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Self-Advocacy Training for Students with Complex Communication Needs using Time Delay and Generative Learning

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Self-Advocacy Training for Students with Complex Communication Needs using Time Delay and Generative Learning

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THESIS

A thesis submitted in partial fulfillment of the requirements for
the degree of Master of Science in Education in the
College of Education
at the University of Kentucky

By

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ABSTRACT OF THESIS

Self-Advocacy Training for Students with Complex Communication Needs using Time Delay and Generative Learning

Employers seek employees with communicative competence in various vocational environments. Communicative competence is created through socio-linguistic skills such as self-advocacy and self-determination skills. This study examined communicative competence for individuals with complex communication needs within a vocational environment. Generalization of skills across environments is imperative for skill development for individuals with disabilities. This study also examined the use of generalization of skills with using generative learning.

KEYWORDS: Generative learning, complex communication needs, vocational environments, self-advocacy

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DEDICATION

To all individuals with different abilities that have achieved every level of high expectation presented to them within academic and community settings.

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First, my thesis co-chairs, Dr. Amy Spriggs and Dr. Sally Shepley, who portray the quality of scholar I aspire to be and have supported and shaped my ideas during this process. Next, I wish to thank the director of Graduate Studies, Dr. Melinda Ault for directing me toward opportunities that will further my career in special education. In addition to technical and instrumental assistance above, I received equally important assistance from family and friends. My co-founder, Jeanine Mosher, of the Person First Academy, a program that seeks to provide transitional supports to individuals with disabilities- who envisions a society that prioritizes the adequate and efficient instruction of the disability community. Additionally, my mother, Sandra Lee, who provided ongoing support and encouragement as I completed my studies.

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CHAPTER 1. INTRODUCTION

Positive post high school outcomes for students with disabilities using multiple modes of communication relies, in part, on their ability to successfully advocate for their wants and needs in multiple environments. Successful employees must demonstrate their ability to effectively communicate a repertoire of wants and needs (Cannella-Malone & Schaefer, 2017). Students with intellectual disability and complex communication needs (CCN) often struggle with basic receptive and expressive communication skills in the work environment; this includes communicating clearly to peers and employers (Ju et al., 2012). Students with CCN are characterized as not having the ability to use vocal speech alone to aid them in daily communicative interactions (Brady et al., 2016; Light et al., 2019; Quinn et al., 2021). Expressive and receptive language deficits cause difficulties relaying important information to communicative partners in the work environment, thus, effecting communicative competence in multiple settings.

Communicative competence is displayed when one individual is speaking and the other individual receiving or listening to their communicative attempts understands what is being communicated (Light & McNaughton, 2014). Successful communicative competence is established when individual communicative partners display adequate levels of communication skills to meet environmental demands. This leads to the attainment of personal, educational, vocational, and social goals of both parties (Light & McNaughton, 2014.) Adults with disabilities will have an enhanced employment experience when communicative competence is established. Communicative competence

is successful when both the listener and receiver are using communication repair skills in discourse. Communicative competence is comprised of linguistic, operational, strategic, and social skills, or a combination such as sociolingustic skills. (Light & McNaughton, 2014). Sociolinguistic communication skills include taking turns, initiating interactions, requesting attention or information, and confirming communication (Light & McNaughton, 2014).

Sociolinguistic communication skills fall under the umbrella of soft skill instruction for students with CCN. In the workplace, soft skills are defined as social skills that enhance an employee's performance. Instructing adults with disabilities on these skills will directly attribute to more meaningful employment post high school (Clark et al., 2019; Lindsay et al., 2014). Inclusive work environments consist of employees on a wide spectrum of competency and ability level. This includes learners using augmentative and alternative communication (AAC) devices. AAC devices are an applicable means of communication for individuals that are unable to produce intelligible speech with their communicative partners (Reichle et al., 2019).

Employers seek employees who demonstrate various job support skills when hiring for positions within their establishments. These job skills are alike regardless of age or ability level. One important job support skill is seeking help when needed (Ju et al., 2012). Agran and colleagues (2016) surveyed various employers to indicate what employers perceived as the most valued employment social skills for their establishment. The ranking scale used in this study ranged from a 0-5 with lower scores describing social skills that were of lesser value and higher scores describing social skills that were

of higher value. Their findings stated that *seeking clarification for unclear instructions* was the highest ranked social skill needed for success in vocational settings with a mean rating of 4.86 out of 5 (Agran et al., 2016, p. 115).

One effective way to teach conversation skills in a classroom environment with the intent of generalizing to vocational settings using video modeling. Handley et al., (2020) used video models to teach conversation repairs to students in vocational settings such as requests for clarification i.e., "I don't understand" or "what?" and confirming statements like, "okay". In this study, video models depicted appropriate ways to use various conversational repairs in a vocational setting. They found that one participant's ability to use the correct conversational repair went to 100% after the third intervention session and stabilized at 100% throughout. This participant also achieved 100% when probed during maintenance trials.

Seeking help or clarification when needed is practicing basic self-advocacy skills. Self-advocacy is the ability to identify and express accommodations, modifications, wants, needs, thoughts, and feelings in multiple environments (Pfeifer et al., 2021). Pairing needed self-advocacy phrases in situations where clarity in conversation has been interrupted strengthens communicative competence in different situations. Furthermore, self-advocacy is an example of the sociolinguistic conversation skills adults with disabilities must have to demonstrate communicative competence in the workplace. Individuals with disabilities often experience challenges expressing the need for accommodations and modifications needed to do a successful job. Due to this reality, there is a need to efficiently teach these skills to students as they begin learning transition

skills. Educators need to begin efficient and effective instruction on job support skills to ensure positive community work experiences, job maintenance, and positive social outcomes within a work environment. This can be accomplished through intentional planning for generalization of skills. Generalization instruction should extend across various environments, people, peers, and skill sets. Programming for generalization of skills in a comprehensive treatment package is an efficient way to provide instruction to students with disabilities (Smith et al., 2016; Stokes & Baer 1977).

Programming for generalization of skills can be accomplished through generative instruction or matrix training. Kemmerer and colleagues define matrix training as, "a systematic way to organize instruction to promote generative outcomes that involves arranging target stimuli into a table (i.e., matrix) by placing two or more components that, when combined, result in combinations of multiple components (e.g., action, agent, and object)" (2021, p. 474). Matrix training allows for multiple words or phrases to be taught in a systematic way in one single grid causing the most efficient instruction to take place without extending instructional procedures Axe and Sainato used a 6x6 skills matrix to instruct participants how to follow a set of single step actions within a grid they organized into submatrices that would be targeted during intervention with the other non-targeted matrix combinations probed for generalization throughout the duration of the study (2010). Examples in their matrix included, "stamp deer, highlight tape, circle skateboard" (Axe & Saintao, 2010). These combinations were taught with hopes that participants would complete the actions along the horizontal part of the matrix like stamp, highlight, and circle on the vertical items on the matrix such as deer, tape, and circle. They found one participant responded correctly to 94% of untrained pairings and

another participant responded correctly to 86% of the untrained pairings. These results indicate the efficiency of generative learning when there are multiple items to learn at once. This is critical to consider for educators who need to teach transition-age youth self-advocacy communication skills.

To fully promote accessibility and positive post high school outcomes for this population of learners there are a few key aspects that must be considered: how to effectively train future employees to generalize the various skills they are acquiring in the classroom and how to differentiate the teaching amongst learners with multiple modes of communication. Current research supports matrix training being provided for students with autism and other disabilities, but there is a lack of research conducted with AAC users in the workplace (Kemmerer et al., 2020).

1.1 Purpose and Research Questions

The purpose of this study was to evaluate the overall effectiveness of using systematic instruction (i.e., time delay and video modeling) to teach self-advocacy phrases to adults with disabilities and CCN in vocational settings, while planning for generalized learning thought matrix training. The research questions were:

2. Will participants acquire the use of self-advocacy phrases within vocational settings using a video model and time delay?
3. Will a matrix training system promote generalization of self-advocacy phrases in untrained environments?

