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Using Photography Activity Schedules to Facilitate Independent Completion of Academic Tasks for Young Children with Autism

Nicole Taylor
Utah State University

USING PHOTOGRAPHIC ACTIVITY SCHEDULES TO FACILITATE INDEPENDENT COMPLETION OF ACADEMIC TASKS FOR YOUNG CHILDREN WITH AUTISM

by

Nicole Taylor

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Approved:

Thomas Higbee, Ph.D. Major Professor	Kaitlin Bundock, Ph.D. Committee Member
Heather Weese, M.S. Committee Member	Laurens H. Smith, Ph.D. Interim Vice President for Research and Interim Dean of the School of Graduate Studies

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ABSTRACT

Using Photographic Activity Schedules to Facilitate Independent Completion of Academic Tasks for Young Children with Autism

by

Nicole Taylor, Master of Science

Utah State University, 2018

Major Professor: Thomas Higbee, Ph.D.
Department: Special Education and Rehabilitation

Some children with autism spectrum disorder (ASD) struggle to perform a series of academic tasks, like academic worksheets, independently. Photographic activity schedules are one technique that has been demonstrated to promote independent behavior in individuals with ASD. This study used a multiple baseline design across participants to examine how activity schedules impacted the accurate and independent completion of a series of academic tasks (i.e., worksheets) for young children with ASD. Participants included three young children with ASD 6 and 7 years old who performed a series of academic tasks in the presence of an adult, but struggled to display those concepts accurately in the absence of an adult. Procedures involved training participants to use activity schedules through graduated guidance until participants used activity schedules to accurately complete three academic tasks without additional assistance. Completing these worksheets using schedules not only improved student accuracy but also provided

more opportunities for students to learn in an environment with their typically developing peers.

(47 pages)

PUBLIC ABSTRACT

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Some children with autism spectrum disorder (ASD) struggle to perform a series of academic tasks, like academic worksheets, independently. Photographic activity schedules are one technique that has been demonstrated to promote independent behavior in individuals with ASD. This study examined how activity schedules impacted the accurate and independent completion of a series of academic worksheets for three young children with ASD ages 6 and 7. Participants needed to performe a series of math and reading worksheets in the presence of an adult, but struggle to display those concepts accurately in the absence of an adult. Procedures involved training participants to use activity schedules until participants used activity schedules to accurately complete three worksheets without additional assistance. Completing these worksheets using schedules not only improved student accuracy but also provided more opportunities for students to learn in an environment with their typically developing peers.

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Nicole Taylor

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CHAPTER I

INTRODUCTION

Researchers have shown that young children with autism evidence delays in acquisition of basic skills (Matson & Nebel-Schwalm, 2007). In order to investigate how these individuals can acquire basic skills, researchers examined different techniques that increase independence skills in (a) communication, (b) social, and (c) functional areas (Akers, Higbee, Pollard, Pellegrino, & Gerencser, 2016; Pierce, Spriggs, Gast, & Luscre, 2013; Stevenson, Ghezzi, & Valenton, 2016). However, no research was found in published literature on how these children can systematically access grade level content areas, or academic skills, independently (Barnett & Cleary, 2015). Researchers have spent time understanding how to improve the independent demonstration of social, communication, and functional skills of children with autism; however, researchers need to investigate how to assist students with autism in completing academic tasks without an adult present.

Many children with autism spectrum disorder (ASD) struggle with dependency on others to complete basic academic tasks, especially when children are given a series of academic tasks and expected to complete every step independently. A prompt dependency occurs when an individual's ability to respond correctly is dependent on a prompt from another individual (Clark & Green, 2004). Some professionals suspect this occurs because many children with ASD are prompted often in one-on-one and small group instructional settings (Hume, Loftin, & Lantz, 2009). The intensive prompting that students with ASD receive from adults in these settings may not always be faded

appropriately, which may create responses that are contingent on adult instruction. This can potentially stop a student from demonstrating true mastery of academic concepts and can hinder that student's ability to learn in an environment with his typical peers. Learning how to perform a series of tasks centered on core academic concepts independently (e.g., reading, mathematics) may increase the life and independence skills of a child with ASD as well as lead to a greater amount of time spent with same-aged peers in the general education setting.

Hume, Plavnick, and Odom (2012) claimed that the independent demonstration of any skill across settings is crucial for improving access to general education environments for children with ASD. In order to ensure that these individuals are gaining access to the most inclusive setting possible, students must be able to accurately and independently complete independent seatwork task (e.g., a series of academic worksheets) in multiple settings. One method proven to help children with ASD exhibit independent skills is the use of photographic activity schedules. Activity schedules are a series of photographs that prompt an individual to complete a set of activities (McClannahan & Krantz, 2010). For example, if a child with ASD struggled to complete a series of counting worksheets accurately, he would refer to an activity schedule containing icons representing each task in a specific order to help him complete each step independently (e.g., turtle worksheet, dinosaur worksheet, farm worksheet). Individuals are taught to follow activity schedules using physical prompts/manual guidance that is delivered from behind and faded as quickly as possible. No verbal instructions or prompts are used to teach individuals how to follow activity schedules. Researchers discovered

that activity schedules improved the ability of children with ASD to independently (a) complete transitions, (b) exhibit on-task behavior, and (c) increase appropriate social/play skills (Akers et al., 2016; Bryan & Gast, 2000; Pierce et al., 2013). When looking at the effective role activity schedules play in increasing independent completion of a variety of activities in multiple settings, it seems important to investigate their effectiveness at promoting independent completion of academic tasks (i.e., worksheet completion) among children with ASD.

