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Using Video Promoting on an Ipod Touch to Teach Multiple-Step Recipes to Transition-Age Students With Moderate to Severe Cognitive Disabilities

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USING VIDEO PROMPTING ON AN IPOD TOUCH TO TEACH MULTIPLE-STEP RECIPES TO TRANSITION-AGE STUDENTS WITH MODERATE TO SEVERE COGNITIVE DISABILITIES

by

Kjerstin Mourra

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ABSTRACT

Using Video Prompting on an iPod Touch to Teach Multiple-Step Recipes to Transition-Age Student with Moderate to Severe Cognitive Disabilities

by

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Individuals with moderate to severe cognitive disabilities often experience difficulty in acquiring daily living skills without prompting from others. This project examined the effects of video prompting on an iPod Touch to teach multiple-step recipes to individuals with moderate to severe cognitive disabilities. Participants included four transition-age students with moderate to severe cognitive disabilities who frequently require prompting from others when completing multiple-step tasks. Target behaviors included recipe-following and reorientation to the video prompt after steps completed. Procedures included a baseline phase when the participant was presented with a direction to make a food item which had a printed recipe on the package. When the baseline probes demonstrated low but stable levels of responding, the researcher presented the participant with an iPod that illustrated each step of the task in motion video (i.e., video prompting). After imitation of the model, the researcher directed each individual

participant, “Now you try.” Once the participant reached mastery with a recipe using the iPod Touch, the participant was asked to follow the recipe again in probe conditions with no iPod Touch (i.e., probe sessions) and in weekly probes to check for maintenance of skills. After maintenance in the classroom kitchen had been demonstrated by the participant, the researcher conducted a probe for each of the recipes in the participant’s home kitchen. The intervention increased independent recipe-following behaviors for all participants across all recipes presented. Two participants were held in baseline for one recipe and the data remained low and stable without intervention. The recipe-following behaviors were maintained for participants during weekly probes and the generalization probes in their homes showed mastery or near mastery levels for all participants. These data add to the body of research showing that video prompting is an effective method in teaching daily living skills to individuals who are prompt dependent in completing multiple step tasks. Findings also add to the research that video prompting is an effective method in teaching generalization of skills to new environments.

(59 pages)

PUBLIC ABSTRACT

Using Video Prompting on an iPod Touch to Teach Multiple-Step Recipes to Transition-Age Student with Moderate to Severe Cognitive Disabilities

by

Kjerstin Mourra

This study investigated effects of video prompting using an iPod Touch to teach recipe-following to four 16-19 year-old youth with intellectual disability and autism in a transition classroom. Target behaviors involved correctly following three multi-step recipes: microwave dinner, brownies, and gelatin. A multiple-probe design across recipes was replicated across participants. After low levels of responding in baseline probes, researchers presented participants with an iPod Touch showing each step of the task using video and with audio narration. Following the video prompting phase, maintenance and home-based generalization probes were conducted. The intervention increased recipe-following performance for all participants. Performance maintained and generalized to youths' home kitchens. Results are discussed in regards to using video demonstrations in a sequence of prompts.

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INTRODUCTION

Students with severe cognitive disabilities often require specially designed instruction in order to acquire daily living skills (Westling, Fox, & Carter, 2015). Specialized instruction may include the temporary use of prompts (e.g., verbal cues, gestures) from adults to assist students in acquiring skills. Post and Storey (2002) discussed the issue of students with severe disabilities and their reliance on adults for prompts in order to complete tasks with accuracy and independence. Prompt dependence hinders a student's ability to perform daily living skills independently.

For transition-age (16-22 years) students, limited independence in daily living skills can be detrimental to their self-determination and restrict living environment options as adults (Cannella, O'Reilly, & Lancioni, 2005). A recent review of literature determined that video modeling is an effective way to teach independent task completion to students with disabilities (Bellini & Akullian, 2007). Researchers defined video modeling as a method in which the desired behaviors are demonstrated by a video recording. One adaptation or variation of video modeling is video prompting which involves splitting the video model into smaller video segments and having the student watch one step then complete that step before moving on to the next step (Cannella-Malone et al., 2011). Video prompting has been used to teach a variety of skills such as: community-based vocational tasks, cooking skills, meal preparation, laundry folding, table washing, and vacuuming (Cannella-Malone, 2013; Huntington, 2014; Mechling, Ayres, Foster, & Bryant, 2013; Van Laarhoven, Kraus, Karpman, Nizzi, & Valentino, 2010). This study focused on the effects of video prompting on teaching independent recipe-following skills in a food preparation task. Along with measuring the

effectiveness of a video-prompted recipe, I examined the extent to which the skills obtained will be maintained over time and generalized to other settings.

Literature Review

I used the ERIC via EbscoHost, Education Source, PsycINFO and found 406 articles using search terms *video modeling, disabilities, video prompting, independent living skills, and cooking*. Many of the articles related only to children with autism and mostly to teaching skills to young children; these were excluded because they did not relate to teaching transition age students. Further investigation indicated that 28 articles related to teaching independent living skills to people with disabilities and only 14 of those were specifically about teaching cooking skills. I was interested in the effects of video prompting on teaching cooking skills to adolescents representing multiple disability populations; therefore, I selected four articles that related more specifically to either the effectiveness of video prompting over video modeling or teaching cooking skills to high school-age students with disabilities.

Bellini and Akullian, (2007) conducted a meta-analysis of 23 single-subject design studies that examined the effectiveness of video modeling with children who have autism. Another purpose of the study was to determine if video modeling met the criteria of an evidence-based practice as outlined by Horner et al. (2005). The analysis examined intervention, maintenance, and generalization of video modeling on (a) social communication skills, (b) functional skills, and (c) behavioral functioning. The authors used eight criteria to select studies for their analysis, including; (a) participants had an Autism Spectrum Disorder (ASD), (b) study focused on improving behavioral

functioning, social-communication skills, or functional skills, (c) study assessed effects of video modeling, (d) study was single-subject design, (e) study had discrete dependent variables, (f) data presented graphically for each participant, (g) studies from peer-reviewed journals, and (h) studies published in English. Based on these criteria, 23 studies were select. In total, 73 participants, ranging in age from 3-20, were included in these studies; they were from 13 states and four countries (Bellini & Akullian, 2007). The analysis found that video modeling was an evidence-based practice and was effective method for teaching students with ASD.

For the purpose of my study, I reviewed studies that targeted the instruction of functional skills. Three demonstrated the effectiveness of video modeling in teaching self-help skills. First, Norman, Collins, and Schuster (2001) examined video modeling with video prompting to teach three skills (cleaning sunglasses, putting on a wrist watch, and zipping a jacket). Second, Shipley-Benamou, Lutzker, and Taubman, (2002) used video modeling to teach four functional skills (setting a table, pet care, mailing a letter, and making orange juice). Finally, Lasater and Brady, (1995) used video modeling to teach students shaving legs, making a sandwich, and hanging clothes. Each study established that video instruction was a highly effective method for teaching and maintaining self-help skills to students with ASD. Three additional studies (Alcantara, 1994; Haring, Kennedy, Adams, & Pitts-Conway, 1987; Mechling, Pridgen, & Cronin, 2005) focused on the effect of video modeling on teaching purchasing skills. All three studies concluded that the procedure was effective in the acquisition and maintenance of purchasing/grocery shopping skills in community settings (Bellini & Akullian, 2007). Video modeling has been shown to be effective with people with ASD in numerous

studies. I wanted to explore research that included children with other severe cognitive disabilities along with adaptations to video modeling that could produce a greater effect on acquisition of self-help skills.

Cannella-Malone et al. (2011) conducted a comparison study using a multiple probe across participants design along with an alternating treatment design. This study compared the effects of video modeling and video prompting on acquisition of daily living skills (laundry and washing dishes). The seven students in the study ranged in age from 5-20 and all had severe intellectual disabilities with deficits in daily living skills. The video prompt consisted of 18 one-step videos (lasting 2 to 16 s), while the video model was a single video (1 to 2 min) depicting all steps beginning to end (Cannella-Malone et al., 2011). The baseline condition consisted of the student being brought to the laundry room (for laundry) or near the sink (for washing dishes) and told to "Do the laundry" or "Wash the dishes." If the student did not initiate a step in the task for more than 30 s, the session was terminated. The intervention condition introduced either a video model or video prompt for each task with direction from the instructor to "Watch this" and then "Now you do it" during two training sessions of intervention (Cannella-Malone et al., 2011).

Cannella-Malone et al. (2011) demonstrated that video prompting was more effective for all seven students than video modeling. For five of the seven students, video modeling had no effect on their acquisition of laundry skills and washing dishes. Authors mentioned one possible reason for this finding may have been attending to a brief one-step video was more effective for students with severe disabilities who have difficultly attending to multiple-step directions and tasks without prompting. Another factor

affecting the difference may have been the level of disability of the students. Research (Westling et al., 2015) shows that people with more severe disabilities require more time to learn tasks, therefore, researchers recognized students may have been able to acquire the skills with video modeling if the intervention had been extended (Cannella-Malone et al., 2011). The tasks in this study required 18 steps to completion; I wanted to find further research that demonstrated the effectiveness of video prompting on more complex tasks.

