants did not reach the performance criterion until after completion of the CBI module. Students may be able to pass written tests about how to complete an SP session but still not perform the steps correctly. This could impact TPPs if they are only relying on passing test scores and not assessing performance.

CBI Duration

While CBI may be effective, it is also important to examine the length of time needed for completion. CBIs that require several hours may not be a practical solution for instructors to use during courses that are tasked with covering several topics each week. However, the average duration needed for participants to pass a SP procedure recall test to advance to the roleplaying portion of the study was only 32 min, which is less time than a typical college class. While this study was not directly evaluating the duration needed to reach the 90% performance criterion, three of the four participants reached criterion immediately upon completion of the CBI module. This is significantly shorter than previous CBI used in TPPs. Pollard et al (2014) used a CBI composed of 4 modules that averaged 115 min for participant completion and Russo-Campisi (2020) had three modules totaling 65 min for completion. Depending on the skill being taught, shorter CBI trainings may still be effective for reaching fidelity for both knowledge and skill acquisition.

Asynchronous Video Feedback

Only one participant required asynchronous video feedback in the study to reach criterion for implementation accuracy of SP. The feedback was only 4 min long and was sufficient to increase the participant's implementation to criterion and for her to maintain the skill. In Marano et al.'s (2020) review of the literature, the authors found that almost half of the CBI studies required live performance feedback or coaching to reach criterion. The results of the current study suggest that pre-recorded video feedback that highlights areas to improve can be an effective way to deliver feedback without requiring the instructor to be present. However, it should be noted the participant made the same error

in the generalization probe so further coaching may be needed when generalizing to new settings or skills.

Limitations

Although this study had positive results, there are several limitations worth noting. The first limitation is the participant sample. All participants in the study identified as white and non-Hispanic or Latino, displaying a lack of diversity. The university at which the study was conducted has a racially and ethnically diverse student population and promotes equity and diversity in both teaching and research. By randomly selecting participants from the pool of interested students that met the recruitment criteria, diversity was not prioritized to ensure that the study demographics more accurately represented the university's student population. Another limitation was the small sample size, which is a common limitation of single case designs. These participant factors limit the generalization of the results.

Another limitation of the study was the change of the operational definition of a task direction during baseline due to unclear participant directions. The directions provided to the participants were to complete a SP session with the sight word cards and did not specify that it should be for word identification. I did not foresee participants delivering task directions for a variety of behaviors like spelling the words and defining the words so the operational definition had to be expanded due to the unclear directions delivered to the participants.

A third limitation of the study was a methodological error made during one of Kendall's maintenance sessions. The camera was not turned on, so the confederate and Kendall immediately repeated the session with the camera filming and data were

recorded from the filmed version. The confederate and participant both reported that the sessions were identical, however, there is a chance that data results could be inaccurate for that session.

A fourth limitation was the operational definition and data recording for securing the learner's attention with an attentional cue. For the first trial for probe and training trials, data were recorded as correct (+) or incorrect/not observed (–) since it is required for the first trial. However, for the other trials in a session, there was an option to record NA if there was not a need to verbally deliver an attentional cue (i.e., the learner was making eye contact or looking at the sight word card). Since the confederate was attending to the participants in all roleplaying sessions, NA was recorded four out of the five times for step 1 in probe trials and four out of five times for step 1 in training trials for all participants in baseline, post-CBI, and maintenance conditions. Since NA results were excluded from the calculations, this left only one probe trial and one training trial for data collection, meaning participants either scored 0% or 100% for these steps. Previous research measuring SP implementation accuracy only recorded a + for correct implementation and – for incorrect or omitted steps (Tekin-Iftar et al., 2017; Tunc-Paftali & Tekin-Iftar, 2021). However, the operational definitions for each step were not reported, so it is unclear how data were recorded for trials in which the learner's attention was secured and there was no need to deliver an attentional cue. Recording NA instead of a + for steps in which attention was already secured could have drastically lowered the participants' scores for these steps in the current study, impacting the ability to compare results across other studies on SP.

Another limitation of the study was the lack of variation in the controlling prompt and student response modes used. This study strictly measured the participants' ability to implement SP with a verbal controlling prompt to elicit vocal responses. The CBI touched on different types of controlling prompts and showed video examples of controlling prompt options and learner response modes, however implementation accuracy of varying controlling prompts was not measured.

