A Video Model Teaches Young Adults with Disabilities How to Organize Materials and Prepare a Simple Meal

TIEE Technical Report III

by
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Preface

Research studies are particularly fascinating when the results are clear-cut, yet surprising, and when they compel additional experiment. The research reported herein, conducted by Stacy Gilmore in partial fulfillment of her Master's Degree at San Diego State University, had these effects, and in spades.

Ms. Gilmore implemented a multi-probe design across participants to determine the extent to which a video model could teach young adults with mild to moderate levels of intellectual and social disabilities how (1) to organize the necessary materials and equipment (called mise en place), and then (2) to make a grilled cheese sandwich.

During baseline, none of the five participants performed mise en place before commencing to make their sandwich and only one participant made a grilled cheese sandwich. Following the video model intervention, all of the participants performed mise en place and all made a grilled cheese sandwich. All participants also displayed maintenance of their mise en place and sandwich making skills.

Here are the really interesting findings:
1 All of Gilmore's participants performed mise en place and made the sandwich. Such consistency of video model effectiveness is unusual and, to our knowledge had not been demonstrated previously for food preparation measures.

2 All of Gilmore's participants performed mise en place and made the sandwich within three viewings of the video model. This level of efficiency has not been demonstrated previously for participant after participant in a published study.

3 None of Gilmore's participants required any intervention other than the video model in order to perform mise en place and to make the sandwich. No previous video modeling study of food preparation to our knowledge has shown the video model to be a completely stand-alone teaching tool. This outcome seemed particularly relevant to the efficient use of teacher time and the possibility that a video model might be an effective and efficient teaching tool in the home.

4 For all five participants, both mise en place and the making of the grilled sandwich generalized to a very different environment than the kitchen in which the skills were taught. In addition, for all five participants, mise en place generalized to the making of a peanut butter and jelly sandwich without specific training or prompting. This outcome was particularly exciting because the self-management skill evidenced by mise en place is not generally characteristic of individuals with disabilities like those in Gilmore's study.

5 All participants made the sandwich at the direction of Ms. Gilmore as is typical of food preparation studies and food preparation training of individuals with intellectual disabilities in general. However, one of the participants informed Ms. Gilmore that he made a grilled cheese sandwich at home one weekend day for lunch. That encouraged a review of the food preparation literature, which revealed that, in nearly every one of the existing studies, participants were allowed to eat the food product but no evidence was provided that they actually did or, even more importantly, that they ever asked to make the food product when they wanted to eat it. This was not so much a matter of generalization as of transfer of function from the teacher's command to make the food product to the reinforcing value of the product. Gilmore was able to test transfer of function with two other participants, whose "lunch went missing" one day. Both requested to make a grilled cheese sandwich, actually did, and ate the sandwich, providing interesting evidence of transfer of function and, perhaps more importantly, leading to the question of whether the "failure to generalize" often noted for individuals with intellectual disabilities is as much a failure of transfer of function. We are currently investigating this train of thought.

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This report was completed by the author in partial fulfillment of the requirements for a Master of Arts Degree in Special Education at San Diego State University

Dedication

The completion of this project would not be possible without the help of Hillary Whiteside, Alicia Ritter, Jenn Walk, Jaime Kurtz and Dr. Suzy Fitch. Thank you for your input, your support, and your company.

My deepest appreciation and gratitude are owed to Dr. Kenneth Traupmann. Thank you for the countless hours spent reading and editing text, watching video, discussing charts, formatting graphs, arguing rational, and providing feedback, good and bad. Thank you for mentoring me, teaching me, challenging me, feeding me, and making sure I've slept. Your encouragement and inspiration made this a project of which I am very, very proud.

Abstract

This multiple-probe study found that video modeling was an effective intervention in teaching transition-aged students with disabilities to organize their materials and prepare a grilled cheese sandwich. Five males, ages 18-22, with deficits in adaptive skill areas, including independent living skills, participated in the study. During baseline, median performance across participants was 28% of steps completed correctly. After 1 viewing, all 5 participants substantially increased steps completed correctly, with 4 of 5 reaching criterion within 3 video training sessions. None of the participants organized their materials and workspace, referred to as mise en place, during baseline. All 5 participants performed mise en place upon viewing the video. All 5 generalized mise en place to a new task. Of the 4 participants who reached criterion, all maintained the procedure when assessed up to 3 weeks after the last viewing of the video and generalized the grilled cheese sandwich procedure and mise en place across multiple stimuli. Results and implications are discussed.