Johnson, Blood, Freeman, and Simmons (2013) investigated video prompting on an iPod touch to teach food preparation skills to two 17 year old male students using multiple probe across behaviors design. The purpose was to evaluate the effectiveness of the intervention, but also determine to what extent an iPod could be used independently by students with moderate disabilities. Three preferred food items for each student were chosen. All tasks were determined to have a similar level of difficulty. During baseline probes, both students had low percentage of steps completed independently (10-40%). Once the video prompting was implemented, both students increased independent completion of steps. During the intervention, if the student did not initiate a step within 5 s of watching the prompt, the teacher prompted the student to watch the video a second time. If the student again failed to initiate the step or if the step was completed incorrectly, the teacher provided partial physical assistance to perform the step. By the end of the study, the students used the iPod independently to access the video prompts. One maintenance probe was completed for each of the students with each of the three recipes. All probes showed that the students maintained the same high level of independent skill acquisition as they did in the intervention phase. The study results were

limited because there were only two students and they were both 17 year old male students (Johnson et al., 2013).

Another study used video prompting to teach cooking skills to students with moderate disabilities (Graves, Collins, & Schuster, 2005). In this study, there were three participants (one male, two females) ages 16-20. The participants had IQs ranging from 45-51 and received special education services in a self-contained classroom with IEP goals for functional life skills. During the baseline condition, researchers gave the participants the direction to make the food item without access to video prompts. When baseline was low and stable, intervention was started with one recipe for each participant. The intervention involved introducing a video tape with video prompts shown on a small TV in the kitchen. One maintenance probe was done one week after mastery of a recipe and the video tape was not available during those sessions. The participants all reached criterion on recipes taught and maintained the skill for at least one week in a maintenance probe. One recipe was held in baseline for all participants and the data remained low and stable without intervention. Video prompting was effective in helping all three participants to acquire the skills in an average of 10.3 sessions.

In summary, video modeling has been shown to be an effective method in teaching daily living skills to individuals with disabilities (Bellini, & Akullian, 2007). In further research of students with severe disabilities, researchers found that dividing the video model into video prompts was more effective than a video model containing all steps (Cannella-Malone et al., 2011). When teaching more complex recipe-following skills, video prompting has been shown in one study to be effective using an iPod touch to deliver the video prompts (Johnson et al., 2013). Graves et al. (2005) also

demonstrated the effectiveness of video prompting on teaching cooking skills. In my study, I examined the effects of video prompting on the acquisition of complex recipe-following skills and on the maintenance and generalization of skills to the home environment for each of the students.

Purpose Statement and Research Questions

The purpose of this study is to examine the effects of video prompting to teach independent completion of three multiple-step recipes to individuals with moderate and severe cognitive disabilities. My research questions are as follows: Given four transition-age students (16-19 years)

1. To what extent will video prompting have an effect on independent completion of multiple-step recipes in the classroom using an iPod touch as measured by steps accurately completed?
2. To what extent will acquired skills be maintained by one or two weekly probes in the classroom?
3. To what extent will acquired recipe-following skills across three multiple-step recipes generalize to the individual's home environment?

METHOD

Participants

The study included four participants, three male and one female. The participants attend a suburban high school with the majority of their time spent in a functional life skills special education classroom working on academic, social, self-help, daily living and vocational skills. All participants 18 years old or older have parents as their legal guardians. Parents of all participants express their desire for their child to learn more independent skills in the home including but not limited to cooking basic recipes. All participants have an intellectual disability and IEP goals relating to learning functional life skills, including cooking.

Nathan is an 18 year old male with a medical diagnosis of Down Syndrome. Based on the Comprehensive Test of Non-verbal Intelligence (CTONI), Nathan has an IQ score of 64. Nathan scored 66 on the Vineland Adaptive Behavior Scales. Sally is a 16 year old female with a medical diagnosis of Autism. On the Kaufman Assessment Battery for Children, Sally obtained a score of 62. Sally scored 73 on the Vineland Adaptive Behavior Scales. Neal is a 19 year old male with a medical diagnosis of Autism. Based on the Stanford-Binet Intelligence Scale (SB-IV), Neal obtained an IQ score of 50. On the Vineland Adaptive Behavior Scale, Neal scored 42. Tyler is a 19 year old male with a medical diagnosis of Down Syndrome. He obtained an IQ of 37 as measured by the Wechsler Nonverbal Scale of ability. Tyler obtained a score of 50 on the Vineland Adaptive Behavior Scales.

All participants require adult or peer tutor verbal directions and verbal and/or physical prompting to complete complex daily living tasks such as doing laundry, cooking, shopping, and cleaning. All participants have some experience performing recipe-following skills in the classroom setting; however none of them has experience with performing recipe-following skills via video instruction. Five selection criteria were based on participants' (a) understanding of English in both verbal and written form, (b) demonstration of enough visual acuity to navigate on iPod touch, (c) initiation of simple one step iPod prompt videos with at least 66% accuracy, (d) performance showing no more than 40% mastery of package recipes, and (e) return to recipe upon completion or attempt to complete a step in the recipe on 80% of observed steps in a recipe with minimal verbal or gestural prompting from adults.

Setting

Baseline and the initial intervention phases were completed in the participant's classroom setting. The classroom kitchen is equipped with all basic cooking ingredients, supplies, and appliances. Once mastery criteria were reached for participants, maintenance probes were completed in the classroom kitchen. Depending on how quickly mastery was achieved, one or two weekly maintenance probes were done to show mastery maintained over time. After maintenance showed mastery, participants were observed completing each of the three recipes in their own home kitchen.

Pre-Experimental Observations/Assessments

I conducted a pretest on all students in the life skills class who speak and

understand English to determine eligibility for the study and need for pre-training. The first part of the assessment included three one-step cooking tasks after watching a video prompt. Students were assessed individually, with all three one-step tasks successively presented. In the classroom kitchen, students were given one verbal direction before the first presentation of the video prompt, "Watch the video then do what it says." I presented the students with a one-step video prompt to complete a cooking task (open bread bag, get milk, and then set timer for 1 min). I observed the students watching the video and completing the task and marked a checklist recording student performance of tasks as correct (+) or incorrect (-). Students who correctly complete 2 out of 3 tasks independently continued with the second eligibility assessment.

The second assessment, done with ten students, included one opportunity to follow a complex package recipe. The student was directed to make chocolate chip cookies. I observed the students individually and marked on a checklist of steps, the students' demonstrated ability to follow each step correctly. I also marked on a checklist whether or not the student returned to the recipe when they finished with each step. Students who demonstrated 0-40% mastery of written recipes were eligible for the study. All students who do not meet the eligibility criteria were excluded due to their lack of need or ability to follow a video prompt to complete a complex recipe. The second pre-assessment narrowed the study to four participants who met all criteria.

Following the pre-assessment, I filled out a checklist of skills about the participant to determine if the participant needed any pre-training. I also went to each participant's home to conduct an ecological assessment of the kitchen facility. In the latter assessment, I performed a brief assessment of items and placement of items in the

home kitchen to determine if any changes were needed for the creation of the video prompts in the classroom to facilitate recipe-following.

Dependent Variable

Recipe-following skills were defined as the participant performing the steps of the recipe sequentially and independently. Recipes to be used in the study were microwave frozen dinner, brownies, and gelatin. Recipes were selected based on student interest and availability of the ingredients and appliances needed. I completed each recipe and listed the steps to determine the difficulty of the recipes. Gelatin and frozen dinner were chosen because they were similar in difficulty level and skills needed to complete the recipe. A brownies recipe was chosen because it is slightly more difficult and required more ingredients. Each step in the recipe was used to create a separate video prompt and I recorded steps individually.

Response Measurement

Task Analysis

Recipes were descriptively task analyzed into sequential steps as shown in Table 1 (See Appendix A). Another teacher and I conducted the cooking steps to determine the adequacy of the task analyses and make adjustments accordingly. After this analysis, steps were listed on a checklist for recording purposes of the experiment.

Percent Correct

Based on the task analysis of each recipe, the participants' acquisition was measured by percent of independent correct responses. Recipe-following was scored on

an observer checklist as correct (+) or incorrect (-). Correct was scored if participant watched the video prompt then completed the step accurately and independently. Incorrect was scored if participant did not watch video or did not complete the step accurately and independently. Incorrect was also recorded if the participant did not complete the task within the maximum time limit listed on the data sheet. The maximum time was double the amount of time it takes a same-age peer without disabilities to complete the task. Double time was chosen because I timed myself doing simple tasks then timed two of the participants doing the same tasks. Participants required an average of two times the amount of time it took me to do the task. The additional time was provided because of the primary data collector who conducted all sessions. Data were collected by one of the life skills special education teachers serving as the interobserver agreement and treatment fidelity data collector.

Interobserver Agreement

There were two data collectors for the study, myself and another special education teacher. The second data collector recorded interobserver agreement data. Interobserver agreement (IOA) was collected on recipe-following skills for 64% of the sessions across all phases of the study. A trial-by-trial method was used to calculate IOA (Cooper, Heron, & Heward, 2007). Agreement in IOA was recorded if the same recording of a response was recorded by both data collectors. Trial-by-trial IOA was found by dividing total number of agreements on correct and incorrect responses by the total number of trials and then multiplying by 100. The trial by trial IOA was 97% agreement.