Lastly, a limitation of this study was the complexity of the CBI module created. The SP CBI module included a variety of components including written and audio narration, interactive questioning, multiple video examples and non-examples, and a pre/posttest. It is not possible to determine which of the CBI components led to positive results and which components were unnecessary. Additionally, even though it is time-efficient in the long-run, creating a CBI can be time-consuming to create. Lastly, a free trial of the online program Articulate Storyline 360 was used to create the CBI module; however, at the time in which the study was conducted in 2023, an annual personal plan was $549. This may be out of the price range for many TPPs that operate on strict budgets.

Implications for Practice

Results from the current study suggest that CBI is a successful option to teach simultaneous prompting to preservice teachers. Since many TPPs use DE formats (Xu & Xu, 2019), the use of CBI modules allows students the flexibility to access content at their own preferred times and pace and still receive quality instruction. Instructors can still provide engaging lessons that keep learners active through videos, interactive activities, and formative and/or summative testing with immediate feedback. Preservice

teachers with no background in systematic instruction were able to reach criterion in knowledge and skill acquisition after completing one approximately 30 min SP module. Only one participant required an additional 4 min asynchronous video feedback session to reach criterion. This is a feasible option for instructors who may have large class sizes online and may not have the time or ability to provide live feedback for each student in need of extra support.

Instructors choosing to use CBI in the future to teach SP or other forms of systematic instruction should consider their students' prior knowledge when determining how in-depth of instruction is needed for each step. Students farther along in their TPPs that have had experience in classrooms or prior exposure to instructional methods may find brief explanations and examples sufficient, while newer and less-experienced preservice teachers may require more thorough explanations.

Another implication for practice in TPPs is the use of real students. While confederates were used in this study to control for learner behaviors and responses, instructors using CBI in TPPs should consider embedding the evaluation of correct implementation into their students' practicum placements and use real students instead of confederates. This allows the preservice teachers to gain hands-on experience with students and eliminates the need for the instructor to provide a confederate.

Lastly, instructors embedding CBI into their coursework should consider more cost-effective software that may already be familiar to students to create modules. This could include creating modules through Google Forms, Qualtrics, or other less costly programs. Many course platforms such as Blackboard Ultra and Canva also have the capability to create modules that would allow students to complete their work directly

within the course page and that can automatically sync to gradebooks to eliminate extra steps for instructors.

Implications for Future Research

There is a need to expand research on CBI to other skills and student populations within TPPs. This could include using CBI to teach other systematic instructional procedures or evidence-based practices that lead to high academic student outcomes. Additionally, many TPPs have varied groups of students within the same course including graduate students, non-traditional alternative certification students, and undergraduate preservice students. Future researchers should evaluate the use of CBI for other student populations served by IHEs. Another area of focus regarding student populations is the diversity of participants. The current study used randomized sampling procedures to choose the four participants from the total number of students who met the prerequisite inclusion criteria for the study. Randomized sampling without stratification did not allow the ability to prioritize diversity among participants to better align to the student population at UofL. Future researchers should develop recruitment and participant selection procedures that account for diverse participants.

There is also a need for more participants to increase the generalizability of results for CBI. Most of the research evaluating CBI uses single case design methodology, which prominently have small sample sizes. Replication of single case design studies evaluating CBI is one way to increase the external validity of the outcomes for given populations and skills. Another way to increase sample size is the use of group designs to evaluate CBI in TPPs, especially when examining the use for courses with larger student enrollment.

There is a need for detailed and transparent reporting of study procedures and measures by future researchers. In addition to listing individual steps or components of the skill being measured, operational definitions should be included to increase consistency in data collection across studies. This can allow for more accurate comparisons and replications of studies in the future. For example, this study used a modified SP task analysis from Tekin-Iftar et al. (2017), but it is unknown if implementation accuracy was measured the same for each step since operational definitions were not reported.