CHAPTER II

LITERATURE REVIEW

Introduction

Using EBSCO HOST Psych INFO, I searched for studies on activity schedules using the terms *photographic activity schedules* and *picture activity schedules.* I also included the following filters in my search: *peer reviewed academic journals,* and *dissertations*. Overall, I found 168 studies. Of these, 23 used activity schedules as the independent variable. I examined those 23 studies by looking for activity schedules that (a) were picture-based, (b) focused on transitions between locations, and (c) focused on task completion. Studies were excluded when they did not contain at least one of the above components. The following three articles were considered the most relevant:

Bryan and Gast (2000) conducted a study to measure the effect activity schedules and graduated guidance had on the on-task and on-schedule behavior of four students diagnosed with high-functioning ASD. Participants were between 7 and 8 years old (three male and one female) and all attended a resource class located in a public elementary school for half of the day. The remaining half of the day was spent in the general education setting with support from special education staff. All participants were on grade level or 1 year below grade level in reading but all struggled to stay on task without adult supervision. Participants also demonstrated picture to object correspondence but were unfamiliar with activity schedules. Researchers held the study in the resource classroom for 45 min sessions. Students were told by the teacher to begin working on

literacy centers and students were prompted by the supporting staff to check their schedules. The staff continued to prompt students as needed to complete tasks and transition to centers. All prompting was delivered physically from behind and no verbal prompting was used by the staff. Researchers used a momentary time sample recording system to track on-task behavior and a checklist to track on-schedule behavior. All participants displayed on-schedule behavior and on-task behavior at 100% accuracy across three consecutive sessions in the generalization posttest phase. Based on these data, the researchers suggested researching activity schedules for other subject areas and in more inclusive settings. Using these schedules would, in theory, help students who are struggling with on-task behavior be more focused and engaged in the material given to them. More research will need to be done, however, to investigate exactly how activity schedules will help students perform various academic tasks accurately in more inclusive settings.

Pierce et al. (2013) studied the effect activity schedules had on the independent transitioning skills of four students with moderate ASD. Participants were all male, between 9 and 11 years old, and attended a self-contained classroom for students with disabilities. During a portion of the day, these students attended four different centers where the following topics were addressed: reading, math, fine motor, and recreation and leisure time. All participants demonstrated an ability to match visual stimuli and had previous experience with activity schedules; however, these participants all struggled to transition between locations and activities appropriately. Some transitioned too slowly while others exhibited verbally and physically aggressive behavior during transitions.

Researchers held the study during the center rotations mentioned above.

All tasks given were previously mastered by the participants and each center was 5 min in duration. All centers were also marked with a certain geometric shape and color (i.e., math was the blue diamond center) and each activity schedule contained every center only once. Each schedule had five pages with five icons on each page. The following steps were placed horizontally on every page: stop, clean up, stand up, center location, and sit. Sessions were held for roughly 30 min, once a day, for 5 consecutive days. The order locations presented on the schedule changed randomly from session to session. When center time began, the teacher briefly reviewed where each center was located. At the sound of a timer, each participant was expected to stop the task he was working on, check his schedule, walk over to the correct location, and begin the next task. Researchers used a least prompts system to assist the participants. This system involved providing the least intrusive prompt necessary for a student to produce an accurate response (e.g., if a student did not walk to the correct location independently, the instructor lightly tapped the student from behind to prompt that student to walk to the correct location. If that prompt was ineffective, then the instructor began to physically guide the student from behind).

Researchers also provided verbal praise statements about every 60 s for on-task behavior. Researchers used an event recording method to track the percentage of schedule steps completed independently. All participants completed all steps with 90% to 100% accuracy across at least three consecutive sessions. In the posttest generalization phase, all participants maintained these percentages with novel colors and geometric

shapes representing each center. Based on these results, Pierce et al. (2013) suggested expanding the use of activity schedules to other locations in and out of schools, as well as evaluating these schedules' effectiveness in completing more complex routines and tasks.

Akers et al. (2016) studied the impact activity schedules had on the playground skills of three young children with ASD. All participants were male, between 4 and 5 years old, and attended a university-based preschool for children with ASD. Each child had previous experience with individual activity schedules in the classroom setting and demonstrated advanced visual matching abilities. All participants, however, struggled to play appropriately during unstructured time on the playground. Each participant engaged in stereotypy or other repetitive movements (i.e., playing in woodchips) and did not use play structures appropriately (i.e., ladders, slides, etc.). Researchers created an activity schedule for each child in the study. Each schedule contained five to eight activities (i.e., slide), with one photographic representation of an activity per page. When the experimenter said, "Go play," each participant (a) opened his schedule, (b) pointed to the icon, (c) went to the correct activity, and (d) performed the desired task until it was completed. Experimenters used graduated guidance to prompt each child physically from behind, and each child was rewarded with a small edible item once his schedule was completed. Researchers collected data on the number of tasks completed and the percentage of schedule components independently completed. All participants completed schedule components independently with 80% to 100% accuracy. Participant one accurately completed five activities independently, participant two completed eight activities independently, and participant three completed seven activities independently.

All demonstrated significant increases in both schedule component and task completion from baseline levels. Akers et al. (2016) demonstrated how playground skills can be accurately produced while using an activity schedule without adult prompting, but also conveyed the need for more research on how to increase independence skills across different tasks and settings.

In the three studies above, all researchers found that activity schedules were beneficial in increasing the independent skills of children with ASD. These children began to (a) exhibit on-task behavior while engaging in independent tasks (Bryan & Gast, 2000), (b) perform transitions without adult assistance (Pierce et al., 2013), and (c) engage in appropriate play in the absence of prompting from others (Akers et al. 2016). All researchers, however, expressed a need for studies to be extended to different tasks and settings. To address this gap in the literature base, I will be extending the above studies to different tasks and locations by examining how activity schedules affect the completion of a series of academic tasks when an adult is not present for children with ASD, and if those tasks can be completed in the general education setting.

Purpose Statement and Research Questions

The purpose of this study is to examine the effects of using activity schedules, and manual guidance, to teach the independent completion of a series of academic tasks to young children with ASD in the inclusive setting. These academic tasks will include worksheets that address basic math and reading concepts. My research questions are as follows.

When considering three young children with ASD:

1. How will activity schedules affect the percentage of a series of academic worksheets completed accurately in the absence of an adult in a self-contained setting?

2. To what extent can activity schedules affect the percentage of a series of academic worksheets completed accurately and in the absence of an adult in the general education setting?

CHAPTER III

METHODS

Participants

Three children ages 6 and 7 years old, two male and one female, who attended a public elementary school in the Western U.S. participated in this study. All participants had an educational classification of autism and demonstrated delays in language, academic, and independence skills. Kyle (age 7, Caucasian) received an overall score of 93 on the Verbal Behavior Milestones Assessment and Placement Program (VB-MAPP) (Sundberg, 2008), placing his language skills in the developmental age of approximately 30 months. Kyle also uses an Augmentative and Alternative Communication (AAC) device because he exhibits forms of nonvocal behavior. He used an iPad as an AAC device with voice output capabilities to communicate his wants and needs. His device was present in all sessions throughout the study, but it was placed on guided access by the implementer, so no other application was accessed by Kyle. If Kyle used his AAC device, it was treated as a vocalization and the implementer responded accordingly based on treatment procedures. Frank (age 6, Other Pacific Islander/Caucasian) received an overall score of 146 on the VB-MAPP (Sundberg, 2008), placing his language skills in the developmental age of approximately 40 months. At the time of the study, he produced five to seven-word utterances. Chelsey (age 6, American Indian/Caucasian) also received an overall score of 106.5 on the VB-MAPP, placing her language skills in the developmental age of approximately 30 months. At the time of the study, she produced

three to four-word utterances.