Treatment Integrity

Treatment integrity (TI) was collected on my conducting of the intervention by a second special education teacher. The second data collector recorded TI data. Target behaviors of the teacher observed included: (a) following a script when delivering initial instruction, (b) waiting the specified time limit before prompting (c) preparation of materials, and (d) use of verbal prompts to watch video at the correct time. TI was calculated by dividing the number of observed teacher behaviors by the total number of opportunities to respond, and then multiplied by 100 (Cooper et al., 2007). TI was calculated to be 96% and was collected on 25% of sessions for the intervention, maintenance, and generalization phases. All discrepancies in TI were due to slight differences in timing.

Experiment Design

This study used a multiple probe design (Cooper et al., 2007) across recipes for each of four individual participants. The design allowed for demonstration of low baseline performance without excessive exposure to difficult recipes. In the case of two recipes, baseline probes continued throughout the experiment to test for low rates of responding.

Procedures

Baseline

During baseline, participants were presented with a direction to prepare the food item (brownies, gelatin, or frozen dinner). Since the recipes contained skills that the

participants have done independently on other recipes, the researcher watched for the ability to follow a recipe rather than complete the steps of a recipe individually. Once the direction was given to make the food item, the researcher waited the specified time limit for each of the steps before marking the data as incorrect. See Appendix B for examples of data collection. Due to the successive nature of recipe-following, once the participant was scored three items as incorrect, the session was terminated to eliminate excessive participant frustration. When participants demonstrated low, stable responding during the baseline probes, they were introduced to the intervention phase of the study, one recipe at a time.

Video Prompts

This section describes the development and implementation of the independent variable.

Development of the video prompts. The descriptive task analyses for each recipe was recorded step-by-step using the Video Scheduler application on a classroom iPod touch. Example photos of the application are in Appendix D. Each recipe was contained in one folder in the application. Videos were recorded by one of the students' special education teachers and the subject of the video was myself. Each recorded prompt was 30 seconds or less. Distance and perspective of the video was determined task by task for each recipe (e.g. tasks that involve fine-motor skills such as measuring or stirring were viewed closer than tasks that involve more movement in the kitchen such as getting milk from fridge). In the video I read the recipe on the package and stated the task as I completed it in the video. I also described important quality specifications as I completed them in the video (i.e. I am stirring until the powder is gone). Video prompts

were developed in the classroom where the training and practice took place. The items and ingredients in the model were in the same location and were the same brand as the items the student used when the video prompt intervention was introduced. For each participant, the recipe with the most stable baseline was used to begin intervention.

Implementation of the video prompts. The video prompt was introduced during the participants' typical cooking instruction time. When the participant entered the kitchen, I instructed the participant to make the food item. I then showed them the iPod and said, "The recipe is on the iPod, watch me." I stood within 2 ft of the participant and set the iPod on the table so that it was clearly visible to the participant. The iPod was already open to the Video Scheduler application. With one finger I touched the desired recipe to open the folder containing the video prompts for the recipe. I then touched the top video prompt so that it began to play. When the video prompt finished I imitated the task from the prompt. Then I exited out of the recipe to the main menu of the application and instructed the participant, "Now you try." I then stepped away from the counter and sat at a table nearby to collect data. Mastery criteria for this phase was above 80% of steps completed independently and within the time limit. Participants needed to reach mastery criteria for three consecutive steps before moving on to the no video phase. Participants were allowed to eat the completed recipe if they desired non-contingent on performance level.

Least to most prompting during intervention. After the initial instruction to complete the task, a least-to-most prompt procedure was used when a participant did not complete a step correctly or if they did not complete the step in the specified time. Initially, when I could see that a participant was making an error or past the specified

time, I would point to the video. After 5 s, if they had not started the video I stated, "Watch step 1" (replacing 1 with whatever step they needed to repeat). If the participant missed the same step two or more times in a row due to taking too long, I would say, "Do it as fast as the video." No physical prompts were used in this study. All prompts delivered were to redirect the participant to watch the video prompts on the iPod.

No Video In The Classroom

Once the participant reached mastery criteria for three consecutive sessions, the iPod was removed from the counter. When the participant entered the room, he/she was given the direction to cook the food item. If he/she asked for the video I would tell them, "Do it without the video this time." If he/she maintained mastery levels for three consecutive sessions in the no video phase then he/she moved into the once weekly maintenance probe phase. If the participant was not able to maintain mastery in this phase then he/she was placed in a video chunking phase.

Video Chunking

If the participant reached mastery with video prompts but was not able to maintain mastery levels in the no video phase, he/she was introduced to the video prompts put together into fewer, shorter videos. The steps were put together, three steps in one video chunk. The participant remained in this phase until he/she reached mastery for three consecutive sessions. Then he/she returned to the no video phase.

Maintenance In The Classroom

Once the participant reached mastery criteria for the recipe without the video (above 80% independently correct during three consecutive data sessions), the participant

was asked to make the food item again at least 1 week and as much as 3 weeks after mastery criterion was met. The video prompt was not available during maintenance. More maintenance sessions were collected for participants who acquire the skills more quickly. If participant maintains mastery criteria during maintenance probes, the participant will be moved to the generalization phase. If participant does not demonstrate mastery during one of the weekly probes, the video chunking phase was introduced and the participant needed to complete the recipe at least three times consecutively at mastery in order to move back to the maintenance phase.

Generalization To Home Kitchen

One probe with each of the three recipes was carried out in the home kitchen of each participant. Video prompts were not available unless the participant was unsuccessful in completing the recipe. If the participant did not follow the recipe with at least 50% of steps completed correctly, video prompts were introduced. Due to differences between home and classroom kitchens, the first author provided each participant with brief direction about location of items needed for the recipes. For brownies, the first author showed each participant how to set the temperature on the oven for preheating, because all participants' kitchens had different ovens than the one used in the classroom. No further assistance was provided. Parents and family members were asked to leave the kitchen to avoid prompts or distractions. Otherwise, procedures were identical to no video and maintenance probes.

Social Validity

Upon completion of the generalization phase of the study, the researcher had

participants and parents complete a brief survey about the video prompts and the use of the iPod touch. Questions to participants included: (a) How well did you like using the iPod to learn the recipe? (b) How helpful were the video prompts when you were learning to cook the recipe? (c) Would you use the iPod again to learn to cook something new? All three items were rated by the participant on a 3-point scale. The results of this survey are in Figure 5 and a copy of the questionnaire given to participants is in the appendix. Questions to parents included: (a) To what extent does your child make sandwiches, snacks or other foods requiring more than one ingredient? (b) To what extent does your child find one-item snacks in the kitchen? (c) To what extent does your child help you make snacks or meals in your kitchen? (d) To what extent is your child familiar with location and use of cooking appliances, utensils and supplies in your kitchen? (e) How effective was video prompting on an iPod in teaching cooking to your child? (f) How likely are you to continue to have your child cook the recipes learned at home? All parent survey items were rated on a five-point scale.

RESULTS

As shown in Figures 1, 2, 3, and 4, all participants increased independence in recipe-following skills as a result of the video prompting. All figures are located in Appendix A. Nathan and Sally acquired and maintained mastery level performance across all three recipes. Neal and Tyler acquired and maintained mastery level performance in the two recipes with a third recipe held in baseline throughout the study. All four participants had mastery or near mastery performance in the generalization phase in their home kitchen.

Figure 1 displayed the graphic data for Nathan. When introduced to the video prompting for gelatin, Nathan's performance went from 0% baseline probes to 92% of steps completed independently in his second session with video prompting. Since that session, his performance maintained mastery levels for two more sessions with the video prompting and three probe sessions. Three once weekly maintenance probes in the classroom also showed mastery level performance for Nathan in the gelatin recipe. Once Nathan's performance reached mastery in gelatin, he was introduced to the video prompting for brownies. Brownies were selected for his second recipe due to more stable baseline. By the fourth session in video prompting, Nathan's performance reached mastery levels (94%) with brownies. After two more sessions above mastery with video prompting and probe three sessions, he was moved to maintenance for brownies. In two once weekly maintenance probes, Nathan again demonstrated mastery level performance in recipe-following skills for brownies. Another baseline probe demonstrated stable baseline for his third recipe, frozen dinner, and so after reaching mastery in brownies, video prompting was started for frozen dinner. From low baseline probe levels (0-15%),

Nathan's performance immediately reached mastery (85%) when video prompting was introduced. He maintained mastery levels for three video prompting phases, three probe sessions, and for one maintenance probe 1 week later. At the end of the study, a generalization probe was conducted in Nathan's home kitchen for all three recipes and his performance maintained mastery level for gelatin (85%) and frozen dinner (85%), and near mastery level (78%) for brownies. Performance at home was low because of congested placement in kitchen.

Figure 2 represents the graphic data for Sally's performance. Sally was introduced to video prompts with making a frozen dinner after three baseline probes at 0%. By the third session of video prompting, Sally's performance reached 85%. Her performance then dropped to 77 percent for one session then went back up to mastery levels for three consecutive sessions. She performed at mastery for three more probe sessions and was moved to maintenance. Across three sessions of once weekly maintenance probes, Sally performed at mastery levels. Once mastery was reached in frozen dinner, Sally was introduced to video prompts for making gelatin due to more stable baseline levels (0%). Sally's performance reached mastery levels in the first session with video prompting and maintained mastery across the intervention phase, the probe sessions and two once weekly maintenance probes in the classroom. Once mastery was reach in making a gelatin, Sally began video prompting after a low (0%-11%) and stable baseline was reached in brownies. Her performance reached mastery level (83%) in making brownies by the fifth session of video prompting. She performed at mastery level for three consecutive sessions of intervention and three probe sessions. Sally performed at mastery level for one maintenance probe conducted 1 week after mastery

was reached with no video. In her home kitchen, Sally performed at mastery levels for all three recipes (frozen dinner 85%, brownies 89%, and gelatin 100%).