Another implication for future researchers is eliminating the use of a confederate or varying confederate's behavior to better mimic real students. The current study used confederates due to lack of regular access to students who receive services in the MSD classroom setting. However, using real students when possible, such as through practicum placements, may increase the social validity of studies and allow participants to demonstrate SP with the targeted population. If a confederate must be used, future researchers should consider manipulating more aspects of the confederate's behavior such as acting distracted throughout or not attending to the materials to give participants a more authentic depiction of student behavior. Lastly, future researchers should investigate individual components of CBI to determine which features are necessary to lead to skill acquisition. Since this CBI included a variety of features such as video examples, non-examples, and interactive questioning, it is unclear which components or combination of components contributed to the successful implementation of SP by the participants. Comparison designs should be used in future research to directly compare different features of CBI.

Conclusion

The teaching profession is a hands-on field that requires the ability to implement instructional procedures with high levels of fidelity. As TPPs continue to shift to asynchronous formats, it is imperative to examine which online teaching procedures are effective for skill acquisition so teachers are entering the field fully prepared. The current study evaluated the use of CBI to increase implementation accuracy of SP for four preservice teachers. Results indicated that the CBI alone was effective for three of the participants, and one participant only required brief asynchronous video performance feedback to reach criterion. In addition, the CBI only took approximately 32 min to complete, showing the practicality in TPPs in which time is valuable.

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Appendix A

Participant Prerequisite Screening Questions

1. Are you currently enrolled in a pre-professional education course?
    a. Yes
    b. No
2. Have you had any previous training or experience using Simultaneous Prompting?
    a. Yes
    b. No
3. Have you had any previous training or experience in systematic instruction?
    a. Yes
    b. No
4. Are you able to meet in-person on campus 2-3 times per week for approximately 30 minutes across 4 weeks?
    a. Yes
    b. No

Appendix B

Confederate Procedural Fidelity Form

Session 2 and on

Participant: _____ Date: _____ Confederate Name: _____ Script #: _____ Session Type: Baseline/Post-Int/Maintenance Session #:____ IOA? Y/N

Steps to Complete	Circle
1. Camera turned on and filming	Yes or No
2. Read the following script: "Thank you for being here today. Just a reminder that there is a camera in the room recording for data collection purposes. We will be conducting a roleplaying session for Simultaneous Prompting. Here are your materials: sight word cards, a data sheet to record data, a pencil, and a simultaneous prompting program sheet that describes the steps of the procedure. I will leave the room and give you up to 5 minutes to review the program sheet and materials. Please do not use your phone or computer to do further research during the review time or any time outside of the study. If you are done before the time limit, you can let me know when you are ready to begin by opening the office door. "	Yes or No
3. Provided set time to review the procedure sheet without instructor present	Yes or No
4. Gives the instructions: "Pretend that I am a student and complete a simultaneous prompting session with the sight word cards. You will use a verbal prompt and 3 second wait time. You may begin whenever you're ready"	Yes or No
5. Confederate followed script.	Yes or No
6. Refrained from answering questions or providing information on SP. If asked questions, can say "I am sorry, I am unable to answer questions specific to SP until the end of the study. Or encourage the participant to try their best	Yes or No
# of Yes Responses	
Total	
Percentage of Correct Steps	

Script Number: _____

Record script in the boxes below.

Probe Trials	Training Trial
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.

Appendix C

Confederate Procedural Fidelity Form

Baseline Session 1 Only

Participant: _____ Date: _____ Confederate Name: _____ Script #: _____
Session Type: Baseline/Post-Int/Maintenance Session #:____ IOA? Y/N

Steps to Complete	Circle
1. Camera turned on and filming	Yes or No
2. Microsoft Teams turned on with screen share enabled and recording	Yes or No
3. Read the following script: "Thank you for being here today for the study on computer-based instruction. Just a reminder that there is a camera in the room recording for data collection purposes and the computer is logged into Microsoft Teams and also recording. Before we begin, I am going to leave the room and have you complete a demographic information survey and a 5 question pre-test on the computer. Please do not use your phone, computer, or other materials to do outside research during this time. When you are done, please open the door and we will begin!	Yes or No
4. Background sheet given	Yes or No
5. SP Pre-test completed with Teams Recording	Yes or No
6. Read the following script: "We will now be conducting a roleplaying session for Simultaneous Prompting. Here are your materials: sight word cards, a data sheet to record data, a pencil, and a simultaneous prompting program sheet that describes the steps of the procedure. I will leave the room and give you up to 10 minutes to review the program sheet and materials. Please do not use your phone or computer to do further research during the review time or any time outside of the study. If you are done before the time limit, you can let me know when you are ready to begin by opening the office door. "	Yes or No
7. Provided set time to review the procedure sheet without confederate present	Yes or No
8. Gave the instructions: "Pretend that I am a student and complete a simultaneous prompting session with the sight word cards. You will use a verbal prompt and 3 second wait time. You may begin whenever you're ready"	Yes or No
9. Confederate followed script.	Yes or No
10. Refrained from answering questions or providing information on SP. If asked questions, can say "I am sorry, I am unable to answer questions specific to SP until the end of the study." or encourage the participant do just try their best	Yes or No
# of Yes Responses	
Total	
Percentage of Correct Steps	