CHAPTER 2. METHOD

2.1 Participants

2.1.1 Student Participants

Participants in this study were in ninth and tenth grade. Participants engaged in vocational skills training that prepared them to obtain work within the community. Participants communicated either via vocal emissions, AAC devices, or used both as their methods of communication. Participants met the following inclusion criteria: (a) ability to emit up to four word phrases using vocal speech or AAC device, (b) ability to follow two-step task directions, (c) ability to initiate and respond to basic communicative interactions such as greetings and comments about likes and dislikes using their method of communication (e.g., responded to questions about favorite foods, colors, songs), (d) ability to attend to a 2 min video, (e) ability to imitate a video model, (f) ability to complete selected vocational tasks, (g) adequate gross and fine motor skills, (h) ability to scan an environmental setting, and (i) ability to distinguish different attributes of an environmental setting such as missing items needed to complete a task when given a visual list of items that are needed to complete the task.

30 students within three different self-contained special education classrooms were screened at the beginning of this study. Three individuals met inclusion criteria; however, one did not assent to participate. Therefore, two participants enrolled in the 9th and 10th grade were included in the study. These participants have received academic instruction within the self-contained special education classroom setting meaning they received less than 40% of their instruction within the general education classroom setting.

Eliza was a 15-year-old female in the 9th grade. Eliza had a diagnosis of Down syndrome. Eliza's communicative abilities were assessed using the Peabody Picture Vocabulary Test- 4 (PPVT-4; Dunn & Dunn, 2007). This assessment is designed to measure receptive (hearing) vocabulary of English-speaking adults and children. On this assessment Eliza scored a 60 which is in the 1st percentile range meaning well below expected level. Eliza could communicate basic wants and needs to others in short phrases but had difficulty making appropriate comments when engaging in conversation with communicative partners. Eliza could communicate basic wants and needs to others in 3-4 word phrases but exhibited difficulty expressing what she needed in unfamiliar situations to various communicative partners. Eliza's adaptive and functional skills ability levels were measured using the Adaptive Behavior Assessment System third edition (ABAS-3) (Harrison & Oakland, 2015). Eliza scored a composite score of 52 indicating she is in the extremely low range.

Daja was a 16-year-old female in the 10th grade. She met the criteria of autism spectrum disorder per the Gilliam Autism Rating Scale (Gilliam, 2014). This assessment is used to determine children with autism compared to children without autism and the severity of characteristics in children with autism. While her most recent evaluation did not report a specific score, it was indicated that Daja scored within the high range on this assessment. The ABAS-3 was used as another measuring tool for Daja. This assessment classifies developmental and functional skills in individuals with disabilities as well as measuring ongoing success. Daja's performance indicated poor independent functioning with social score of 50. Daja's language and pragmatic skills were below average when compared to same-age peers. Daja utilized vocaal speech and an AAC device (iPad with

ProLoQuo2Go) to communicate her wants and needs. Per classroom teacher observation, Daja used 2-3 word phrases when utilizing both modes of communication. Daja required visual prompting in all instructional programming including video modeling, and video prompting per informal classroom teacher observations. Instructional programming included producing coherent sentences, engaging in conversation with others and all vocational skills training. Daja independently completes janitorial vocational tasks such as sweeping, wiping tables, and picking up trash with visual task analyses.

2.1.2 Others

This study was implemented by the classroom teacher within the transition laboratory. The teacher was also a masters student pursing a graduate degree in special education. At the time of the study, the special education teacher had been teaching for 5 years and had experience using time delay and video modeling within her classroom to provide instruction. Two special education teachers within the department collected interobserver agreement (IOA) data as well as procedural fidelity data for the duration of the study. The special education teachers received training on the procedures of this study, including data collection. Training sessions were conducted prior to the implementation of this study and the special education teachers had to reach 100% accuracy on data collection.

2.2 Instructional Setting and Arrangement

All conditions of the study were conducted within the transition laboratory at a high school in a rural county in a southeastern state of the United States. The laboratory consisted of four different transitions settings focused on food service, office management, clothing and retail, and grounds keeping. Each transition setting had a designated area that was set up to simulate the community work environment. Each area had wooden tabletops, counter space, specific equipment, and materials students may need to carry out the vocational tasks that align to that environment.

2.3 Skills Matrices

A skills matrix (generative learning) was generated based on the environmental settings and the target self-advocacy phrases (see Figure 1). There were three environmental settings and three self-advocacy phrases used during this study, resulting in a 3 x 3 matrix. The environmental settings were horizontally set across the matrix and the self-advocacy phrases were set vertically along the matrix. Matrices were counterbalanced across settings and phrases for each participant to control for sequencing effects and behavioral covariation, increasing the internal validity of the study. The pairings along the diagonal of the matrices were those that that were trained; all other pairings were not directly trained (i.e., used to assess generalization; Axe & Sainato, 2010).

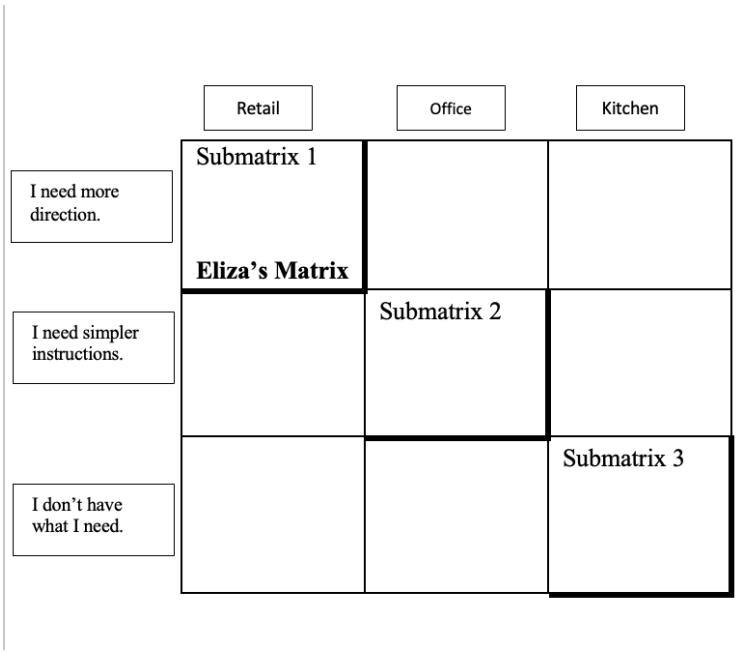

Figure 1 Eliza's Skill Matrix

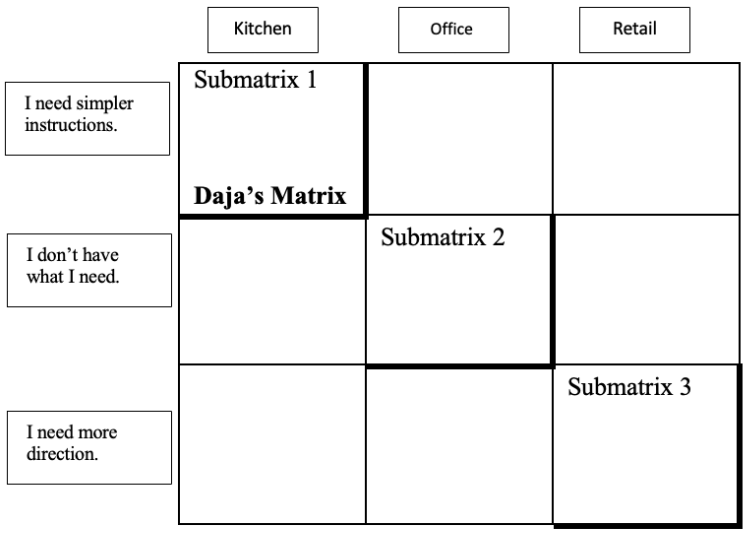

Figure 2 Daja's Skill Matrix

2.4 Materials and Equipment

2.4.1 Vocational Materials

Vocational tasks were presented throughout probe conditions, intervention conditions, and generalization conditions. Vocational tasks were aligned to food service, office, and clothing and retail activities. Food service materials included cups, dishwasher pods, and cooking materials (utensils and food ingredients). Office materials included staplers, shredding machines, and papers for shredding. Clothing and retail materials included folding board, clothes, shoes, laundry detergent, washing machine and drying machine, and school supplies. Vocational tasks were chosen and in place prior to the start of the study as a part of the transition program. Vocational tasks aligned with specific job requirements students would have to partake in community job settings.