Neal's data were represented in Figure 3. For brownies, Neal's first three baseline probes showed performance at 0%. Neal's performance reached mastery (94%) in his seventh session of video prompting. He performed at mastery levels for three consecutive sessions in video prompting and three probes. Across three once weekly probes, Neal performed at mastery levels in the classroom kitchen. Once mastery was reached for brownies, Neal started video prompting for making a frozen dinner. During the second session, Neal performed at mastery criteria at 100%. His performance then dropped to 77% for one probe session then went back up to mastery for three consecutive sessions. He maintained mastery levels during probes and for two once weekly maintenance probes in the classroom. Neal's third recipe was held in baseline and remained low and stable (0%) across all probes. In his home kitchen, a generalization probe was conducted for the two recipes he learned with intervention. Neal made a frozen dinner with 100% of steps completed independently and brownies with 83% of steps completed independently.

Tyler's data are presented in Figure 4. After a zero level baseline, he started video prompts with gelatin and reached mastery level by the third session. His performance reached mastery for three consecutive sessions, but due to the excessive time Tyler required on measuring water (210 s) and adding the mix to the water (185 s), one additional session with intervention was conducted the following day and he fell below mastery. Following this session, Tyler was prompted by the first author to perform as fast as the video and he again reached mastery for three consecutive sessions. Unlike

the other participants, Tyler watched each step on the video very closely even after mastery was reached. The other participants paid very little attention to the videos once they mastered a step. Following mastery on preparing gelatin, one no video probe was conducted and Tyler's independent performance decreased to 46%. During this probe, he requested the iPod from the first author, who directed him to "try to do it without the video." Following this session, researchers recorded three to four steps into one video. When video chunking was introduced, Tyler performed to mastery levels for two sessions, then dropped below mastery for one session. Subsequently, his performance increased and maintained mastery level for three consecutive sessions. Thereafter, in three no video probe sessions, he performed at or near mastery levels. Again, due to excessive time spent on two of the steps, he was re-introduced to video chunking. His performance reached mastery in the second chunking phase and was then probed again without the video. Tyler demonstrated mastery level for one session, then dropped one step below mastery during the second session in that phase. His time increased with repeated sessions. Two maintenance probes in the classroom showed mastery levels. Once mastery was reached in the probe, Tyler started video prompting for heating a frozen dinner. He acquired mastery level (92%) by the sixth session and maintained mastery across three no video probe and one maintenance probe session. Tyler's performance was held in baseline for brownies throughout and maintained a low stable level of responding. At home, a generalization probe was conducted for heating a frozen dinner and preparing gelatin. In the gelatin probe, Tyler completed 15% of steps independently and correctly. After that session, the video prompts were given to Tyler to use in his home kitchen and he completed 92% of steps independently and correctly.

Tyler was then asked to heat a frozen dinner with video prompts unavailable. He made the frozen dinner with 92% of steps completed independently and correctly within the time limit. Like the previous data for the gelatin recipe, Tyler completed the recipe at mastery levels when the video prompts were available but did not need the video prompts when heating the frozen dinner.

As seen in Figures 1, 2, 3, and 4, all participants had low stable baseline probes and the video prompting intervention immediately increased recipe-following to high response rates for all participants across all recipes. Nathan, Sally and Neal demonstrated that they did not require the video prompt once they reached mastery criteria with the video prompts. Tyler performed the task within the time limit when the video was available but did not maintain a fast pace when the video was removed. Video chunking helped Tyler to maintain skills at a faster pace when the video was later removed.

SLP Data

Table 2 presents data on prompts required by participants in intervention sessions. Tyler's video chunking prompts are not shown in Table 2. For Nathan, Sally, and Neal, fewer video, gestural, and verbal prompts were required over successive video prompting sessions. For Tyler, video prompts were required in all sessions.

Social Validity Survey Responses

Results of this survey are in Figure 6 and a copy of the questionnaire given to parents is in Appendix C. Three of four participants indicated they liked using the iPod to learn recipes. When Neal was questioned, it was unclear whether he disliked using the

iPod or recipe-following in general. All participants indicated video prompts were helpful in learning to cook recipes. Three of four participants indicated that they would use the iPod again to cook new recipes. Two parents indicated their child made sandwiches, snacks, or other foods in the kitchen at least 2-3 times per week. One parent (Neal's) indicated "occasionally" and one parent (Tyler's) indicated "never." All parents indicated that their child found snacks and other items in the kitchen daily or 4-5 times per week. One parent responded indicating her child helped make snacks or meals in the kitchen daily, while the other three parents indicated "never" or "occasionally." When asked whether their child was familiar with the location of cooking items and supplies, all parents indicated "somewhat." Three of four parents indicated video prompts were effective in teaching cooking to their child, while one indicated "somewhat to very effective." Finally, three of four parents indicated they were very likely to have their child continue to make the recipe they had learned in the kitchen. The fourth parent (Neal's) indicated he was unlikely/somewhat likely to do so.

DISCUSSION

Findings of this study showed that all participants acquired independent recipe-following skills with video prompts. One participant required a supplemental procedure (video chunking) before performing steps for one recipe in a no probe phase. Performance of all participants generally maintained over time. Home-based generalization data showed high levels of performance for three of four participants. The same participant who required the video chunking procedure also required video prompts to make one of two recipes in the home kitchen.

Consistent with previous research (Cannella-Malone, 2013; Graves et al., 2005; Huntington, 2014; Mechling et al., 2005; Mechling et al., 2013; Smith et al., 2015), findings point to the effectiveness of video prompts as a temporary and less intrusive procedure for increasing performance. Unlike video modeling in which all steps are shown at once, the efficacy of video prompts seemed related to separation of steps into discrete tasks. Learners may benefit from presentation of distinct and isolated task steps using video, which essentially "chain" the steps together to produce complex, multi-step operations. For all participants except Tyler, video prompts of each task step served a temporary purpose. Tyler seemed reliant on the video prompt, but he performed tasks independently when the video chunking procedure was used.

Similar to the findings of Graves et al. (2005) and others, video prompting appears to be an effective tool to assist in teaching daily living skills to students with intellectual disability. This study demonstrated the effectiveness of the intervention across students of a wide range of functioning levels. Conceivably, video prompts can be

used for a broad range of simple to complex tasks taught to learners with wide ranging ages and characteristics.

In addition to efficacy, video prompts appear to be a least intrusive method that is relatively easy to eliminate after temporary use (Smith et al., 2015). Importantly, the source of the prompt was a technology device, not the instructor. Dependence on technologically based prompts may be considered more socially acceptable to consumers than reliance on others. Reliance on a video model may be judged more acceptable in relation to reliance on live models or instructor-led prompts, although research is needed.

Given initial acquisition of recipe-following, the video chunking procedure increased Tyler's preparation of gelatin across three sessions. From a practical standpoint, video of three to four consecutive steps was easily recorded and appeared to be an adequate controlling prompt for Tyler to complete the combined tasks. Tyler responded to video chunking as a temporary method for fading prompts, as explained by Sigafoos et al. (2007). However, with video chunking, Tyler also performed steps in less time than he had performed individual steps with video prompts. Therefore, the chunking procedure served not only as a method for fading video prompts but also as a way of decreasing time to perform each step. However, as noted by Sigafoos et al. (2007), it is unclear whether acquisition of recipe-following would have occurred more rapidly with a single video model, or larger chunks of multiple steps, without resorting to individual-step video prompts. Future research should consider the efficiency of learning multi-step tasks using individual step prompts compared to video chunking, or grouping of steps on those occasions when performance fails to meet time criteria.

This study assessed generalization to the participants' home kitchens. With minimal orientation by the first author, participants followed recipes. In some cases, participants had little experience in their home kitchen. These findings call for replication in future research in which generalization conditions, like this study, involve significant alteration of the study environment.

There were notable limitations in this study. Related to the generalization probe, the first author was present in the home kitchen and all experimental conditions, and therefore may have served as the discriminative stimulus for participant performance. She also served as the model on iPod steps. Future research should consider systematically varying the presence of multiple instructors across conditions to investigate patterns of responding. Second, the data collectors were aware of the purposes of research and expectations regarding participant performance in each experimental phase. There were no opportunities to train and use experimentally "blind" observers, which should be considered in future research.