Script Number: _____ Record script in the boxes below.

Probe Trials	Training Trial
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.

Appendix D

Confederate Scripts

Script 1:

Probe Session	Training Session
1. Correct	1. Correct
2. No Response	2. Correct
3. Incorrect	3. Incorrect
4. Incorrect	4. Correct
5. Correct	5. Correct

Script 2:

Probe Session	Training Session
1. Incorrect	1. Correct
2. Incorrect	2. Correct
3. Correct	3. Correct
4. No Response	4. Correct
5. Correct	5. Correct

Script 3:

Probe Session	Training Session
1. No Response	1. Correct
2. Correct	2. Correct
3. Incorrect	3. Correct
4. Incorrect	4. No Response
5. Correct	5. Correct

Script 4:

Probe Session	Training Session
1. Correct	1. Correct
2. Correct	2. Correct
3. Incorrect	3. Correct
4. No Response	4. Correct
5. Incorrect	5. Correct

Script 5:

Probe Session	Training Session
1. Incorrect	1. Correct
2. No Response	2. Incorrect
3. Correct	3. Correct
4. Incorrect	4. Correct
5. Correct	5. Correct

Appendix E

Generalization Procedural Fidelity Form

Participant: _____Date: _____ Session Type: Generalization Session #:____

IOA? Y/N Implementer: _____

Steps to Complete	Circle
1. Camera turned on and filming	Yes or No
2. Participant provided up to 5 minutes to review the procedure sheet prior to beginning.	Yes or No
3. Participant given the materials (data sheet, pen, sight word cards).	Yes or No
4. Read the instructions: "Complete a simultaneous prompting session for sight word identification with ____. You will use a verbal prompt and 3 second wait time. You may begin whenever you're ready."	Yes or No
5. Refrained from answering questions or providing information on SP. If asked questions, can say "I am sorry, I am unable to answer questions specific to SP until the end of the study. Or encourage the participant to try their best	Yes or No
# of Yes Responses	
Total	
Percentage of Correct Steps	

Student Responses: +, -, 0

Probe Trials	Training Trial
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.

Appendix F

Video Release Permission Form

Video Release
University of Louisville Teacher Training Videos

The Center for Instructional and Behavioral Research in Schools (CIBRS) at the University of Louisville, under the direction of Dr. Terry Scott, is engaged in creating videos focused on training teachers to provide effective instruction and management in real classroom settings. A doctoral student at the University of Louisville, Mary Elliott, is creating a new training on systematic instruction that will be used to fulfill requirements for her dissertation and may also be used by CIBRS for future training.

Some of these video scenarios are scripted to show specific conditions and methods and others are taken naturally as instruction occurs in the classroom. In some of the scenarios, students may be asked to make errors so that videos can demonstrate how to effectively handle these situations. These videos may be used in training modules, university courses, on-line educational courses, conference presentations, and in school professional development activities. In addition, videos may be placed on a training website.

This form serves as a video release, granting permission for you or your child to appear in these videos. No students will be named in any of these videos.

I hereby grant video release permission for (me/my child) _____ to appear in videos produced by Mary Elliott and CIBRS for training. I realize that these videos are likely to be distributed for training projects on a national level.

Signature: _____

Date: _____

Appendix G

SP Task Analysis, Procedural Fidelity, and Interobserver Agreement Form

Participant: _____ Date: _____ Data Collector: _____ Script #: _____ Session

Type: Baseline/Post-Int/Maintenance Session #:_____ Session Date: _____ IOA? Y/N

Mark + if implemented the step correctly. Mark – if implemented incorrectly or omitted, mark NA if no opportunity.