2.4.2 Video Models

Video models were used as a priming activity. Bainbridge and Myles (1999) defined priming activities as "a method of supplying information to prepare for the effective performance of a task or activity and involves previewing the child's future task or activity in a non-threatening and exploratory manner" (p. 106). Videos showed different academic task-based scenarios that would support the use of the targeted self-advocacy phrases targeted within the study. Video models were instructional in nature meaning they described when an employee would need to use a self-advocacy phrase when prompted by a task direction. Video models displayed adult actors completing academic tasks using a combination of third- and first-person perspective, with narration added from the principal researcher. Each video model had an example for vocal communicators and communicators using AAC. A script was used for each video that the

principal researcher followed. The videos geared toward AAC users showed those communicators how to use buttons that used the entire vocational phrase for each single button within the grid on the device. There were three different videos for the three different self-advocacy phrases that were trained on the diagonal of the matrix. Each participant was given the same three videos before probe and intervention sessions began.

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2.4.3 Data Collection Materials

Data collection materials for this study included task analysis of the activity along with places to mark behavioral responses that aligned with the systematic procedure used in the baseline probe and intervention conditions of the study typed on standard printer paper. There were two different data collection methods for the baseline, probe, and intervention conditions of this study, which required two different data sheets. Other data collection materials included pencils, pens, and timers.

2.5 Dependent Variables

The percentage of independently emitted self-advocacy phrases within three different vocational settings was the primary dependent variable in this study. Emitting self-advocacy phrases within the vocational setting was defined as the participant using their main mode of communication (i.e., vocal speech, AAC, or both) to speak three pre-determined functionally independent statements or requests that would allow them access to more information and/or task directions within the instructional setting in which trials were taking place. This information and/or task directions would provide participants with the necessary instruction to complete the vocational activity they were tasked to

complete. The pre-determined self-advocacy phrases were constructed to aid the participant in requesting specific help to complete a vocational task within the instructional environment. The self-advocacy phrases the participants were taught included: (1) “I need more direction”, (2) “I don’t have what I need”, and (3) “I need simpler instructions”. Students could have used a functionally equivalent phrase, if it was specific to the task (e.g., “I don’t have any soap”). There were two different non examples of the dependent variable within this study. The first non-example of the dependent variable would be considered phrases that were not relevant to the task at hand or phrases vague in nature. For example, “I need help”, “help please”, “help”. The second non example would be if the participants initiated the completion of the task but completed it incorrectly without using the correct phrase. For example, the researcher asked the participant to sort items by color and the participant begins sorting items by style (i.e., short sleeve vs long sleeve) without using the self-advocacy phrase. Example task directions for each phrase across environments are listed in Figure 2.

Table 1 Example Tasks by Self-Advocacy and Environmental Setting

Self-advocacy statement# 1: “I need more direction”.	Office	Clothing and Retail	Food Service
	Task Direction: “File the papers” Meaning: Place completed assignments in the corresponding teacher bin for pickup/delivery	**Task Direction:** “Sort the shirts” Meaning: Put a pile of shirts in the correct categories (long sleeves, short sleeves, colors, etc).	**Task Direction:** “Pour a cup” Meaning: Walk to the refrigerator and fill a cup up with a beverage
	Task Direction: “Put the sheets together” Meaning: Staple 2-3 single sheets of paper into work packets	**Task Direction:** “Take care of the laundry” Meaning: Load the washer with the dirty clothes and start it”	**Task Direction:** “Get the washer ready” Meaning: Load the dishwasher in an organized way

	Task Direction: "Put the papers in the machine" Meaning: Shred the stack of papers using the paper shredder	**Task Direction:** "Fix the supplies" Meaning: Organize the school supply shopping section by putting the supplies in the correct area	**Task Direction:** "Make the surface fresh" Meaning: Wipe the tables using the wipes

Self-advocacy statement# 2: "I don't have what I need"	Office	Clothing and Retail	Food Service
	Task Direction: "Log onto the computer" Missing item: • Student sign in sheet • Laptop is missing	**Task Direction:** "Fold the shirts" Missing Item: • Folding Board	**Task Direction:** "Load the dishwasher" Missing Item: • dish pods • Dishes are not in the sink
	Task Direction: "Staple the sheets of paper" Missing Item: • stapler is missing • Papers are not in sight	**Task Direction:** "Load the washer" Missing Item: • Detergent Bucket is missing	**Task Direction:** "Wipe the tables" Missing Item: • Wipes
	Task Direction: "Shred the papers in the shredder" Missing Item: • Shredder is missing • Stack of papers is missing • Shredder is not plugged in	**Task Direction:** "Load the dryer" Missing Item: • Dryer sheets are missing	**Task Direction:** "Put the cookie ingredients into the bowl" Missing item: • bowl • Various ingredients

Self-advocacy statement# 3: "I need simpler directions"	Office	Clothing and Retail	Food Service
	Task Direction: "Compose the assignments from Mr. Jones class in a	**Task Direction:**	**Task Direction:** **"**Preheat the kitchen range at figure 365 to

	precise bundle and position the bundle into the accurate compartment” Meaning: “Stack the papers and place it into the bin that says, “Mrs. Mosher”	**“**Intertwine the clothing articles to ensure an impeccable display” **Meaning:** Fold the clothes	make it sweltering for the biscuits” Meaning: Set the oven at level 7 to make it warm for the cookies
	Task Direction: “Conjoin the loose files with a piece of metal using that black apparatus” Meaning: Staple the sheets using the stapler	**Task Direction:** “Settle the wardrobe in the washing apparatus using the assignment inquiry attached with adhesive” Meaning: Put the clothes into the washer and use the task analysis on the side	**Task Direction:** “Systematize the java materials on the dolly” Meaning: Organize the coffee supplies on the cart
	Task Direction: “Formulate the assignments in alphabetic order to increase the ability to gift the pupils within Mrs. Stuarts class with their arduous efforts” Meaning: Stack the papers in Mrs. Stuarts class in alphabetic order so that he can give a good grade.	**Task Direction:** “Arrange the academy stock on the mantlepiece in the matron area” Meaning: Organize the school supplies on the shelf in the women’s department	Task Direction: “Amalgamate the biscuit fixings in this vessel” Meaning: Mix the cookie ingredients in this bowl

2.6 Experimental Design

A multiple probe across behaviors and vocational environments design was used to determine the effects of video models and time delay for using the appropriate self-advocacy phrases in the workplace (Ledford & Gast, 2018). Within the multiple probe design, probes were conducted for a single participant within similar environmental contexts (i.e., the various vocational settings in the transition laboratory) across multiple behaviors that are functionally independent and functionally similar. Behaviors are classified as functionally independent if introduction of one behavior does not affect the behaviors in the other tiers not receiving the treatment. Additionally, behaviors are classified as functionally similar when the independent variable is likely to have the same or a similar effect on each behavior in each tier. Functionally independent and functionally similar behaviors help strengthen internal validity by controlling for behavioral covariation. Behavioral covariation is defined as behavior changing in the tiers prior to intervention, when intervention has been introduced to at least one tier (Ledford & Gast, 2018). This study was replicated across two participants to strengthen internal validity and experimental control. A multiple probe design is appropriate for this study because the research question is nonreversible, and seeks to increase self-advocacy in the workplace, a desirable behavior for transition-age students (Ledford & Gast, 2018). A multiple probe design was chosen over a multiple baseline design due to potential testing and attrition threats. Multiple probe designs do not require extended baseline testing due to predetermined intermittent probes, thus controlling for attrition due to testing fatigue (Ledford & Gast, 2018).