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APPENDICES

Appendix A

Tables and Figures

Table 1

Steps for Recipes Used in Video Prompting Intervention

Brownies		Frozen Dinner		Gelatin	
Step	Time (s)	Step	Time (s)	Step	Time (s)
Get brownie mix	20	Get macaroni	14	Get gelatin	22
Get liquid measuring cup	20	Open package	18	Get liquid measuring cup	16
Get oil	26	Cut top with knife	28	Measure 1 cup of water	30
Get eggs	30	Microwave for 2 min	30	Microwave water 1 min, 30 s	44
Preheat oven to 350 degrees	22	Take out of microwave	60	Add mix to water	48
Get pan	14	Pull back cover	28	Stir until powder gone	130
Grease pan	26	Stir with spoon	96	Get pan	18
Get medium bowl	34	Replace cover	24	Pour into pan	28
Add brownie mix	48	Microwave for 2 min	46	Measure 1 cup of water	30
Add water	24	Set timer for 2 min (cool)	20	Add water to pan	18
Add oil	66	Remove from microwave	44	Stir	12
Add eggs	64	Throw away cover/box	20	Put pan in fridge	30
Stir	100	Stir with spoon	30	Put supplies away	20
Pour into pan	78	TOTAL TIME	458	TOTAL TIME	446
Put pan in oven	30				
Set timer for 24 min	36				
Take out pan	42				
Turn off oven	16				
TOTAL TIME	696				

Table 2

Prompts Required by Participants in Video Prompt Sessions: Number and Percentage of Steps

Nathan: Gelatin						
Session	Video		Gesture		Verbal	
4	13	100%	6	46%	1	8%
5	13	100%	1	8%	0	0%
6	5	38%	0	0%	0	0%
7	0	0%	0	0%	0	0%
Nathan: Brownies						
Session	Video		Gesture		Verbal	
8	18	100%	6	33%	0	0%
9	16	89%	5	28%	0	0%
10	10	56%	4	22%	0	0%
11	1	6%	1	6%	0	0%
12	1	6%	1	6%	0	0%
13	3	17%	3	17%	0	0%
Nathan: Microwave dinner						
Session	Video		Gesture		Verbal	
15	13	100%	2	15%	0	0%
16	6	46%	2	15%	0	0%
17	1	8%	1	8%	0	0%

Sally: Microwave dinner						
Session	Video		Gesture		Verbal	
4	13	100%	6	46%	3	23%
5	13	100%	4	31%	1	8%
6	13	100%	2	15%	0	0%
7	10	77%	3	23%	0	0%
8	8	62%	2	15%	0	0%
9	0	0%	0	0%	0	0%
10	0	0%	0	0%	0	0%
Sally: Gelatin						
Session	Video		Gesture		Verbal	
12	13	100%	2	15%	0	0%
13	9	69%	0	0%	0	0%
14	2	15%	2	15%	0	0%
Sally: Brownies						
Session	Video		Gesture		Verbal	
17	18	100%	7	39%	0	0%
18	18	100%	5	28%	0	0%
19	15	83%	4	22%	0	0%
20	13	72%	4	22%	0	0%
21	7	39%	3	17%	0	0%

22	0	0%	3	17%	0	0%
23	0	0%	2	11%	0	0%

Neal: Brownies

Session	Video		Gesture		Verbal	
4	18	100%	6	33%	3	17%
5	18	100%	7	39%	0	0%
6	18	100%	4	22%	0	0%
7	18	100%	6	33%	0	0%
8	16	89%	7	39%	0	0%
9	14	78%	4	22%	0	0%
10	4	22%	1	6%	0	0%
11	6	22%	3	17%	0	0%
12	3	17%	3	17%	0	0%

Neal: Microwave dinner

Session	Video		Gesture		Verbal	
13	13	100%	5	38%	0	0%
14	6	46%	0	0%	0	0%
15	6	46%	3	23%	0	0%
16	1	8%	1	8%	0	0%
17	0	0%	0	0%	0	0%
18	0	0%	0	0%	0	0%

Tyler*: Gelatin

Session	Video		Gesture		Verbal	
4	13	100%	8	62%	5	38%
5	13	100%	3	23%	1	8%
6	13	100%	1	8%	0	0%
7	13	100%	2	15%	0	0%
8	13	100%	2	15%	0	0%
9	13	100%	3	23%	0	0%
10	13	100%	2	15%	0	0%
11	13	100%	1	8%	0	0%
12	13	100%	1	8%	0	0%

Tyler*: Microwave dinner

Session	Video		Gesture		Verbal	
21	13	100%	10	77%	0	0%
22	13	100%	5	38%	0	0%
23	13	100%	6	46%	0	0%
24	13	100%	3	23%	0	0%
25	13	100%	3	23%	0	0%
26	13	100%	1	8%	0	0%
27	13	100%	0	0%	0	0%
28	13	100%	1	8%	0	0%

*video chunking phase prompts not shown

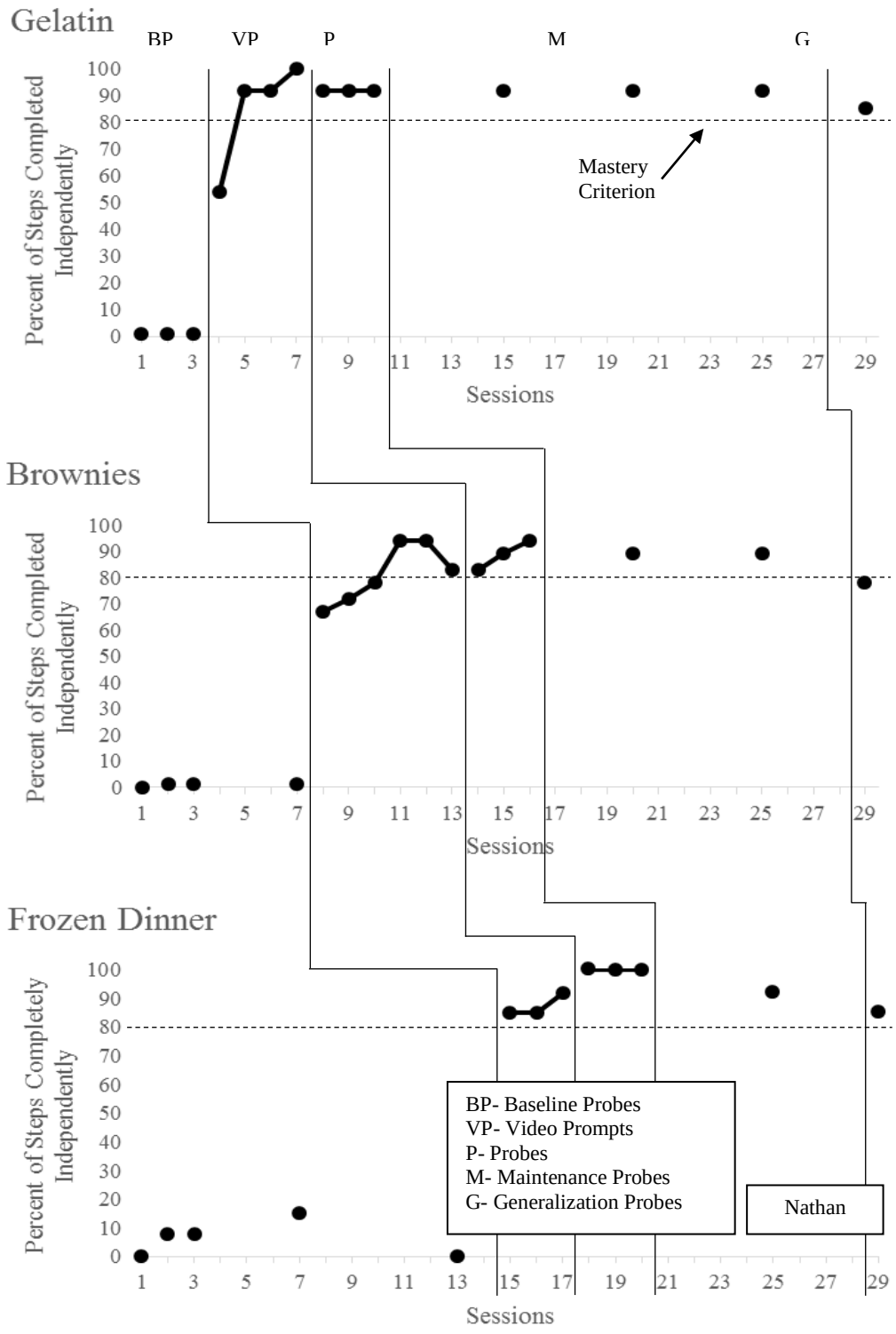


Figure 1. Percentage of independent, correct responses on three recipes for Nathan.