SCRIPT

Probe Trials					
STEP	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5
Secure learner's attention with attentional cue					
Deliver task direction					
3 sec wait time					
CONFEDERATE RESPONSE (C, I, NR)					
Consequence (praise correct, ignore incorrect/nr)					
Record data					
Training Trials					
STEP	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5
Secure learner's attention					
Deliver task direction					
Immediately deliver verbal CP					
CONFEDERATE RESPONSE (C, I, NR)					
Consequence (praise correct, repeat CP for incorrect/nr and then praise)					
# Correct Steps					
Total Steps					
Percentage of Correct Implementation					

PROCEDURAL FIDELITY	**Circle**
1. Camera turned on and filming	Y or N
2. Background info survey (B1 only)	Y/N/NA
3. Pre-test given and Teams Recording/Screen shared (B1 only)	Y/N/NA
4. Read the direction scripts.	Y or N
5. Provided time to review the procedure sheet without instructor present	Y or N
6. Gives the instructions: Pretend that I am a student and complete a simultaneous prompting session with the sight word cards. You will use a verbal prompt and 3 second wait time. You may begin whenever you're ready"	Y or N
7. Confederate followed answer script.	Y or N
8. Refrained from answering questions or providing information on SP.	Y or N
# of Yes Responses	
Total	
Percentage of Correct Steps	

Appendix H

Simultaneous Prompting Recall Test Questions

1. What are the trial types of Simultaneous Prompting?
    a. Probe Trials and Training Trials
    b. Delay Trials and Probe Trials
    c. Constant Trials and Verbal Trials
    d. Training Trials and Delay Trials
2. Which trial type should always go first when using Simultaneous Prompting?
    a. Probe trials
    b. Training trials
    c. Order does not matter.
3. During probe trials, you should NOT
    a. Deliver the attentional cue.
    b. Praise correct responses.
    c. Error correct
    d. Data collect
4. Drag and drop the steps below to sequence in the correct order for a training trial.
    a. Deliver the attentional cue.
    b. Deliver task direction.
    c. Immediately deliver the controlling prompt.
    d. Deliver the consequence.
5. Drag and drop the steps below to sequence in the correct order for a probe trial.
    a. Deliver the attentional cue.
    b. Deliver task direction.
    c. Provide pre-determined wait time for the student's response.
    d. Deliver the consequence.
    e. Record data.

Appendix I

SP Test Score Sheet

Participant Name: _____ Date: _____ Data Collector: _____

Pre-Test 1/Pre-Test 2/Post-Test IOA? _____

Mark a + if the participant answered correctly, a – if the participant answered incorrectly or did not respond.

	+ or – or NR
1. What are the trial types of SP?	
2. Which trial type should always go first when using SP?	
3. During probe trials, you should NOT:	
4. Drag and drop order for Training Trials	
5. Drag and drop order for Probe Trials	
Total	

IOA Score: _____

Appendix J

Participant Information Survey

Directions: Please complete the following form on your demographic and educational background.

Name: _____

Age: _____

Ethnicity:

a. Hispanic or Latino
b. Not Hispanic or Latino
c. I prefer not to say.

Race:

a. White
b. Black or African American
c. Asian
d. Native Hawaiian or Other Pacific Islander
e. Other _____
f. Multiracial
g. I prefer not to say.

Gender Identify:

a. Male
b. Female
c. Non-binary
d. Prefer to self-describe.
e. I prefer not to say.

College Major: _____

College Grade Level:

a. Freshman
b. Sophomore
c. Junior
d. Senior

Appendix K

Social Validity Questions Delivered Via Qualtrics

1. I found the module informative about how to implement simultaneous prompting.
    a. Strongly Disagree
    b. Disagree
    c. Neutral
    d. Agree
    e. Strongly Agree
2. The module was easy to navigate.
    a. Strongly Disagree
    b. Disagree
    c. Neutral
    d. Agree
    e. Strongly Agree
3. The module maintained my attention during the training.
    a. Strongly Disagree
    b. Disagree
    c. Neutral
    d. Agree
    e. Strongly Agree
4. The module explained the content clearly.
    a. Strongly Disagree
    b. Disagree
    c. Neutral
    d. Agree
    e. Strongly Agree
5. The video examples clearly demonstrated the components of simultaneous prompting.
    a. Strongly Disagree
    b. Disagree
    c. Neutral
    d. Agree
    e. Strongly Agree
6. There were enough video examples of simultaneous prompting to learn the procedure.
    a. Strongly Disagree
    b. Disagree
    c. Neutral
    d. Agree
    e. Strongly Agree