The design of this study was implemented by introducing three functionally independent self-advocacy phrases across multiple environments and will be replicated

across multiple participants. Each participant had probe data collected intermittently across all behaviors within the study with the skills matrix introduced for one of three behaviors and environment pairings along the diagonal of the matrix (see Figure 1) in a time lagged procedure. Probes were collected across all three behaviors to determine the participants behavioral responding prior to intervention. Once data were stable across all three behaviors intervention was introduced in the first tier. Mastery criterion was set at 100% accuracy over three sessions. Once mastery was met for the first tier, intervention was introduced with the second tier. Before we introduced intervention for the second tier one probe was conducted for all behaviors in the untrained tiers. Once probe data were stable, intervention within the second tier started. This process repeated until all tiers received intervention. Throughout the study, probe data were collected intermittently across all tiers with intervention being introduced on the diagonal of the matrix. Experimental control was demonstrated through this process when behaviors changed when, and only when, interventions were introduced. A functional relation is demonstrated in a multiple probe across behaviors design when all threats to internal validity have been controlled for and there are at least three demonstrations of effect at three points in time.

2.7 Screening Procedures

Participants were evaluated on their ability to complete various vocational tasks within the different simulated vocational settings in the transition laboratory. The purpose of screening was to ensure that the vocational tasks being completed were familiar to the participants as in, participants could complete 80% of the task analytic steps of each activity. The purpose of this is to ensure that task selected for this study were within the

participant's repertoire since emitting the appropriate self-advocacy phrase was the focus of this study. For this screening procedure, a student was given a variety of tasks to be completed within the laboratory using the materials already provided. The participant could have given three different responses: a correct response, an incorrect response, and a no response. If a student completed the task 80% correctly with no missing items, specific verbal praise was given, and that task was included in the study.

2.8 Procedures

Three sessions were conducted each day during vocational instruction. Three trials were conducted per session lasting between 15 to 20 min. Sessions were conducted across all three self-advocacy phrases in their matrix assigned vocational environments. Each session included three trials that took place with environments prearranged before trials took place. For example, for Phrase 1: "I am missing an item," the environment in which the task direction was given was arranged with one item missing to complete the task. This was replicated for each trial for each training set within the skills matrix for each participant with up to five different task directions. Before each trial, researchers looked for attentional responses such as eye contact, head pointed in the direction of the person giving the task direction, etc. before the task direction was given. Once attention was secured a verbal task direction was given to the student (e.g., "are you ready to work in the transition laboratory").

2.9 Probe Procedures

Once the task direction was given to the student the probe session began. Each trial lasted a fixed time of 30 s. The time frame was determined by the number of seconds

it would take a same age neurotypical peer without disabilities to assess the environment and ask for the appropriate kind of help. During each trial the participant could emit a correct response or an incorrect response. A response was considered correct if the participant went into the environmental area, evaluated the problem, and emitted the appropriate diagonal trained self-advocacy phrase. If a correct response was emitted by the participant, the researcher gave specific verbal praise and scored the trial as correct (+). A response was considered incorrect (-) if the participant went into the environmental area and stood there for the 30 s duration, or if the participant did not emit a self-advocacy phrase that would have enabled them to go on to the next stage of completing the task or the participant stated an incorrect or vague phrase. A trial was considered over once the 30 s time limit was reached.

2.10 Intervention

Prior to transitioning to the laboratory, the participant was given a choice between preferred reinforcers. This information was provided by the classroom teacher before sessions began. Once reinforcers were selected by the participant, the participant was given a video model specific to their training set. Videos were shown once to participants in a 1:1 instructional arrangement on a classroom iPad immediately before sessions started. Video models for each self-advocacy phrase and environmental setting pair were given after probe sessions and before intervention settings. For example, after probe sessions in tier 1 a video model was given for behavior one and video models for behaviors in tiers 2, 3 and 4 were given after mastery criterion was reached in the previous tier signaling intervention to begin in tiers 2, 3 and 4.

Once videos had been played the researcher would give an attentional cue “are you ready to work in the transition lab?”. The researcher would then wait for the appropriate attentional response (eye contact, gesture, yes or no elicited from the participants mode of communication) and then transition into the specific setting for the session to follow. The environments were intentionally sabotaged before students began instruction to ensure the participants would have an opportunity to use the appropriate self-advocacy phrase to complete the task. The implementer would secure attention by looking for attentional responses such as eye contact, and the participant facing in the direction of the implementer giving the task direction. The researcher would then play an instructional video model once before the intervention session began. Video models depicted how to use conversation repairs within a vocational setting. After the video played the researcher would secure attention by giving an attentional cue of, “are you ready?” The implementer would then give the first verbal task direction, determined by the diagonal trained responses within each participants counterbalanced skills matrix (see Figure 1 and Figure 2). The researcher would wait 10 s for the participant to initiate the task.

Time delay was used as the instructional procedure for the intervention condition. The participant could emit a correct response before the prompt (B+), an incorrect response before the prompt (B-), a correct response after the prompt (A+), an incorrect response after the prompt (A-), or no response (NR). A response was considered correct before the prompt (B+) if the student communicated the appropriate self-advocacy phrase while in the environmental setting that aligned to the diagonal trained pairing for that environment and phrase before the 10 s wait time was over. If a correct response before

the prompt (B+) was given, the researcher gave specific verbal praise to the participant and allowed the student to continue completing the task. A response was considered incorrect before the prompt (B-) if the participant emitted a statement that did not align to the diagonal trained pairing for that environment and phrase or a statement that is still considered functionally equivalent but vague such as, “I need help”. If an incorrect response before the prompt was given the researcher would remind the student to “wait if they do not know what to say” and would provide a verbal model controlling prompt by stating the diagonal trained response targeted for each session. A response was considered correct after the prompt (A+) if the student waited 10 s and emitted a correct response after the delivery of the controlling prompt. The researcher would give specific verbal praise for waiting on the answer and then provided the controlling prompt. A response was considered incorrect after the prompt (A-) if the student waited the 10 s, was given the controlling prompt, but still emitted an inappropriate statement that didn’t align with self-advocacy or a statement that was considered a vague response such as, “I need help.” A response was considered a no response (NR) if the total 30 s wait time had expired, and the participant stood in the environmental setting and didn’t say or gesture anything after the prompt. The researcher would record the data accordingly and move on to the next sequence within the trial. Once data were collected on the dependent variable the participant was allowed to complete the task. If the student needed prompting to complete the task in the form of asking for help, help was given. This was not included as data collection for the course of this study. Data were summarized by counting the number of trials with a correct response before the prompt (B+), divided by the 3 trials presented and multiplied by 100. The criterion for mastery was the participants ability to

independently state the correct self-advocacy phrase in the environmental setting according to the diagonal with 100% accuracy across three sessions. The instructor ended the session after all steps within the activity were completed.

2.11 Intervention Modifications

During intervention participants began to anticipate the planned prompts that would be given by the principal researcher if the participant did not use the correct self-advocacy phrase. To control for this, the principal researcher included a modification that included randomizing the activities being used in probe sessions and using different stimuli within the activities.

2.12 Generalization Pre and Post Test

A pre and posttest was used for generalization procedures. Both pre and post testing were determined by the skill matrices. For example, in the 3x3 skill matrix there were a total of six non diagonal self-advocacy phrases and environmental pairings that were probed (see Figure 1). There were two environmental arrangements with self-advocacy pairings that resulted in 12 opportunities for pre and post testing generalization of the dependent variable. Pretesting procedures followed probe procedures. Before the start of instruction each participant was assessed on their ability to state the appropriate self-advocacy phrase within the six non diagonal responses. For example, participant 1 was pretested on their ability to state phrase one in the retail store and the office, phrase 2 in the kitchen and office, and phrase 3 in the kitchen and the retail store. After reaching mastery criterion in the intervention condition, the same six non-diagonal self-advocacy phrases and environmental pairing were assessed in the post test. The only difference

between probe sessions and generalization tests were that the self-advocacy phrases and the environmental pairings were not directly paired together, meaning the intended communicative responses could have been any of the 6 non diagonal trained pairings on the matrix. The environment was arranged and sabotaged identical to probe sessions, and responses were scored as correct or incorrect.