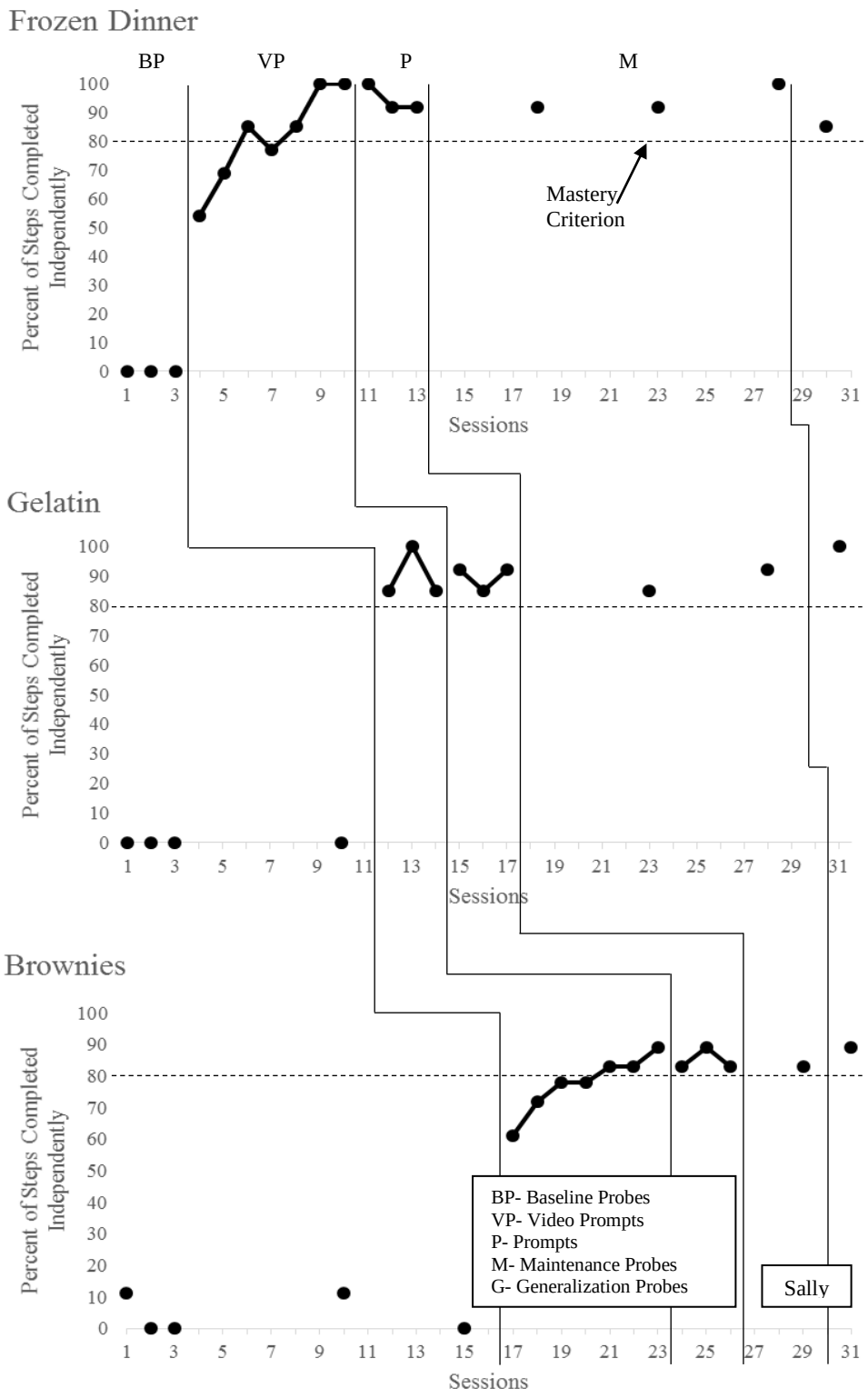


Figure 2. Percentage of independent, correct responses on three recipes for Sally.

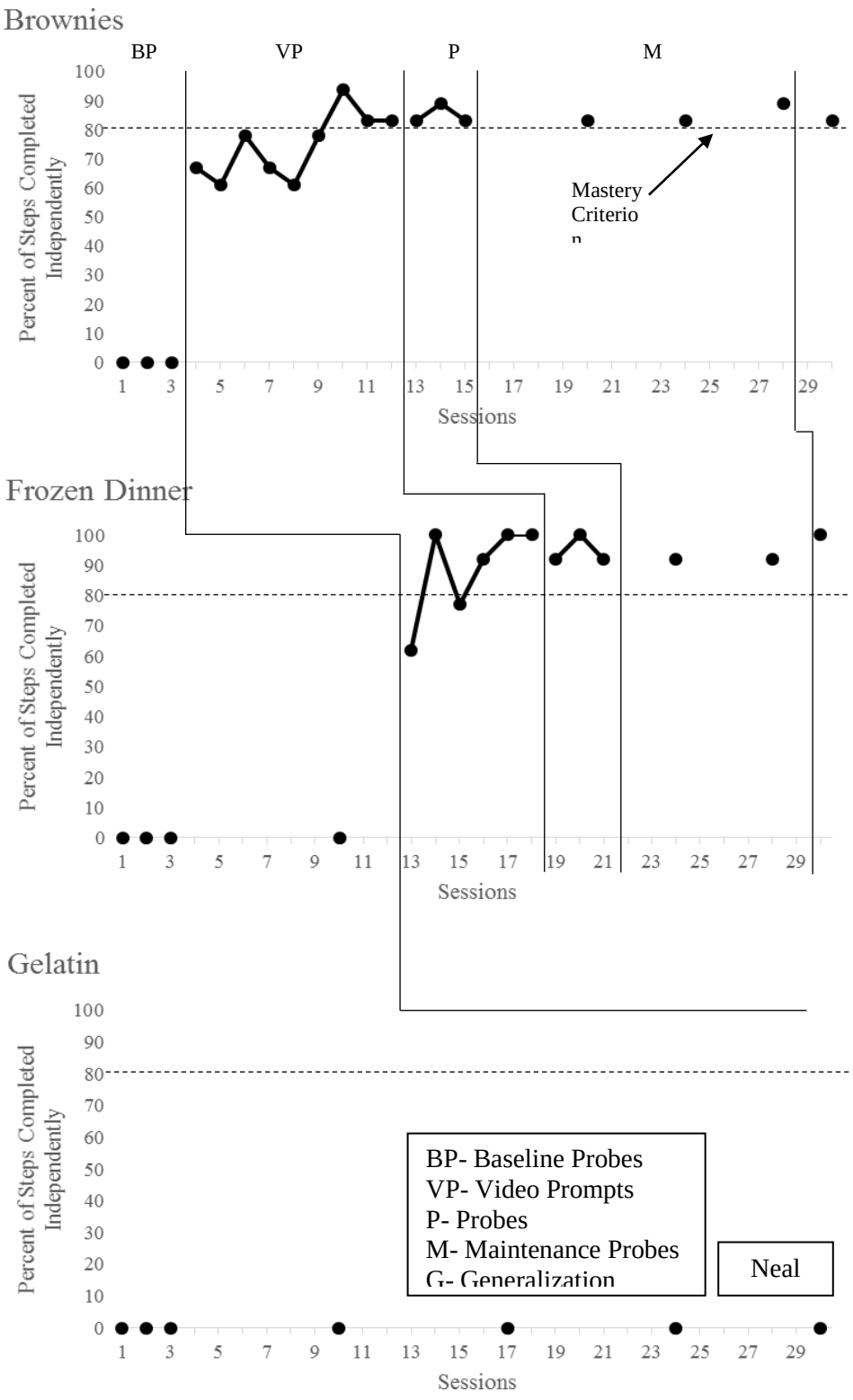


Figure 3. Percentage of independent, correct responses on three recipes for Neal.

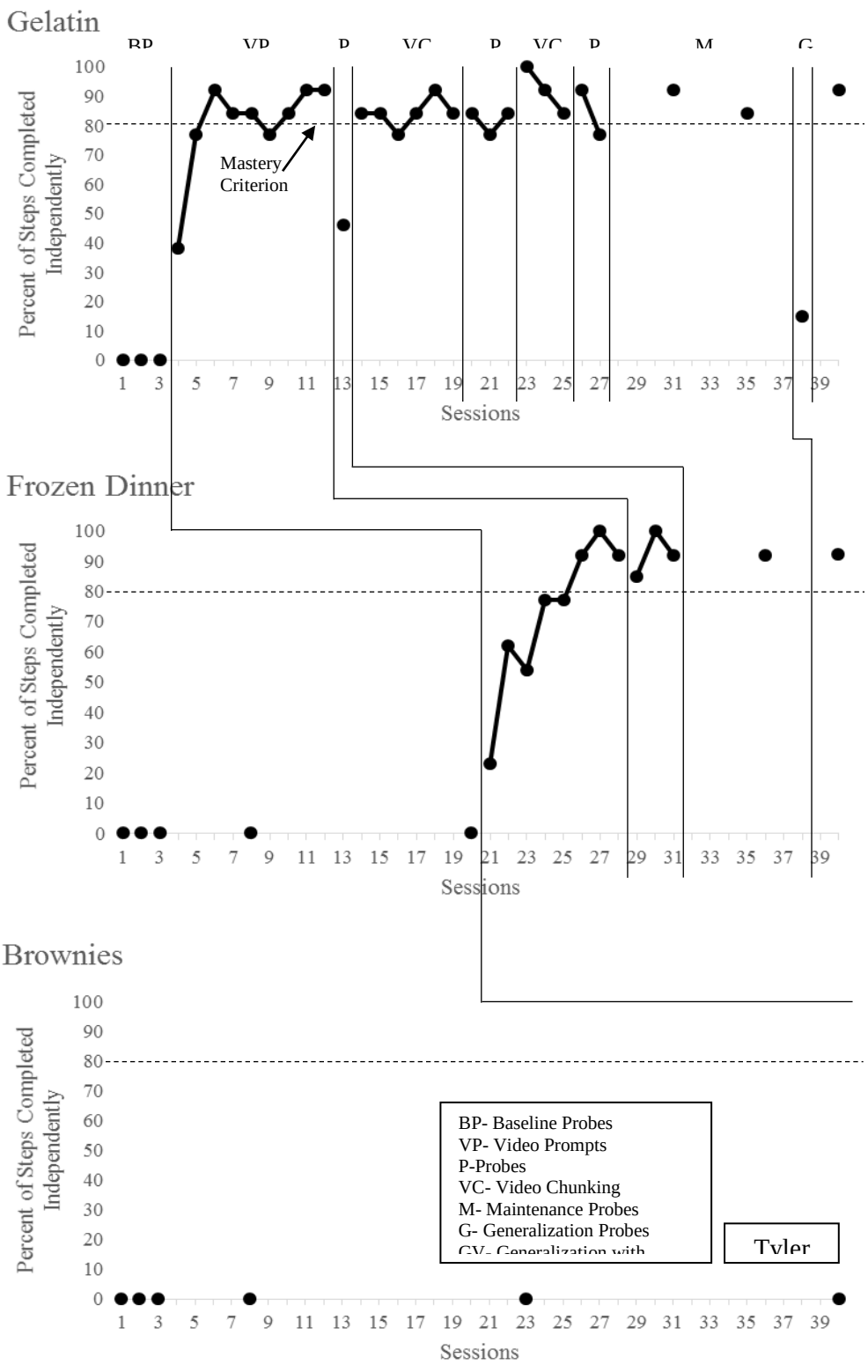


Figure 4. Percentage of independent, correct responses on three recipes for Tyler.