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Introduction

Outcome Deficiencies of Young Adults With Disabilities

Research conducted as part of the National Longitudinal Transition Study-2 (NTLS-2) shows that young adults with disabilities are at a significant disadvantage in numerous post-secondary school outcome criteria in comparison to their general population peers. Initiated in 2001, the NLTS-2 is a 10-year longitudinal study funded by the U.S. Department of Education, Institute of Education Sciences, that has been collecting information on a nationally representative sample of over 11,000 students, who were between 13 and 16 years of age in December 2000. At the time of this writing, the students are young adults ranging in age from 20 to 23 years.

The NLTS-2 researchers conducted telephone interviews of parents and students, school surveys, and student assessments, and they collected grade transcripts. Taken together, the data show that the post-secondary school outcomes for the young adults of the sample, who are now beyond their secondary schooling, are significantly below their general population peers in the areas of post-secondary education, employment, social involvement, leisure, and independence. In the area of post-secondary education, the NLTS-2 authors report that 30% of the young adults with disabilities have taken at least one post-

secondary class and 20% of those surveyed reported that they were enrolled in post-secondary classes at the time they were interviewed. Twenty percent is less that half the rate of enrollment in post-secondary classes for the general population. Moreover, the general population peers are 4.5 times more likely than the young adults with disabilities to be enrolled in classes at a 4-year college. The findings concerning employment are equally bleak. Forty percent of the young adults with disabilities reported that they were employed at the time they were interviewed; whereas, sixty-three peercent of same aged general population peers reported that they were employed (Wagner, Newman, Cameto & Levine, 2005, ES-3).

Outcome Deficiencies Specific to Independent Living Skills

The NLTS-2 researchers also collected data on functional skill performance. The study assessed functional skills in the areas of personal living, motor skills, social interaction and communication, community living, and broad independence. The great majority of young adults with disabilities scored significantly low, with over half scoring two standard deviations below the norm (Wagner, Newman, Cameto & Levine, 2006, 37). These data suggest that, by comparison with the general population, young adults with disabilities have few of the skills necessary to live independently. Among these characteristics are disorganized thinking patterns and inconsistent organization of tasks (Raymond, 2000, p. 267-8). It is noteworthy that the Vineland Adaptive Behavior Scales-Teacher Rating Form II (Sparrow, Cicchetti, & Balla, 2006), an assessment tool favored by school psychologists (Raymond,

2000, p. 59), contains several questions that address organizational skills, further demonstrating the integral role that organization plays in adaptive functioning.

Further complicating the problem for young adults with disabilities is the belief system of their parents and the individuals themselves. When their child was still in high school, almost 90% of the parents of the young adults with disabilities were of the belief that he or she would "probably" or "definitely" live independently after graduation. Among the students, the majority (54%) set independent living as one of their primary transition goals (Wagner et al., 2005, 6-2); yet, 75% of the young adults with disabilities are still living at home up to two years after high school (Wagner et al., 2005, ES-4).

Research Validated Methods

Legally Mandated Practices. Due at least in part to the poor educational, vocational, independent living, and other outcomes for post-secondary young adults with disabilities, like those reported by the NLTS-2 researchers, a focus of recent Federal legislation has been on schooling that promotes more successful transition to adult life. For instance, in the reauthorization of The Individuals with Disabilities Education Improvement Act (IDEIA) of 2004, great emphasis was placed on post-secondary outcomes for young adults with disabilities. In this regard, it seems particularly significant that IDEIA defined transition as:

> A coordinated set of activities for a student with a disability that . . . is focused on improving the academic and functional achievement of the child with a disability to facilitate the child's movement from school to post school activities,

> including postsecondary education, vocational training, integrated employment (including supported employment), continuing and adult education, adult services, independent living, or community preparation . . .