2.13 Reliability

IOA data and procedural fidelity data were completed by special education teachers within the department. Teachers took part in trainings before intervention began which included role playing activities where they identified diagonal matrix pairings and the non-diagonal matrix pairings to produce fluency with the skills matrix. Teachers were given directions for the time delay procedure, and when to provide the controlling prompt to students within the intervention condition. Teachers were given trainings in the form of role playing on the appropriate probe conditions both in probe and generalization conditions. Observers had to collect data at a preset criterion of 100% accuracy to participate as reliability data collectors for this study. If data collection dropped below 80% accuracy during intervention, they were given additional role-playing training opportunities. IOA and procedural fidelity data were collected for a minimum of 20% of all sessions across vocational environments, self-advocacy phrases, and participants throughout the duration of this study.

2.13.1 IOA

A point-by-point measurement system was used to calculate IOA on student responses within the intervention phase of this study between the main researcher and the

special education teachers. Point by point data were calculated by taking the number of agreements divided by the number of agreements plus disagreements and multiplying that number by 100.

2.13.2 Procedural Fidelity

Procedural fidelity data were collected on the researcher's ability to implement the independent variable, the procedures for both probe, intervention, and generalization conditions. Throughout all trials in all conditions procedural fidelity items included adequate environmental arrangements, the appropriate attentional cues and responses delivered, the appropriate task directions were given, and video models delivered after probe sessions and before intervention sessions began. During the intervention trials, additional procedural fidelity items include the time delay procedure along with providing the controlling prompt, providing the video models to students and the differentiation of the diagonal trained and non-diagonal trained behaviors. Procedural fidelity data were calculated by taking the number of implementer behaviors that occurred during the study divided by the number of expected implementer behaviors and multiplying that by 100.

CHAPTER 3. RESULTS

3.1 Visual Analysis

Visual analysis was used to interpret the effectiveness of time delay with video models on each participant's use of self-advocacy phrases along the diagonal of their counterbalanced matrices. Mean pre- and post-test scores were used to assess the participants ability to use the non-diagonal trained pairings within each of their matrices represented in Table 2. Visual analysis of the graphs considered level, variability, trend, immediacy of effect and consistency of effect. Data presented are current as of March 31, 2023.

3.1.1 Eliza

Figure 3 depicts baseline behavioral responses remained stable at 33% accuracy across three sessions in tiers 1 and 2. Intervention was introduced in session 4. Session 4 was conducted using a zero second delay. Eliza received the controlling prompt immediately after the task direction was given to her causing behavioral responding to be at 0% before the prompt and 100% accuracy after the prompt. In session 5, the 10 second time delay was introduced, and behavioral responding immediately increased to 66% accuracy with an accelerating trend, stabilizing at 100% in sessions 6 and 7. Between baseline and intervention, Eliza began pretesting (see Table 1). Eliza's pretesting responses were at a 12.5% accuracy across 6 sessions.

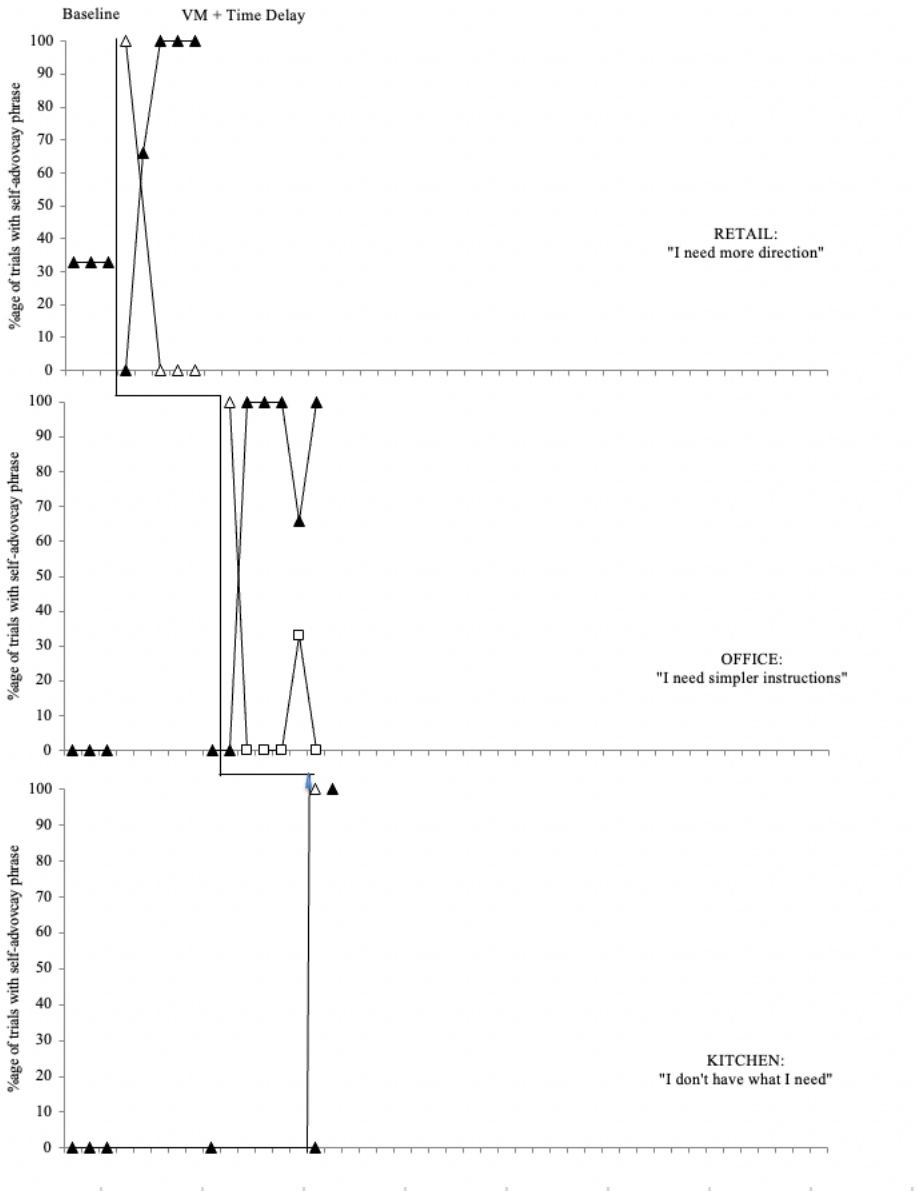


Figure 3 Eliza's Graph

3.1.2 Daja

Figure 4 depicts baseline behavioral responses at an average of 0% accuracy in tiers 1 and 2 with an accelerating trend in tier 3 at 33% accuracy in session 3. Session 4 was implemented with a zero second delay, where Daja received the controlling prompt

immediately after the task direction was delivered. This led to behavioral responding to be 0% before the prompt and 100% accuracy after the prompt. In session 5, the delay was increased to 10 s and there was an immediate change in level, stabilizing with a zero celerating trend at 100%, in sessions 5-7. Between baseline and intervention, Daja began pretesting (see Table 1). Daja's pretesting responses were at an average of 0% accuracy.