7. I felt there was enough information in the module to learn how to implement simultaneous prompting.
    a. Strongly Disagree
    b. Disagree
    c. Neutral
    d. Agree
    e. Strongly Agree

8. I would recommend computer-based instruction as a way to learn simultaneous prompting.
    a. Strongly Disagree
    b. Disagree
    c. Neutral
    d. Agree
    e. Strongly Agree
9. What features of the module contributed most to your learning?

10. What content did you find hard to understand?

11. What comments or suggestions do you have for use of the training in the future?

Appendix L

CBI Training Treatment Integrity And Duration Form

Participant Name: _____ Date: _____ Data Collector: _____

CBI Session #: _____ CBI Session Date: _____

	Circle
1. Teams recording began, screen shared, mic turned on, camera turned on prior to participant entering room.	Yes or No
2. Researcher provides materials (paper, pencil, data sheets) and provides brief explanation of the materials.	Yes or No
3. Reads script: "Today you will be completing a computer based instructional module on simultaneous prompting. This will include a short pre-test, an interactive training with videos and questions throughout, and a post-test. A score of 80% is required on the post-test to move to the next phase of role-playing. If a score less than 80% is obtained, you will be asked to repeat the training in your next session. You may take notes throughout the training if you wish but please do not use any outside sources such as your cell phone or the computer to find answers. You will use the mouse and the "next", "previous," and "submit" buttons to navigate through the training. If you have any technical problems, please use the phone number provided. The computer is currently logged into Microsoft teams and is recording your screen and you as you complete for data collection purposes. After you have completed the post-test, please leave your score displayed on the screen."	Yes or No
4. Asks participants if they have any questions.	Yes or No
5. Refrains from answering questions on SP or providing additional SP info	Yes or No
6. Researcher left room before the participant began.	Yes or No
7. Participant completes entire training	Yes or No
# Yes Responses	
Total	
Training Start Time on Recording (participant hits play) Percentage:	
Training End Time (post-assessment results displayed)	
Total Duration in Minutes:	

CBI Duration Data:

Appendix M

Asynchronous Video Feedback Treatment Integrity Form

Participant: _____ Session Date: _____ Feedback Session #:_____

Data Collector: _____

Did the feedback…	**Circle**
1. Provide performance feedback on errors.	Yes or No
2. Use participant's session video(s) to show mistake(s).	Yes or No
3. Model how to do it correctly.	Yes or No
4. Asynchronous feedback was given prior to the next session.	Yes or No
5. The researcher or confederate were not present.	Yes or No
6. In-person feedback was not provided.	Yes or No
# Correct	
Total	
Procedural Fidelity Percentage:	

CURRICULUM VITA

Mary Elliott, Ph.D.

EDUCATION

University of Louisville
Ph.D. in Curriculum and Instruction, Special Education 2024
OSEP funded doctoral fellow

University of the Cumberlands
Ed. S. in School Counseling 2020

University of Kentucky
B.S. Special Education—Moderate to Severe Disabilities 2011

TEACHING CERTIFICATIONS

KY Professional Certificate for Teaching Exceptional Children Through 2024
Moderate and Severe Disabilities, P-12

KY Provisional Certificate for School Counselor Through 2027
All Grades

PROFESSIONAL EXPERIENCE

University of Louisville
Clinical Assistant Professor 2023 - Present

Project BEES: Building the Epistemology of Engineering for Students with Extensive Support Needs
Research Associate 2022 - Present

University of Louisville
Adjunct Instructor 2022-2023

Binet School, Jefferson County Public Schools, Louisville, KY
Moderate to Severe Disabilities Teacher 2019-2020

Aiea Intermediate, Hawaii Department of Education, Aiea, HI
Fully Self-Contained Special Education Teacher 2016-2019