Participation qualifications included (a) a demonstration of mastery using activity schedules for either transitions or basic closed-ended tasks (at least 90% accuracy across three consecutive sessions), (b) a demonstration of mastery in either math, reading, or writing worksheets in a one-on-one or small group setting where an instructor was present (at least 80% accuracy across three consecutive sessions), and (c) an inability to perform those same mastered worksheets when an instructor was absent. Mastery was defined as completing a worksheet with at least 80% accuracy over three consecutive sessions. Participants were excluded if they failed to meet all three criteria above, if parents did not provide consent for their child to participate, if they were absent for a long period of time, if they chose not to participate, or if they exhibited severe challenging behavior that was harmful to herself or others during research sessions. All participants also had to be within 5 to 9 years of age. To contact participants, the teacher sent a consent form home to parents detailing the study, the risks involved, and the rights of parents and participants.

Settings

Participants performed a series of academic worksheets in two classrooms. The first was in a self-contained autism classroom in a public school in the Western U.S. This class had a total of 9 students with moderate to severe forms of autism with a 2:1 ratio of students to staff. Instruction was focused on language, social, academic, and functional skills using one-on-one and small group instruction. Instruction on the independent

completion of a series of academic worksheets was held at “kidney-shaped” table approximately 1.5 m by 1 m. The classroom also included two 2.2 m by 2 m cubicles containing two chairs and a rectangular table approximately 1 M by 0.5 m, two 3 m by 2.5 m cubicles, a small play rug, a circle time area, a shelving unit containing independent work bins, and a bookshelf.

The second was a general education first grade classroom located in the same school. It contained approximately 25 students with one teacher providing predominantly academic instruction. 25 desks about 0.6 m by 0.4 m were located groups of four facing each other throughout the room. Generalization sessions were held at one of these student desks. This classroom also included a rug area in the back of the class, shelving units containing independent work bins, a projector, two computers, and a bookshelf.

Materials

Each participant was given an activity schedule contained in a mini binder 23 cm by 17.5 cm by 3.5 cm, which contain eight pages, two pages per task. On the left page, there was one 4 cm icon detailing what work bin the participant should retrieve. On the right page, a set of 4 cm icons detailing the specific steps needed to complete that task was ordered vertically, with the first step at the top (Figure 1). Each step was a pictorial representation of each line on a worksheet. The last page in the activity schedule always contained an icon indicating access to a small edible item to serve as a reward. All edible items were in a small container directly next to the work bins.

Participants were given a series of worksheets to complete. Each worksheet was

Figure 1. Activity schedule containing icon representing bin (on left), and icons representing each problem on one worksheet (right).

printed on a white computer paper 27.9 cm by 21.6 cm and placed in a clear sheet protector. Participants used a dry erase marker to complete each worksheet, which contained five steps where participants had to match an item on one side to the other side. These worksheets were then placed inside individual clear bins 35.6 cm by 20.3 cm by 11.7 cm with picture representations of the specific activity attached to the front of each work bin (Figure 2). Using a random number generator, each participant was exposed to nine worksheets in random order (Figure 3). The randomization reset once the participant was exposed to all nine worksheets. Data collectors used a writing utensil (e.g., blue/black pen, pencil), a data sheet detailing the steps necessary for the completion of each task, and a clipboard.

Participants were pretrained on how to complete the worksheets in a group setting

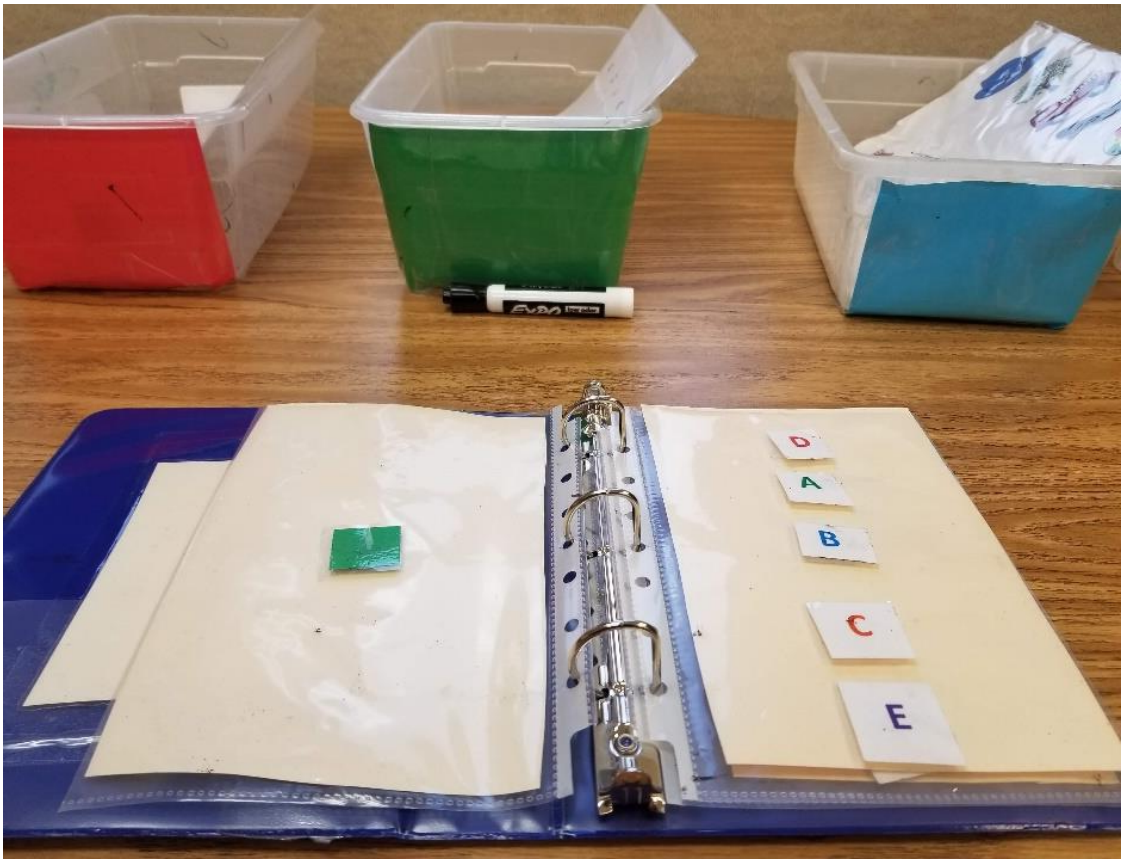

Figure 2. Three work bins containing worksheets (top) with corresponding activity schedule (bottom).