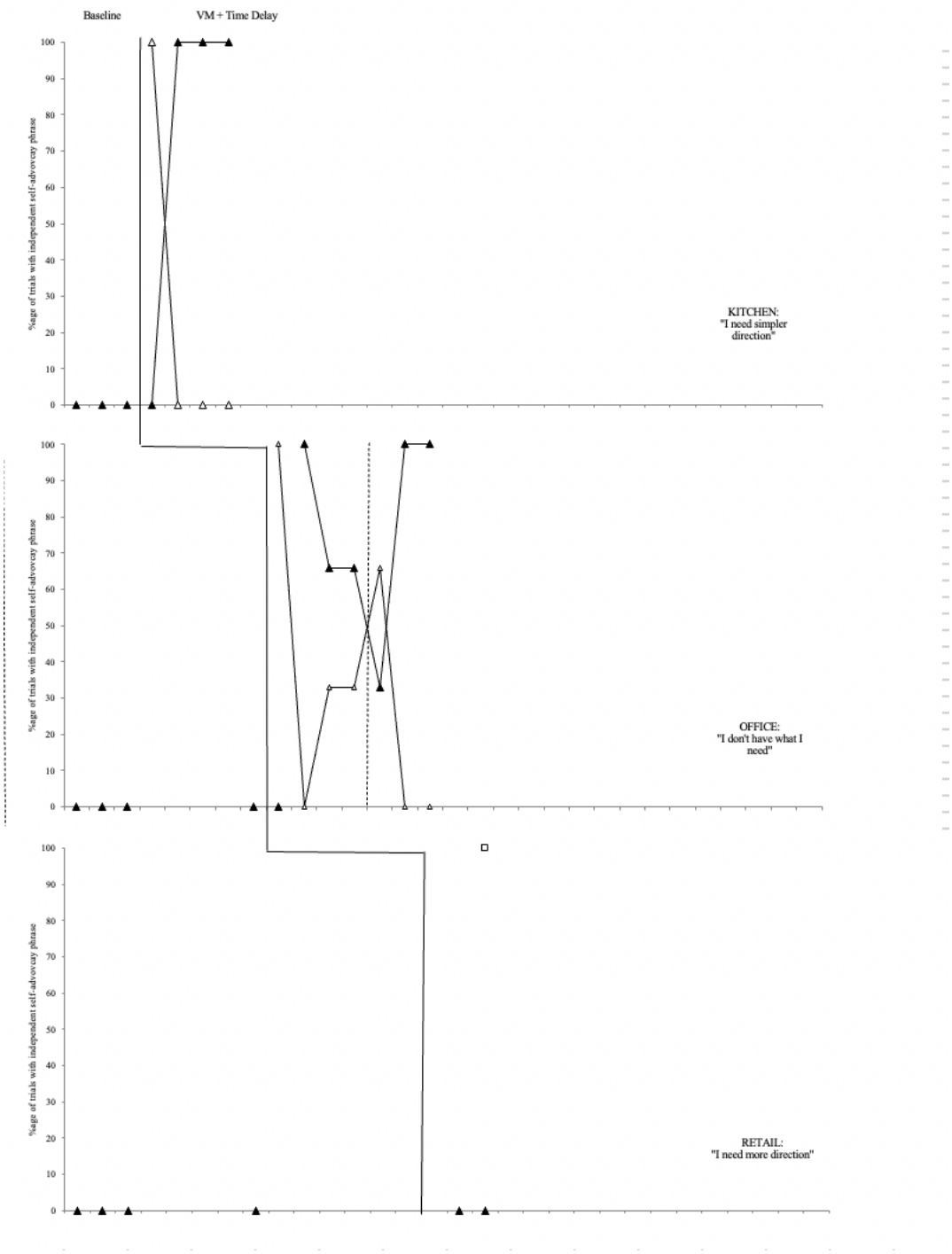


Figure 4 Daja's Graph

Table 2 Pre and Post Test Scores

	Pre-test	Post-Test
Eliza	12.5%	
Daja	0%	

CHAPTER 4. DISCUSSION

The purpose of this study was twofold. The first purpose was to determine the effects of video modeling with time delay in increasing the appropriate use of self-advocacy phrases within vocational environments for AAC and non AAC users. Second, to what extent did generative learning increase participants use of the self-advocacy phrases within different environments. Time delay and video modeling have shown a therapeutic effect on both participants behavioral responding. Each participant used the appropriate self-advocacy phrase when taught to do so within the vocational environmental setting. This aligns with research that suggests that using video modeling can increase skill acquisition and maintenance of learned skills (Cannella-Malone & Schaefer, 2017).

Vocational skills training is imperative for all learners, especially those disabilities. When students with CCN are receiving vocational skills instruction, it is imperative that they can request help when needed. This is critically important for students who use AAC to communicate. Results indicate that video modeling and time delay were effective in increasing the self-advocacy phrases while completing vocational tasks for both participants, suggesting this is an appropriate intervention for students have CCN (both AAC and non AAC users). Eliza made comments throughout the study saying she could use these phrases within her own classroom thus increasing social validity was increased throughout the study.

4.1 Limitations

One limitation for this study is the session formatting for the instructional trials. Three trials were conducted for every session which could alter the independent responding of each participant. The first trial was prompted using a 0 s delay meaning the remaining trials could have behavioral responses based on that first prompted trial. To control for this, mastery criterion was set at 100% accuracy for each participant ensuring that the self-advocacy phrases used without prompting throughout the trials per session would be part of the mastery total at the end of each session. There were three sessions that occurred during a single day making this another limitation for the study. Three sessions per day could cause results to amplify since there was a trial with prompting and two trials after without prompting. To control for this, we had three sessions at criterion of 100% mastery. Additionally, participants began to anticipate the dependent variable during instructional trials by attempting to complete the task without stating the correct self-advocacy phrase in the environment. This behavioral response was scored as incorrect for the duration of the study. In the real-world setting, most vocational task directions would be given in less controlled environments causing the participant to not have a singular stimulus to work on. The laboratory was controlled in this manner, thus causing skewed baseline data.

Another limitation for this study was the screening process to produce an activity bank for matrix training. Researchers had 4-5 different tasks to use for task directions. Matrix training is a vehicle to test for generalization of skills in academic, daily living activities, and functional skills. (Axe & Sainato, 2017, Kemmerer et al., 2021). Participants were screened on vocational activities within a vocational setting to establish

tasks that were known and unknown to develop an activity bank for probe sessions. Possible tasks were chosen from those already included in the classroom vocational setting. This limits the bank of activities to those that were readily available, which limits the examples provided. This could impact translation to the work environment.

4.2 Future Research

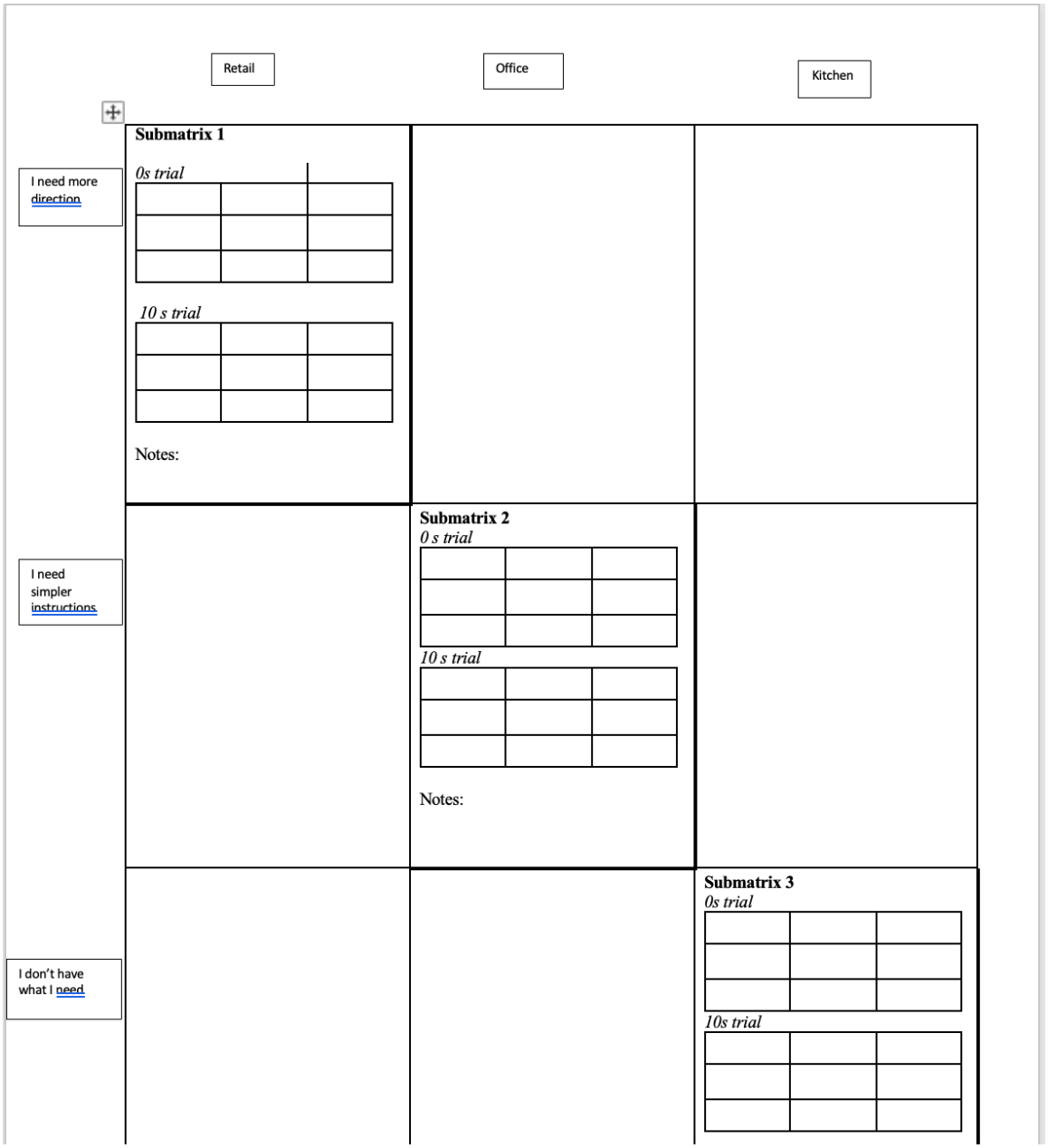
Inclusive work environments consist of employees on a wide spectrum of competency and ability level. There is a need for more research on teaching self-advocacy skills to young adults entering the workforce. Generative learning may be an effective and efficient means to teach these skills to individuals with disabilities, especially those with CCN. Future research should focus on the use of generative learning to further post-secondary skills training for adolescents and young adults with disabilities. Given the nature of their age and their access to resources within the school system, research should focus on identifying effective and concise practices for teaching vocational skills that will likely generalize to the workplace. Future research could experimentally evaluate the generalization of skills taught using a matrix in a classroom to a community-based environment. Current research supports matrix training being provided for students with autism and other disabilities, but there is a lack of research conducted with AAC users and individuals with CCN in the workplace (Kemmerer et al., 2020). Future research could also evaluate if this model is effective in teaching other soft skills or interpersonal relationships in the vocational setting. Additionally, researchers should continue using multimodal communicators in future studies more specifically how can individuals with disabilities and CCN cultivate positive relationships within their communities post-secondary training.