Morton Middle School, Fayette County Public Schools, Lexington, KY
Moderate to Severe Disabilities Teacher 2011-2016

UNIVERSITY TEACHING EXPERIENCE

Clinical Assistant Professor, University of Louisville

EDSP 422/614: Transition Programs and Services for Children and Youth with Disabilities	2023-2024
EDSP 440/611: MSD Curriculum and Methods II	2023-2024
EDSP 443/609: Instructional Methods for Students with MSD	2023-2024
EDSP 444: Moderate/Severe Disabilities Practicum I	2023-2024
EDSP 450: Moderate/Severe Disabilities Practicum II	2023-2024
EDSP 471: Moderate/Severe Disabilities Student Teaching	2023-2024

Adjunct Instructor, University of Louisville

EDSP 450 Moderate/Severe Disabilities Practicum II	2023

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EDSP 444 Moderate/Severe Disabilities Practicum I	2022
EDSP 440/611: MSD Curriculum and Methods II	2022
EDSP 673: Research Seminar in Autism Spectrum Disorders	2021
EDSP 422: Transition Programs/Services for Children with Disabilities	2021
University Supervisor MSD Alternative Certification Program	2021

Guest Lecturer

EDSP 647: Teaching Math to Students with Disabilities, UofL Topic: Mathematics Instruction for Students with MSD	2023
EDSP 520: Assessment of Students with MSD, University of Louisville Topic: Data Collection Methods	2022
EDSP 520: Assessment of Students with MSD, University of Louisville Topic: Reading and Math Assessments	2022

AWARDS

University of Louisville Delphi Center for Teaching and Learning **2021-2022 Faculty Favorite Nominee**	2022
CEC-TED Kaleidoscope 2021 Student Research Poster Competition **Winner of the Outstanding Single Case Research Award**	2021

PUBLICATIONS: JOURNAL ARTICLES

Ackerman, K., Ault, M., Courtade, G., **Elliott, M.,** et al. (under review). Preparing future special education faculty for service in rural communities, *Rural Special Education Quarterly.*

Elliott, M., Long, A. M.**,** Pollard, J., Fitchett, C., Courtade, G. (2024). Bridging the rural special educator gap: Mentoring to support alternative teacher preparation candidates. *Rural Special Education Quarterly, 43 (1), 26-35.*

Hall, A., Fosbinder, J., **Elliott, M.**, & Courtade, G. (2022). An administrative approach for special educator retention. *Kentucky Teacher Education Journal: The Journal of the Teacher Education Division of the Kentucky Council for Exceptional Children*, *9*(1), 1.

Elliott, M. & Swain, R.R. (2021). A special educator's how-to-guide to visual activity schedules. *Kentucky Teacher Education Journal: The Journal of the Teacher Education Division of the Kentucky Council for Exceptional Children, 8*(2), 2.

Shepley, S. B., Spriggs, A. D., Samudre, M., & **Elliott, M.** (2018). Increasing daily living independence using video activity schedules in middle school students with intellectual disability. *Journal of Special Education Technology*, *33*(2), 71-82.

PUBLICATIONS: BOOKS CHAPTERS

Jimenez, B., Courtade, G., Fosbinder, J., & **Elliott, M.** (in press). Science, technology, engineering, and mathematics (STEM) for students with intellectual disability. In *Research-Based Practices for Educating Students with Intellectual Disability (2nd edition).* Routledge.

PRESENTATIONS

Courtade, G., Jimenez, B., & **Elliott, M.** (2024, March). *Project BEES: Engineering success for students with extensive support needs.* [Concurrent session]. Council for Exceptional Children (CEC) Annual Convention and Expo, San Antonio, TX. Referred.

Elliott, M., Snider, K., Courtade, G. (2023, November). *Beyond academics: The development of essential personal skills in pre-service special educators.* [Multiple Paper Presentation] Annual Conference of the Teacher Education Division of the Council for Exceptional Children (TED), Long Beach, CA. Referred.

Elliott, M., Courtade, G., & Bruce, A. (2023, March). *"My professors are on different planets": Building teacher preparation cohesion.* [Multi-presentation session] Council for Exceptional Children (CEC) Annual Convention & Expo, Louisville, KY. Refereed.