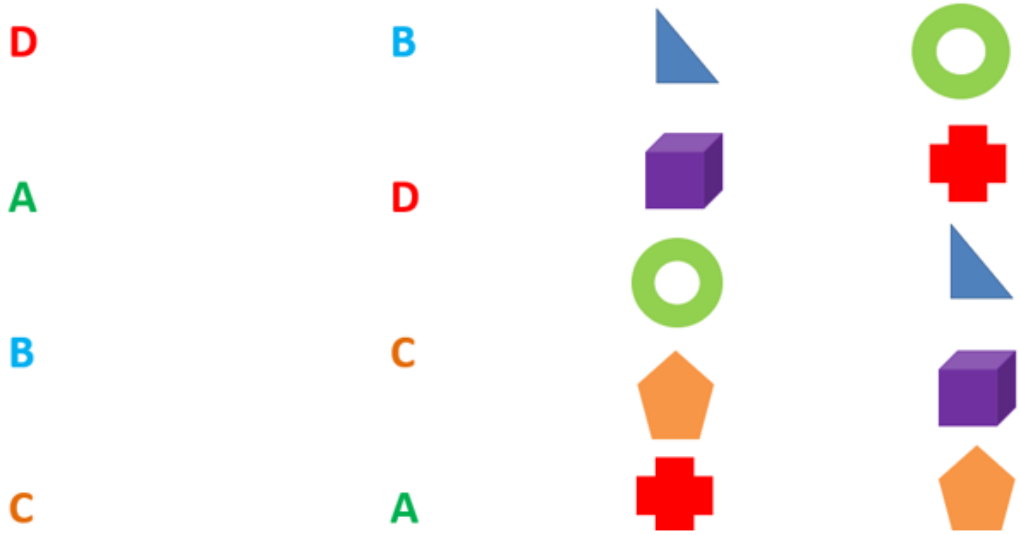

Figure 3. Two different worksheets from a set of nine used by Kyle and Chelsey.

by a classroom instructor. A participant was only pretrained if he could not successfully complete nine different academic worksheets at mastery level. The researcher selected worksheets based on a participant's performance in math and reading groups. For example, if a participant demonstrated mastery (100% accuracy over 3 consecutive sessions or 80% accuracy for at least 4 out of 5 consecutive sessions) in identifying uppercase letters but could not perform those same skills on worksheets, then the researcher would select several different letter-matching worksheets for pre-training sessions. All participants were trained on a series of worksheets that contained both math and reading concepts. Pretraining sessions ended once participants demonstrated mastery for nine academic worksheets. Participants did not perform worksheets consecutively in pre-training sessions and an instructor was always present. The researchers then introduced those same worksheets into the study.

Dependent Variables and Response Measurement

The researcher measured two variables. First, she measured the number of activity schedule components completed independently. Following schedule components independently (without additional prompting) was defined as (a) retrieving the correct activity schedule, (b) opening the schedule, (c) pointing to or touching the icon representing a task, (d) retrieving the corresponding task materials, (e) pointing to or touching the icon representing each step within one task, (f) completing each step within a task after its corresponding icon is selected, (g) cleaning up materials after every task is finished, (h) turning the page to the next task, and (i) closing and returning the schedule

once all tasks are completed. Schedule components were measured by the number of steps followed correctly divided by the total number of possible steps. This percentage was calculated each session for every participant.

Second, the researcher measured the accurate, independent completion of academic worksheets. Accurate task completion was defined as completing all steps within each task correctly and without prompts from others. For example, when completing a "counting objects" worksheet, the participant (a) counted each object within one section by pointing to or touching each object, (b) drew a line from that section to the correct numeric value, and (c) completed every section on the worksheet as previously described. Accurate task completion was measured by the number of steps followed correctly divided by the total number of possible steps. This percentage was also calculated each session for every participant (Figure 4).

Interobserver Agreement

A second observer collected data on both dependent variables for 33% of baseline, activity schedule probe, treatment, and reversal probe sessions to determine interobserver agreement (IOA). IOA was calculated by dividing the total number of trial agreements by the total number of trials. The quotient was multiplied by 100 to calculate the trial-by-trial IOA percentage. The time stamp marked after each trial needed to be within 3 seconds of each other to be counted as reliable. The trial ended when the participant lifted her marker from the worksheet. Data collectors were trained by the researcher in the school setting. Training occurred in the afternoon for 30 min once the

Independent Worksheet Completion with Activity Schedule

Participant: Data Collector:

Date/Condition: Session # :

Schedule Components															
Retrieve Schedule:				Open Schedule:				Close Schedule:				Return Schedule:			
Task	Point to icon	Retrieve materials	Point to icon 1	Complete action	Point to icon 2	Complete action	Point to icon 3	Complete action	Point to icon 4	Complete action	Point to icon 5	Complete action	Clean up materials	Turn Page	Time Stamp

# of correct components: _____ Total # of components:_____

% correct: _____

Worksheet Accuracy						
Task	Step 1	Step 2	Step 3	Step 4	Step 5	Time Stamp

# of correct components: _____ Total # of components:_____

% correct: _____

+ = correct P = prompted − = incorrect

Figure 4. Data sheet for independent schedule completion (top) and worksheet accuracy (bottom).

students left the facility. The researcher modeled the correct data collection procedures, coached the data collectors during practice trials, and then allowed the data collectors to demonstrate correct procedures during role-playing sessions. Training continued until all data collectors agreed at 90% IOA or higher for three consecutive role-playing sessions prior to participation in the study. IOA agreement under independent schedule completion for Kyle, Frank, and Chelsey is 99% (range 96%-100%), 97% (range 88%-100%), and 97% (range 94%-100%) respectively. IOA agreement under worksheet accuracy for Kyle, Frank, and Chelsy is 99% (range 93%-100%), 96% (range 80%-100%), and 99% (range 93%-100%) respectively.