Future research could also call for placing unknown task directions within the known task directions to further help with the ability to know when to ask for help and when not to ask for help. This could also include a probe were the video model was not shown before so that the researcher could get a better idea if the independent variable was being acquired

4.3 Conclusion

Individuals with CCN have post-secondary goals to obtain and maintain employment upon completion of high school. The current literature and research should continue to focus on how to adequately prepare these individuals with employment skills to be successful in those community-based work environments. There is a need to teach employment skills in an effective and concise instructional manner and generative learning allows for instructors in academic settings to carry out this process. Future research should continue to evaluate employment skill abilities within individuals with CCN with instructional procedures that will allow for as much instructional time as possible. This will ensure a complete transition process for individuals with CCN.

APPENDICES


Retail
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Kitchen
I need more direction
I need simpler instructions
I don't have what I need
Submatrix 1
0s trial
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Notes:
Submatrix 2
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10 s trial
Notes:
Submatrix 3
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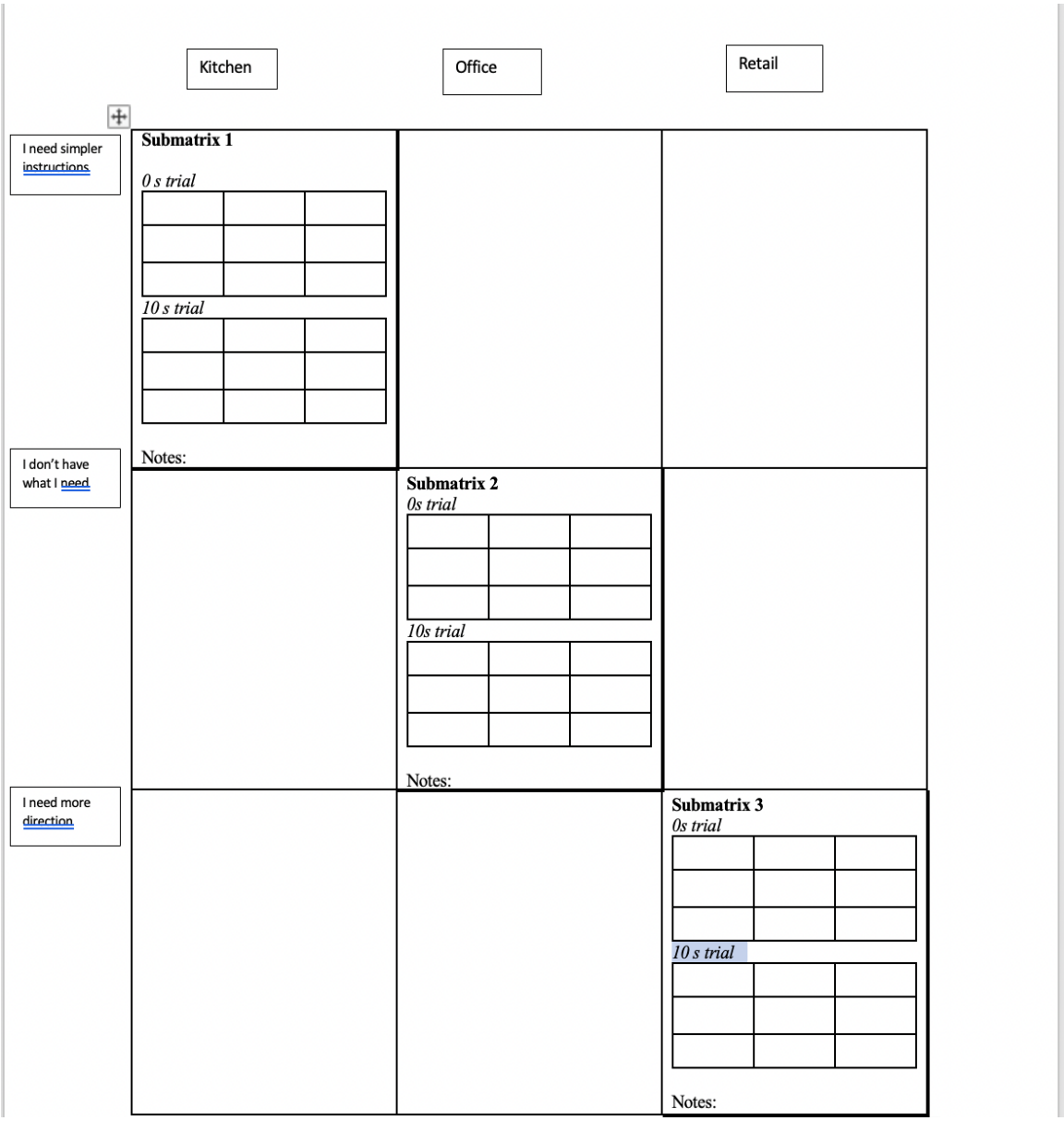
Kitchen
Office
Retail
I need simpler instructions
I don't have what I need
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Submatrix 1
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Submatrix 2
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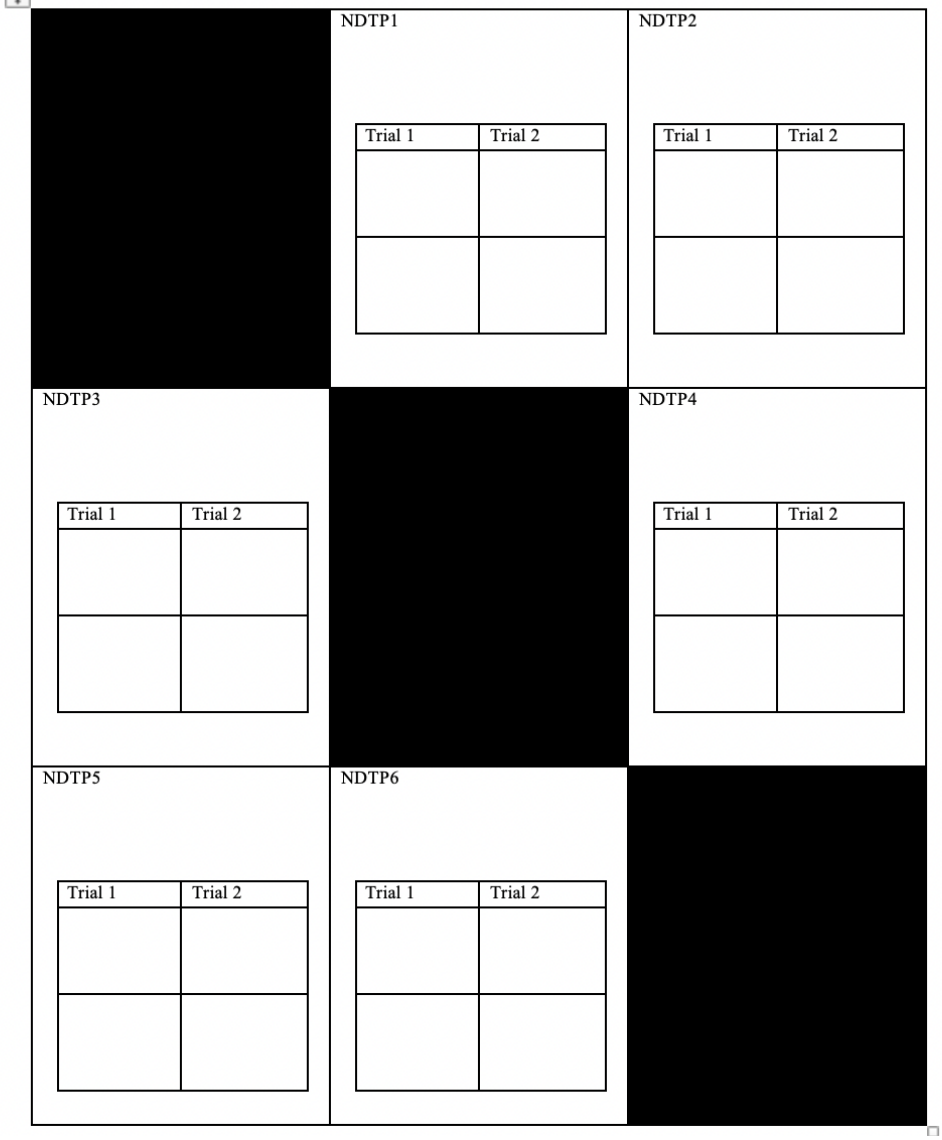
NDTP1
Trial 1
Trial 2
NDTP2
Trial 1
Trial 2
NDTP3
Trial 1
Trial 2
NDTP4
Trial 1
Trial 2
NDTP5
Trial 1
Trial 2
NDTP6
Trial 1
Trial 2