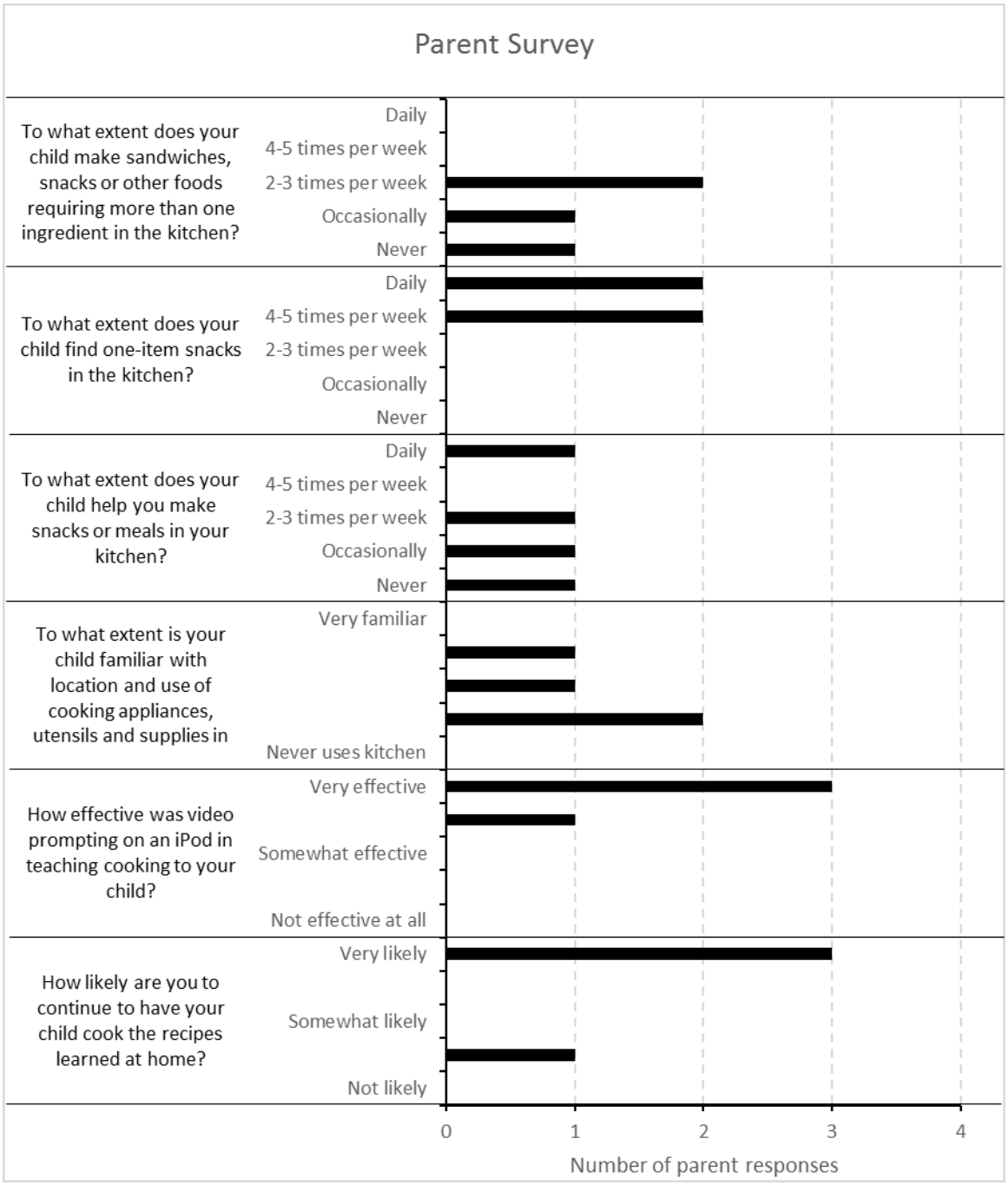


Figure 5. Parent survey responses.

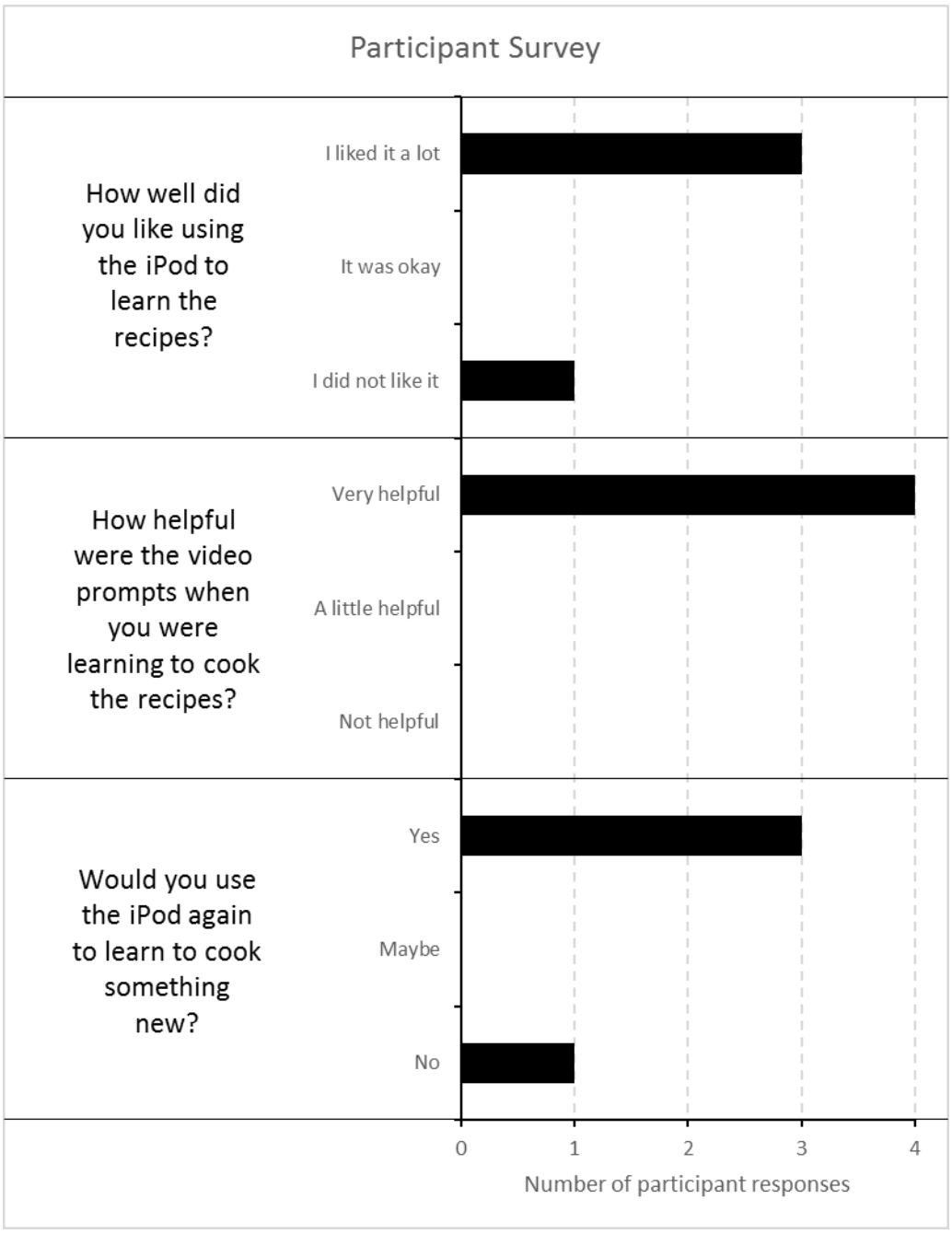


Figure 6. Participant survey responses.