Treatment Integrity

Treatment integrity data were collected by a second data collector on how accurately the implementer completed the following steps for all conditions: (a) collected a data sheet and writing utensil, (b) placed three work boxes in the instructional area, (c) placed the schedule in front of the student (when applicable), and (d) provided the instruction "do all of the work boxes." The implementer then employed graduated guidance to instruct students. Graduated guidance is a series of prompts delivered by an implementer from most intrusive to least intrusive. The following steps were completed in order by the implementer and were checked for accurate implementation only during the conditions in which the implementer employed graduated guidance: (a) hand over hand, (b) hand on arm, (c) hand on shoulder, and (d) tap on shoulder. The implementer delivered each prompt from behind without speaking to the participant. Treatment

integrity was calculated by dividing the number of steps completed correctly for all steps mentioned above by the total number of steps multiplied by 100 to calculate a percentage. Treatment integrity was calculated at 99% for Kyle, Frank, and Chelsey and was collected for 33% of baseline, treatment, activity schedule probe, and reversal probe sessions.

Experimental Design

A reversal design embedded within a multiple baseline design across participants (Cooper, Heron, & Heward, 2007) was used to investigate the effects of activity schedules on the percentage of steps for completing academic worksheets correctly by young children with ASD. Participants moved from one condition to the next when researchers saw treatment effects. This design was deemed the most appropriate for this study because one target behavior was examined across multiple participants and removing and reintroducing the activity schedule demonstrated greater experimental control. The general acceptance of this design and its frequent use in many studies also add to its credibility.

Procedures

The researcher implemented conditions in the following order: baseline, activity schedule probe, generalization baseline probe, training, reversal probe, training, and generalization posttest. Under each condition, data collectors used a data sheet and writing utensil. The instructor needed to ensure that an activity schedule (except for

baseline and some probe sessions), three work bins, and one small edible item were in the instructional area before each session began. All sessions occurred 1 to 2 times a day, 3 to 5 days per week. At least 30 minutes passed before another session began and all sessions in the self-contained setting were video recorded.

Baseline

All baseline sessions occurred at a "kidney-shaped" table approximately 1.5 m by 1 m in a self-contained classroom. One participant sat at the table with a data collector located approximately 1 m outside of the instructional area. Three bins containing various worksheets were placed on the table. The instructor then said, "do all of the work boxes" and left the instructional area. This instruction was the same for all sessions under every condition. Data were collected on the number of steps completed accurately for each worksheet. Schedule components were not scored since the schedule was not present for this condition. The instructor and data collector ignored all questions, comments, or incorrect responses made by the participant and had no interaction with the participant. If the participant attempted to leave the instructional area, however, she was physically redirected by the instructor. If the participant successfully left the instructional area, the session was terminated. The session ended when the participant finished all tasks or when 10 min passed. Baseline data for all participants were collected on average twice a day over consecutive school days until low, stable patterns of responding were observed. Kyle was in the baseline condition for five sessions (minimum) before moving to the next condition and subsequent participants were staggered.

Activity Schedule Probe

This condition occurred in the same environment as baseline with the data collector in the same position. An activity schedule was placed on the table directly in front of each participant. The instructor told the participant to “do all of the work boxes” and then left the instructional area. Data were collected on both schedule components and the number of steps completed accurately for each worksheet. On the last page of the activity schedule was an icon representing a small edible item serving as a reward. If the participant reached the last page, she pointed to the icon, grabbed the edible item, consumed it, and put the container away. Both ignore and termination criteria were still the same as baseline. The activity schedule probe only occurred once if levels were low and immediately before the generalization baseline probe began. If levels were at moderate to high levels, probe sessions were continued until low, stable levels occurred.

Generalization Baseline Probe

This condition was conducted in a first-grade general education classroom located in the same school as the self-contained classroom. This setting was identical for all participants and completely novel to all participants. The participant sat at a student desk while a data collector stood approximately 1 m behind the participant. Three bins were placed on a desk immediately next to the participant while other first grade students were engaging in independent work at their desks. The instructor said, “Do all of the work boxes” and then left the instructional area Data were collected on the number of steps completed accurately for each worksheet. Schedule components were not scored since the schedule was not present for this condition. Both ignore and termination criteria were

identical to baseline criteria. The generalization probe only occurred once and only before the training procedures began.

Training

This condition occurred in the same environment as baseline with the data collector in the same position. The instructor told the participant to "do all of the work boxes." An activity schedule was placed on the table directly in front of the participant. After the command was given, the participant was expected to retrieve the schedule, follow all schedule components, and accurately complete each step for every task detailed in her schedule. On the last page of the activity schedule was be an icon representing a small edible item serving as a reward. If the participant reached the last page, she pointed to the icon, grabbed the edible item, consumed it, and put the container away. The instructor also remained at the table with the participant for the duration of the session and employed graduated guidance, slight physical prompting from behind, to prompt the participant as needed. Graduated guidance was used if the participant began to complete a step incorrectly or if she performed no schedule components or tasks for a period of 3 s. The instructor did not use gestural or vocal prompting. The data collector recorded the number of steps completed correctly for each task as well as the number of schedule components completed correctly. A correct response included any steps or components completed accurately without prompting from the instructor. If the participant successfully left the instructional area without permission, the session was terminated. The session ended when the participant finished all tasks or when 10 min passed. On average, 2-3 training sessions were held per day over consecutive school days

for each participant and were continued until stable patterns were observed in the data. A minimum of five training sessions were required under this condition. Once a participant completed each task with at least 80% accuracy over three consecutive sessions and followed all schedule components with at least 90% accuracy, then she reached mastery.

Reversal Probe

This condition occurred once in the same environment as baseline under the same conditions. The instructor said, “Do all of the work boxes” and then left the instructional area. The activity schedule was not present and no prompts were provided. Data were collected on the number of steps completed accurately for each worksheet. Schedule components were not scored since the schedule was not present for this condition. Both ignore and termination criteria were identical to baseline criteria. Data were collected for one session after mastery was reached under the training condition.