REFERENCES

Agran, M., Hughes, C., Thoma, C. A., & Scott, L. A. (2016). Employment social skills: what skills are really valued? *Career Development and Transition for Exceptional Individuals*, *39*(2), 111–120. https://doi.org/10.1177/2165143414546741

Axe, J. B., & Sainato, D. M. (2010). Matrix training of preliteracy skills with preschoolers with autism. *Journal of Applied Behavior Analysis, 43*(4), 635-652. https://doi.org/10.1901/jaba.2010.43-635

Bainbridge, N., & Myles, S. M. (1999). The use of priming to introduce toilet training to a child with autism. *Focus of Autism and Other Developmental Disabilities, 14(2), 106-109.* https://doi.org/10.1177/108835769901400206

Brady, N. C., Bruce, S., Goldman, A., Erickson, K., Mineo, B., Ogletree, … Wilkinson, K. (2016). Communication services and supports for individuals with severe disabilities: Guidance for assessment and intervention. *American Journal on Intellectual and Developmental Disabilities*, *121*(2), 121–138. https://doi.org/10.1352/1944-7558- 121.2.121

Cannella-Malone, H. I., & Schaefer, J. M. (2017). A review of research on teaching people with significant disabilities vocational skills. *Career Development and Transition for Exceptional Individuals*, *40*(2), 67–78. https://doi.org/10.1177/2165143415583498

Clark, K. A., Test, D. W., & Konrad, M. (2019). Teaching soft skills to students with disabilities with upgrade your performance. *Education and Training in Autism and Developmental Disabilities*, *54*(1), 41–56. https://doi.org/10.3233/jvr-180979

Dunn, L. M., & Dunn, D. M. (2007). Peabody Picture Vocabulary Test--Fourth Edition (PPVT-4) [Database record]. APA PsycTests.

https://doi.org/10.1037/t15144-000

Fey, M. E., Warr-Leeper, G., Webber, S. A., & Disher, L. M. (1988). Repairing children's repairs: Evaluation and facilitation of children's clarification requests and responses. *Topics in Language Disorders, 8*, 63-84. https://doi.org/10.1097/00011363-198803000-00007

Gilliam autism rating scale: third edition. GARS-3. (n.d.). retrieved april 5, 2023, from https://www.pearsonassessments.com/store/usassessments/en/Store/Professional-Assessments/Behavior/Gilliam-Autism-Rating-Scale-%7C-Third-Edition/p/100000802.html?tab=overview

Harrison , P., & Oakland , T. (n.d.). *Adaptive behavior assessment system™, third edition*. PAR. Retrieved April 5, 2023, from https://www.parinc.com/Products/Pkey/5

Handley, B. C. (2020). *The use of video modeling to teach requesting for conversational repair in vocational situations* [Unpublished masters thesis]. University of Kentucky.

Ju, S., Zhang, D., & Pacha, J. (2012). Employability skills valued by employers as important for entry-level employees with and without disabilities. *Career Development and Transition for Exceptional Individuals*, *35*(1), 29–38. https://doi.org/10.1177/0885728811419167

Kemmerer, A. R., Vladescu, J. C., Carrow, J. N., Sidener, T. M., & Deshais, M. A. (2021). A systematic review of the matrix training literature. *Behavioral Interventions*, *36*(2), 473–495. https://doi.org/10.1002/bin.1780

Ledford, J. R., & Gast, D. L. (Eds.). (2018). *Single case research methodology* (3rd ed.). Routledge.

Light, J., McNaughton, D., & Caron, J. (2019). New and emerging AAC technology supports for children with complex communication needs and their communication partners: State of the science and future research directions. *Augmentative and Alternative Communication*, *35*(1), 26–41. https://doi.org/10.1080/07434618.2018.1557251

Lindsay, S., McDougall, C., Menna-Dack, D., Sanford, R., & Adams, T. (2015). An ecological approach to understanding barriers to employment for youth with disabilities compared to their typically developing peers: Views of youth, employers, and job counselors. *Disability and Rehabilitation, 37,* 701–711. https://doi.org/10.3109/09638288.2014.939775

Pfeifer, M. A., Reiter, E. M., Cordero, J. J., & Stanton, J. D. (2021). Inside and out: factors that support and hinder the self-advocacy of undergraduates with ADHD

and/or specific learning disabilities in stem. *CBE life sciences education*, *20*(2), 1-20. https://doi.org/10.1187/cbe.20-06-0107

Quinn, E. D., Cook, A., Wiedrick, J., & Rowland, C. (2021). An initial investigation into the feasibility of the communication matrix professional development program for educational professionals working with students with complex communication needs. *Language, Speech & Hearing Services in Schools*, *52*(4), 1080–1094. https://doi.org/10.1044/2021_LSHSS-20-00154

Reichle, J., Simacek, J., Wattanawongwan, S., & Ganz, J. (2019). Implementing aided augmentative communication systems with persons having complex communicative needs. *Behavior Modification*, *43*(6), 841–878. https://doi.org/10.1177/0145445519858272

Smith, K. A., Ayres, K. A., Alexander, J., Ledford, J. R., Shepley, C., & Shepley, S. B. (2016). Initiation and generalization of self instructional skills in adolescents with autism and intellectual disability. *Journal of Autism and Developmental Disorders*, *46*(4), 1196–1209. https://doi.org/10.1007/s10803-015-2654-8

Stokes, T. F., & Baer, D. M. (1977). An implicit technology of generalization. *Journal of Applied Behavior Analysis*, *10*(2), 349–367. https://doi.org/10.1901/jaba.1977.10-349

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