Appendix B

Data Recording Sheets

Video Prompt Pre-Assessment							
Observer:							

KEY:	
Correct	+
Incorrect	-

Student							
1. open bread bag							
2. get milk							
3. set 1 min timer							
Date							
Raw Score							
Percent							

Cookie Mix Pre-Assessment							
Observer:							

Key:	
Correct	+
Incorrect	-

Student							
Get tablespoon							
Get measuring cup							
Get egg							
Preheat oven to 375							
Get medium bowl							
Add cookie mix							
Measure oil							
Add oil							
Add egg							
Measure water							
Add water							
Stir until dough							
Spoon on cookie sheet							
Put cookie sheet in oven							
Set timer for 8 minutes							
Remove cookies from oven							
Turn off oven							
Date							
Raw							
Percent							

Treatment Integrity	
Observer:	

Key:	
Correct	+
Incorrect	-

Participant #								
Session #								
Script Following								
Waited Correct Time								
Materials Prepared								
Prompting Correctly								
Date								
Raw								
Percent								

Participant 1 Brownies	Observer 1

	Session #																		
1	Get brownie mix	20																	18
2	Get liquid measuring cup	20																	17
3	Get oil	26																	16
4	Get eggs	30																	15
5	Preheat oven to 350	22																	14
6	Get pan	14																	13
7	Grease pan	26																	12
8	Get medium bowl	34																	11
9	Add brownie mix	48																	10
10	Add water	24																	9
11	Add oil	66																	8
12	Add eggs	64																	7
13	Stir	102																	6
14	Pour into pan	78																	5
15	Put pan in oven	30																	4
16	Set timer for 24 min	36																	3
17	Take out pan	42																	2
18	Turn off oven	16																	1
	Date																		
	Raw																		
	Percent																		

Participant 1 Frozen Dinner		Observer 1																
Session #																		
1	Get macaroni	14																13
2	Open package	18																12
3	Cut top with knife	28																11
4	Microwave for 2 min	30																10
5	Take out of microwave	60																9
6	Pull back cover	28																8
7	Stir with spoon	96																7
8	Replace cover	24																6
9	Microwave for 2 min	46																5
10	Set timer for 2 min (cool)	20																4
11	Take out of microwave	44																3
12	Throw away cover/box	20																2
13	Stir with spoon	30																1
	Date:																	
	Raw Score:																	
	Percent:																	

Participant 1 Jell-O		Observer 1																
Session #																		
1	Get jello	22																13
2	Get liquid measure cup	16																12
3	Measure 1 cup water	30																11
4	Microwave water 1:30	44																10
5	Add mix to water	48																9
6	Stir until powder gone	130																8
7	Get pan	18																7
8	Pour into pan	28																6
9	Measure 1 cup cold wate	30																5
10	Add water to pan	18																4
11	Stir	12																3
12	Put pan in fridge	30																2
13	Put supplies away	20																1
	Date																	
	Raw																	
	Percent																	

Appendix C

Parent and Participant Surveys

Research Survey for Families

To what extent does your child make sandwiches, snacks or other foods requiring more than one ingredient in the kitchen? Circle one.

Never		2-3 times per week		Daily
1	2	3	4	5

To what extent does your child find one-item snacks in the kitchen? Circle one.

Never		2-3 times per week		Daily
1	2	3	4	5

To what extent does your child help you make snacks or meals in your kitchen? Circle one.

Never		2-3 times per week		Daily
1	2	3	4	5

To what extend is your child familiar with location and use of cooking appliances, utensils and supplies in your kitchen? Circle one.

Never uses kitchen				Very familiar
1	2	3	4	5

How effective was video prompting on an iPod in teaching cooking to your child? Circle one.

Not effective at all				Very effective
1	2	3	4	5

How likely are you to continue to have your child cook the recipes learned at home? Circle one.

Not likely				Very likely
1	2	3	4	5

Research Survey for Participants

How well did you like using the iPod to learn the recipe?

I did not like it | It was okay | I liked it a lot

How helpful were the video prompts when you were learning to cook the recipe?

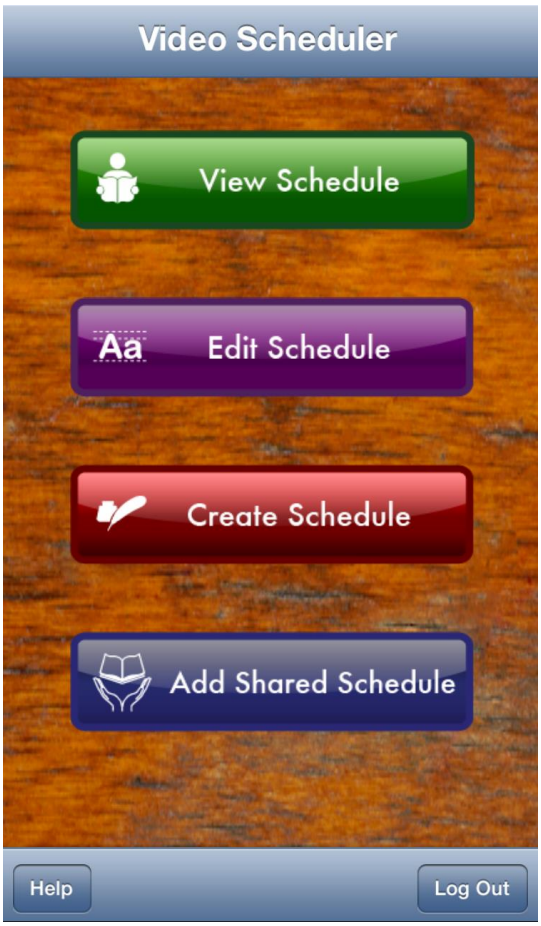
Not helpful | A little helpful | Very helpful

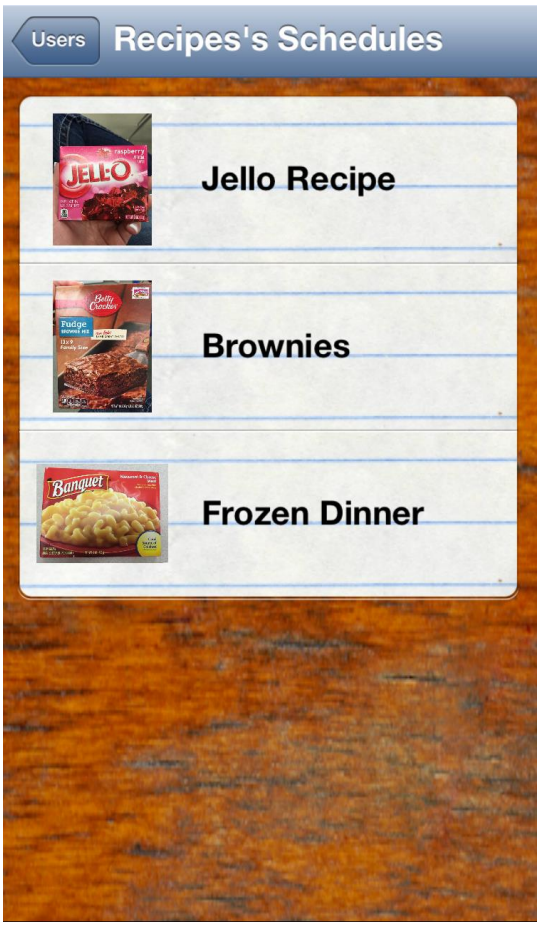
Would you use the iPod again to learn to cook something new?

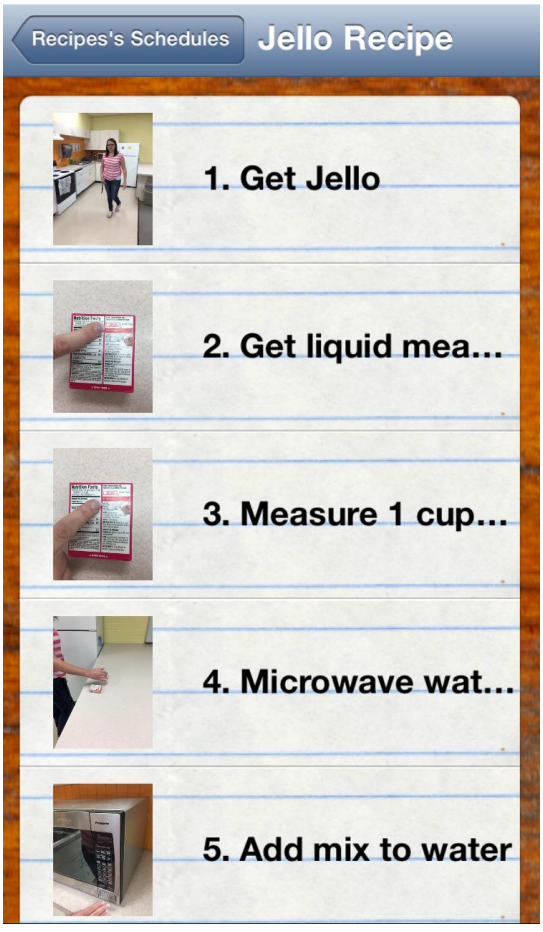
No | Maybe | Yes

Appendix D

Pictures of Video Prompting Application


Video Scheduler
View Schedule
Edit Schedule
Create Schedule
Add Shared Schedule
Help
Log Out


Users
Recipes's Schedules
Jello Recipe
Brownies
Frozen Dinner


Recipes's Schedules
Jello Recipe
1. Get Jello
2. Get liquid mea...
3. Measure 1 cup...
4. Microwave wat...
5. Add mix to water


1. Get Jello