Generalization Posttest

This condition was conducted in the same first-grade general education classroom as the general education probe condition. The participant sat at a student desk with three work bins on a desk immediately next to the participant. The activity schedule was placed on the desk and the instructor told the participant to “do all of the work bins” and then left the instructional area. The data collector was located approximately 1 m behind the participant and recorded the number of steps completed correctly for each worksheet as well as the number of schedule components completed correctly. The instructor followed the same response procedures detailed under the baseline condition. If the participant

successfully left the instructional area without permission, the session was terminated. The session ended when the participant finished all tasks or when 10 min passed. The researcher only conducted one session in this setting if the participant reached mastery, which is task completion with at least 80% accuracy and schedule component completion with at least 90% accuracy. If the participant failed to reach mastery, then training continued to be provided in that setting until the participant reached mastery.

CHAPTER IV

RESULTS

As shown in Figure 5, all three participants increased from baseline in their ability to perform a series of academic worksheets independently in the self-contained setting as well as the general education setting. These three participants also increased in their ability to complete activity schedules independently and reached mastery criteria under every condition. All participants also reached mastery in the generalization posttest phase.

When describing the levels of responding, the following ranges apply for all participants and conditions: low levels are between 0% and 40%, moderate levels are between 40% and 74%, and high levels are between 75% and 100%. When the researcher asked Kyle to complete a series of worksheets in the absence of a schedule during baseline sessions, Kyle's performance maintained at 0% for worksheet accuracy for 5 consecutive sessions. The researcher deemed Kyle's levels to be low and stable, so she introduced the activity schedule probe condition. His worksheet accuracy level was still at 0% while his schedule completion level was at 22% for the activity schedule probe session. In the generalization probe condition, Kyle's worksheet accuracy maintained at 0% and continued at that level for the two following sessions under the training condition. His schedule completion performance under those two training sessions was around 22%. Kyle's independent worksheet accuracy and schedule completion increased to moderate levels of performance for the next two training sessions. Levels increased to around 60% for worksheet accuracy and around 56% for schedule completion.

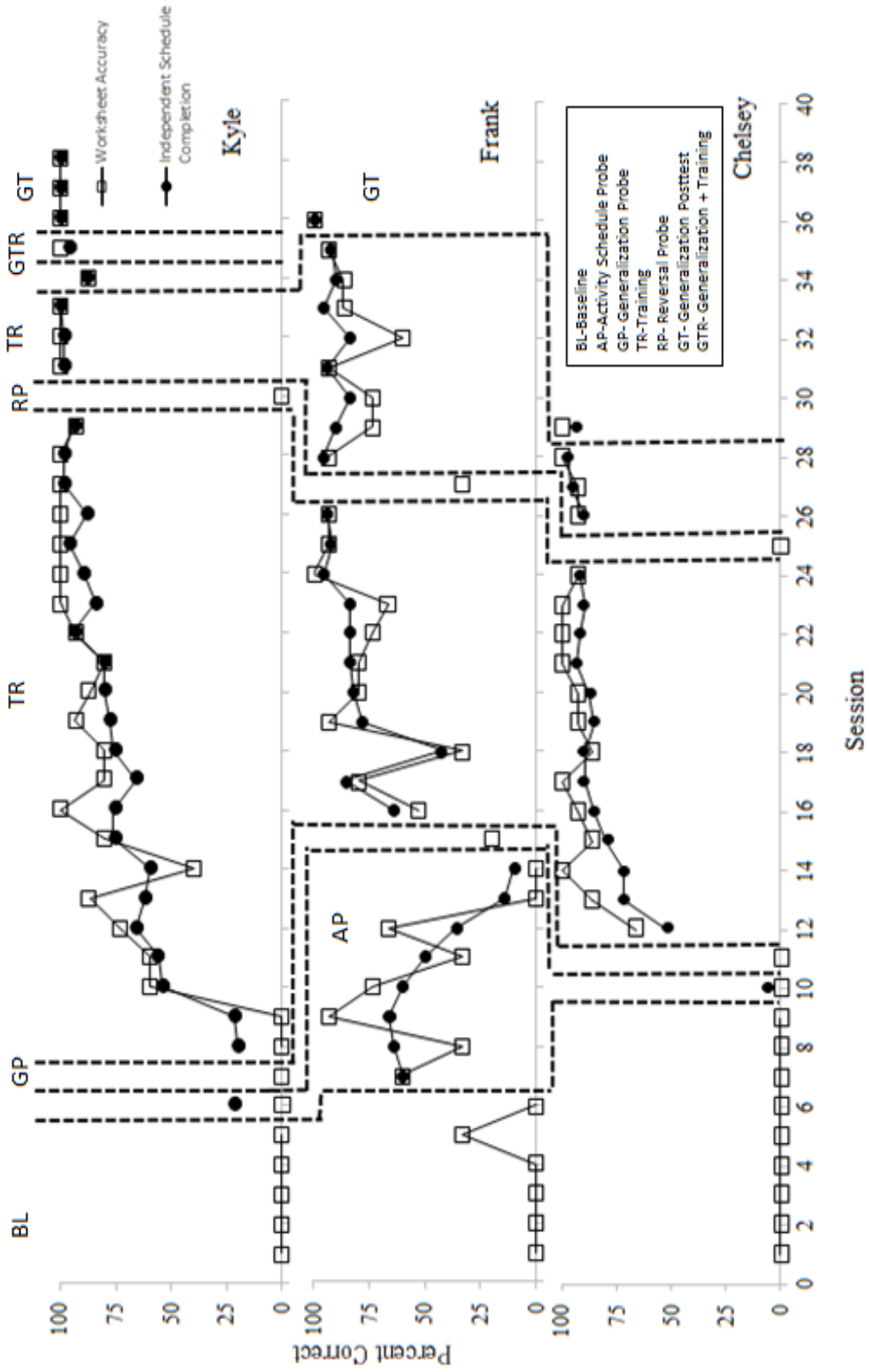

Figure 5. Data of Kyle's, Frank's, and Chelsey's percent correct of independent academic worksheet completion and schedule completion with baseline, activity schedule probe, generalization probe, training, reversal probe, training, generalization posttest, generalization plus training, and generalization posttest.

Meanwhile under Frank's activity schedule probe condition, his worksheet accuracy sharply decreased from 75% to 33% while his independent schedule completion decreased from around 55% to 50%. Chelsey also remained at low levels for both worksheet accuracy and schedule completion during her activity schedule and generalization probe conditions.