Elliott, M., Courtade, G., & Bruce, A. (2022, November). *My professors are on different planets: Building a cohesive teacher preparation program.* [Conversation table]. Annual Conference of the Teacher Education Division of the Council for Exceptional Children (TED), Richmond, VA. Referred.

Long, A., Jones, K., & **Elliott, M.** (2022, November). *From surviving to thriving: How administrators can support and influence special education teacher retention.* [Paper presentation]. Kentucky Exceptional Children's Conference (KY CEC), Louisville, KY. Refereed.

Walte, S., Cushing, L. S., **Elliott, M.,** Rowlett, L., & Deangelo, S. (2022, May). *Who and what have we been talking about?: Trends in topics and equity in literature about transition-aged youth with extensive support needs since 1975.* [Paper presentation]. Division of Career Development and Transition (DCDT) Conference, Myrtle Beach, SC. Referred.

Elliott, M., Long, A., Fitchett, C., Pollard, J., Courtade, G. (2022, April). *What's Working in Alternative Teacher Prep: Survey Results and Next Steps for Program Development: HLPs, Cultural Competencies, Mentoring, and More* [Paper presentation]. Kentucky Excellence in Educator Preparation (KEEP), Virtual Conference. Refereed.

Elliott, M. (2022, April). *What's Working in Alternative Teacher Prep: Survey Results and Next Steps for Program Development: HLPs, Cultural Competencies, Mentoring, and More* [Paper presentation]. Student Research Conference, Lexington, KY. Refereed.

Fitchett, C., Pollard, J., **Elliott., M**. (2022, March). *What's Working in an ATP Program? Survey Results and Next Steps for Program Development* [Roundtable presentation]. American Council on Rural Special Education (ACRES) Conference, Myrtle Beach, SC. Refereed.

Courtade, G., **Elliott, M.,** Long, A., Fitchett, C., Pollard, J. (2022, January). *Ready or not? Feedback from teachers of students with ESN in an alternative teacher preparation program on their preparedness for implementing HLPs* [Poster presentation]. Council for Exceptional Children (CEC) Annual Convention & Expo, Orlando, FL. Refereed.

Elliott, M. (2022, January). *Use your time wisely: Group behavior skills training via telehealth for pre-service teacher education* [Poster presentation]. Council for Exceptional Children (CEC) Virtual Convention & Expo-Kaleidoscope, Orlando, FL. Refereed.

Elliott, M. (2022, February). *Use your time wisely: Group behavior skills training via telehealth for pre-service teacher education* [Poster presentation]. Council for Exceptional Children (CEC) Virtual Convention & Expo, Virtual Conference. Refereed.

Elliott, M. (2021, November). *Use your time wisely: Group behavior skills training via telehealth for pre-service teacher education* [Poster presentation]. Annual Conference of the Teacher Education Division of the Council for Exceptional Children- Kaleidoscope, Fort Worth, TX. Refereed.

Elliott, M. (2021, April). *Group behavioral skills training (BST) via telehealth to teach alternative certification teachers: A research agenda* [Poster presentation].

Kentucky Excellence in Educator Preparation (KEEP), Virtual Conference. Refereed.

PROFESSIONAL DEVELOPMENT

Project BEES
Systematic Instruction for Students with ESN 2023

Fayette County Public Schools
Evidence-based Visual Supports Systems for Students with ESN (Asynchronous) 2021

SERVICE

University of Louisville Student Organization
Kentucky Educator Association- Aspiring Educators (KEA-AE)
Faculty Advisor 2023- present

Remedial and Special Education

Ad hoc Reviewer 2022 - present

Division on Autism and Developmental Disabilities
Conference Proposal Reviewer 2023

Kentucky Educational Development Corporation
Professional Development in Special Education Retention 2022

Kentucky Teacher Education Journal
Ad hoc Reviewer 2022

Greater Louisville Education Cooperative
Evidence-based Visual Support Systems PD Series 2021

Council for Exceptional Children
Division on Autism & Developmental Disabilities 2021
Summer Conference, Technical Support

KEEP Steering Committee
Committee Member 2020- 2021, 2024 - present

PROFESSIONAL AFFILIATIONS

Council for Exceptional Children (CEC)
Division on Autism and Developmental Disabilities (DADD)
Teacher Education Division (TED)
Kentucky Teacher Education Division (K-TED)