Kyle's levels of performance continued to steadily increase from moderate to high levels from session 12 to session 22. His worksheet accuracy increased from 73% to 93% while schedule completion increased from 66% to 94%. Kyle's performance remained at high levels until he met mastery criteria, with worksheet accuracy at 100% for sessions 27 and 28 and 93% for session 29. His schedule completion also met mastery with sessions 27 and 28 and 98% and session 29 at 94%.

After Kyle met mastery in the initial training phase, the researcher implemented the reversal probe at session 30 where Kyle retuned to 0% with worksheet accuracy. Also, in session 30 Frank's worksheet accuracy and schedule completion levels were within high ranges (at least 75%) while Chelsey previously met mastery criteria in the generalization posttest in session 29. After this, the researcher reintroduced the training phase where Kyle returned to mastery performance levels for both worksheet accuracy and schedule completion for three consecutive sessions. Once mastery was met, Kyle was tested in the general education environment where he performed at mastery level for worksheet accuracy (87%) but just under mastery for schedule completion (88%). In an effort to improve Kyle's performance levels, the researcher ran one training session in the general education setting where his performance increased to 100% for worksheet

accuracy and 96% for schedule completion. The remaining three sessions were generalization posttests where Kyle performed at 100% for all worksheet accuracy and schedule component variables.

When the researcher asked Frank to complete a series of worksheets in the absence of a schedule during baseline sessions, Frank's performance maintained at 0% for worksheet accuracy for 4 consecutive sessions. On session five his worksheet accuracy increased to 33% but still remained at low levels and then returned to 0% on session six. The researcher deemed Frank's levels to be low and stable, so she introduced the activity schedule probe condition. His initial levels were in the moderate range with both worksheet accuracy and schedule completion at 60%. Over the next two probe sessions Frank showed varied levels for performance in worksheet accuracy dropping to low levels at 33% then jumping to high levels at 93%. His schedule completion, however, did steadily increase to 66%. The researcher continued running activity schedule probe sessions until Frank demonstrated low, stable levels of responding. At session 14 Frank demonstrated 0% worksheet accuracy and 10% schedule completion. In the generalization probe condition, his worksheet accuracy maintained at low levels with 20% but increased to moderate levels (53%) for the next session under the training condition. His schedule completion performance under that same training session was around 64%. Frank's levels of performance continued to steadily increase from moderate to high levels from session 17 to session 24, with the exception of session 18 where both worksheet accuracy (33%) and schedule completion (42%) dropped to low levels. His worksheet accuracy increased from 80% to 100% while schedule completion increased

from 86% to 96%. Frank's performance remained at high levels until he met mastery criteria, with worksheet accuracy at 100% for session 24 and 93% for sessions 25 and 26. His schedule completion also met mastery with session 24 at 96%, session 25 at 92%, and session 26 at 94%.

After Frank met mastery in the initial training phase, the researcher implemented the reversal probe in session 27 where Frank retuned to low levels with 33% with worksheet accuracy. Also, in session 27 both Kyle and Chelsey preformed at high levels for worksheet accuracy and schedule completion (around 100%) under the training condition. After this, the researcher reintroduced the training phase where Frank initially returned to mastery performance levels for both worksheet accuracy and schedule completion for one session. Although Frank's performance remained at high levels, his responding was varied from sessions 28 to 32 with worksheet accuracy ranging from 60% to 93% and schedule completion ranging from 84% to 96%. Training continued until Frank demonstrated stable responding for sessions 33 to 35. Once mastery was met, Frank was tested once in the general education environment where he performed at mastery level for worksheet accuracy (100%) and schedule completion (100%).

When the researcher asked Chelsey to complete a series of worksheets in the absence of a schedule during baseline sessions, Chelsey's performance maintained at 0% for worksheet accuracy for 9 consecutive sessions. The researcher deemed Chelsey's levels to be low and stable, so she introduced the activity schedule probe condition. Her worksheet accuracy level was still at 0% while his schedule completion level was at 6% for the activity schedule probe session. In the generalization probe condition, Chelsey's

worksheet accuracy maintained at 0%, but increased to moderate levels (67%) for the next session under the training condition. Her schedule completion performance under that same training session was around 52%. Chelsey's levels of performance continued to steadily increase from moderate to high levels from session 13 to session 21. Her worksheet accuracy increased from 87% to 100% while schedule completion increased from 72% to 94%. Chelsey's performance remained at high levels until she met mastery criteria, with worksheet accuracy at 100% for sessions 22 and 23 and 93% for session 24. Her schedule completion also met mastery with session 22 at 92%, session 23 at 90%, and session 24 at 90%.

After Chelsey met mastery in the initial training phase, the researcher implemented the reversal probe in session 25 where Chelsey retuned to 0% with worksheet accuracy Also, in session 25 both Kyle and Frank preformed at high levels for worksheet accuracy and schedule completion (around 100%) under the training condition. After this, the researcher reintroduced the training phase where Chelsey returned to mastery performance levels for both worksheet accuracy and schedule completion for three consecutive sessions. Once mastery was met, Chelsey was tested in the general education environment once where she performed at mastery level for worksheet accuracy (100%) and schedule completion (94%).

CHAPTER V

DISCUSSION

Summary

Given the results, this study demonstrated that activity schedules increased the percentage of a series of three academic worksheets completed accurately by all participants in the self-contained and general education settings. All participants met mastery criteria under the training condition and this behavior generalized to a general first grade classroom with typically developing peers. Based on these preliminary results, it appears that activity schedules may be an effective tool for other forms of independent academic task completion in future studies.

Frank's increased performance levels under the activity schedule probe condition may be due to his learning history with activity schedules coupled with his higher cognitive abilities. One of the criteria to participate in this study was participants needed to be independent at completing basic tasks with activity schedules, which Frank met. The presentation of the schedule alone may have increased his responding because it served as a discriminative stimulus, or it provided an environmental cue to complete the worksheets. Frank may have been able to generalize schedule completing behaviors where the other two participants did not because Frank consistently demonstrated higher cognitive abilities. His VB-MAPP score (Sundberg, 2008) was 10 months higher in verbal language than Kyle and Chelsey and his set of worksheets contained content that was more advanced. For example, Frank counted objects 6-10 while Kyle and Chelsey

matched identical numbers. Frank's higher cognition may have allowed him to generalize his schedule completing behaviors to a novel schedule more successfully than the other participants. Frank's responding, however, did not reach mastery criteria and after several sessions dropped to low levels. This may be because the schedule format was novel, and although Frank was use to using activity schedules for transitions between tasks, he needed additional training on how to follow the schedule for each worksheet. This would explain the variability in his worksheet accuracy and the moderate to low levels of responding for schedule completion. This suggests that although the activity schedule alone had some control over responding, Frank needed additional training with graduated guidance procedures to meet mastery criteria.

During the training condition in session 18, Frank's performance dropped to low levels for both worksheet accuracy and schedule completion. This may be due to Frank's frequent vocal stereotypy and lack of attending to the visual stimuli in his schedule. He was still responsive to physical prompting from behind, but without prompting he would start to flap his schedule back and forth, skip pointing to icons on his schedule, draw lines to the incorrect responses on worksheets, and fail to move on to the next activity in his schedule. In session 19, however, Frank's responding returned to high levels. His vocal stereotypy decreased while his ability to attend to the visual stimuli in his schedule increased. Frank's accurate levels of responding may have dropped and then returned to high levels due to when he was pulled for the sessions. In session 18, the researcher pulled Frank from a small group setting where Frank was engaged in a highly preferred activity (e.g., playdough letters). Although he was initially compliant and came to the

training area, once the researcher gave the instruction Frank engaged in the noncompliant behaviors described above, most likely to avoid the less-preferred task of completing worksheets. In session 19 and the sessions that followed the researcher pulled Frank during activities that were at most moderately preferred, which diminished nonpreferred behaviors and increased correct responding.

After the reversal probe, it took Frank eight sessions to meet mastery criteria while it only took Kyle and Chelsey three sessions to meet criteria. This may be because in the reversal probe, Frank attempted to perform all three worksheets while Kyle and Chelsey made no attempt. Instead of attempting to draw lines to the correct answers, for two of those worksheets Frank simply drew lines to the answers directly next to the problems. When those same worksheets appeared in circulation in the following training phase, Frank's responding began to mirror his responding in the reversal probe session. He may have regressed on these two worksheets because they were harder academically (counting objects 6-10) or simply nonpreferred. Either way, after more training Frank returned to mastery levels and generalized both worksheet accuracy and schedule completion to the general education setting at mastery levels.

The different data trends for both worksheet accuracy and schedule completion for Frank may relate to the disparate level of difficulty in the set of worksheets between participants. Frank's set of nine worksheets were academically more challenging (e.g., pairing upper to lowercase letters) while Kyle and Chelsey, who were given the same set of nine worksheets by the researcher, had a set that were less challenging academically (e.g., matching identical letters). Although all participants demonstrated mastery prior to

the study with the worksheets they were given by the researcher, the differences in academic rigor may account for the different rates in which the participants reached mastery. Since Kyle and Chelsey had the same set of worksheets, this might also account for their similar upward steady trends in responding under the training condition while Frank, who had a more challenging set of nine worksheets, had a more variable upward trend.

In the initial training phase, Kyle's performance in both worksheet accuracy and schedule completion increased at a stable trend to high levels. The schedule completion data, however, were usually just below the worksheet accuracy data. This occurred because Kyle would often attempt to skip problems on a given worksheet, and the implementer would physically prompt Kyle to touch the icon on his schedule representing that task. Once he did point to that icon he would complete that task independently. This indicates that the activity schedules were not only useful in assisting participants in transitioning between worksheets, but also between problems within worksheets.

In the generalization posttest, Kyle performed at mastery for worksheet accuracy but just under mastery for schedule completion. This was most likely because Kyle was in a new setting with his typically developing peers. This novel setting could have made it slightly more difficult for Kyle to attend to his visual schedule, causing him to miss pointing to icons and skip several worksheet problems. After this, the researcher implemented one training session with graduated guidance procedures in the generalized setting, which improved Kyle's performance and he returned to mastery levels under the

posttest condition. This suggests that even if an individual struggles initially in the generalized setting, his responding can be improved after training in that setting occurs.

The findings from this study suggest that activity schedules can be useful in helping individuals with autism complete a series of academic worksheets without assistance from adults. This may be because activity schedules serve as a visual prompt that help students transition between worksheets and between worksheet problems. This eliminates the need for any reliance from an outside party, especially an adult instructor. Students who demonstrate independence in completing a series of academic tasks in the absence of an adult can lessen the need for staff in a classroom and demonstrate that a set of previously mastered skills can be maintained in the absence of an instructor.

Activity schedules may also have implications for ways to systematically support students with autism in an inclusive setting. The results suggested that activity schedules helped students complete academic worksheets in the general education setting without the presence of an aide or assistant. This means that students with autism could become more independent in general education settings and furthers those students' ability to become successfully acclimated into society without the need of additional services.

Limitations and Future Research

One limitation of this study was the age and classification of the participants was narrow. Only young children ages 6 and 7 years old participated and all had an autism classification. More research may need to be done with older populations and with different classifications (e.g., intellectual disability) to see if activity schedules will assist

more populations in independent academic task completion.

Another limitation to consider is the types of academic tasks the participants are completing. Participants completed the same series of nine worksheets without additional tasks being introduced to the study. More research will need to be done to investigate how students respond to the same procedures with different academic tasks.

The participants' mastery of activity schedule procedures prior to this study is another existing limitation. In this study, all participants demonstrated his or her ability to generalize an already acquired skill (e.g., activity schedules) to a new set of activities (e.g., worksheets). Future researchers should consider including participants who do not have prior experience with activity schedules to see if they could be taught schedule components as well as task completion.

One limitation to consider is the lack of an activity schedule under the generalization probe condition. Future researchers will need to include a schedule under this condition so they can perfectly mirror conditions under the generalization posttest. This will help researchers determine whether participants can improve in the generalized setting because of the schedule alone, or if additional graduate guidance procedures will be necessary.

One last limitation is the type of activity schedule used may contain too many steps for some participants. Further research comparing activity schedules used just for transitions between tasks and schedules for transitions between tasks and within tasks may provide greater insights into what schedule is the most effective for certain populations of students.

Activity schedules are effective tools to help young children with autism function independently. This study adds to existing research on how activity schedules increase independence skills, while also providing newer evidence for independence in academic task completion and success in inclusive settings. Based on the findings of this study, those with autism have a reliable, systematic way to gain independence in school settings.

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