In addition to its emphasis on more favorable outcomes for post-secondary young adults with disabilities, IDIEA also alluded to the implementation of a broad curriculum and the use of research-validated practices. The law is clear that transition is:

> designed to be within a results oriented process . . . that includes instruction, related services, community experiences, the development of employment and other post-school adult objectives, and, when appropriate, acquisition of daily living skills and functional vocational evaluation.

This emphasis on transition that is "designed to be within a results oriented process" echoes the intent of the federal No Child Left Behind Act (NCLB) of 2002, which requires that schools implement evidence-based practices founded on scientific research.

Explicit Instruction: A Group of Research-Validated Teaching Methods. The research of Rosenshine (1979) and others (see Carnine, Silbert, & Kameenui, 1990; Cooper, Heron, & Heward, 2007; Swanson, Carson, & Sachse-Lee, 1996) has identified certain teaching practices that are associated with positive achievement outcomes and reduced problem behaviors. Initially called "direct instruction" by Rosenshine and now more commonly referred to as "explicit instruction," these practices have received extensive research validation (e.g., American Federation of

Teachers, 1998; Carnine et al. 1990, Silbert, & Kameenui, 1990; Marchand-Martella, Slocum, & Martella, 2004; Ellis, Worthington, & Larkin, n.d.), so their use in instructional settings is clearly consistent with the intent of NCLB. For example, ten years after Adams (1990) reviewed the then existing research on learning to read, the National Reading Panel (National Institute of Child Health and Human Development, 2000), in their own extensive review of research, confirmed her view that systematic and explicit phonics instruction is effective for children from various social and economic levels and is particularly beneficial for students at risk for developing future reading problems. Direct Instruction of Engelmann and his associates (e.g., Carnine et al., 1990; Marchand-Martella et al., 2004) is a form of explicit instruction in reading and other basic skills that has been found to be highly effective by several review panels (e.g., American Federation of Teachers, 1998). The American Federation of Teachers report gave high praise to Direct Instruction, saying "when this program is faithfully implemented, the results are stunning" (p. 17).

Along similar lines, a very recent report from the National Mathematics Advisory Panel (2008) argues for changing the manner in which mathematics is taught and is quoted as follows concerning explicit instruction:

> Explicit systematic instruction typically entails teachers explaining and demonstrating specific strategies… [The] analysis of the body of research indicated that explicit methods of instruction are consistently and significantly effective with students with learning disabilities in the performance of

computations, solving word problems, and solving problems that require the application of mathematics to novel situations."

Explicit instruction has been effective for individuals with disabilities (e.g. Chan, Cole & Barfett, 1987; Jitendra & Hoff, 1996; Prater, 1998; Swanson et al., 1996), as well as typically developing students (e.g. McCleery & Tindal, 1999; Griffen, Malone, & Kameenui, 1995), and it has also been effective for teaching culturally and linguistically diverse learners (e.g. Nelson & Smith, 1992, Gersten & Geva, 2003).

Modeling as Central to Research-Validated Teaching Methods. The research that first validated the effectiveness of explicit instruction (e.g. Rosenshine, 1979) has also validated an instructional procedure in which the teacher first models how to do the task, then provides students many opportunities to practice the task, prompting them as necessary. This practice of modeling procedural or factual knowledge, is highlighted, for example, by the National Mathematics Advisory Panel's (2008) recent definition of explicit instruction, by which "teachers provide clear models for solving a problem type . . ."

Modeling is a central instructional component of all of the Direct Instruction programs written by Engelmann and his associates (see Marchand-Martella et al., 2004), that have received wide research support as discussed above. In addition to its use in the Direct Instruction programs, modeling has been found to be effective across the full range of academic curricula, including reading (e.g. Smith, 1979; Chan, et al., 1987; Darch & Kameenui, 1987; Torgesen, Alexander, Wagner,

Rashotte, Voeller, & Conway, 2001), writing (e.g. Corden, 2007; Feng & Powers, 2005), mathematics (e.g. Jitendra & Hoff, 1996; Tournaki, 2003), and content areas (e.g. Griffen, et al., 1995, Nelson & Smith, 1992; McCleery & Tindal, 1999). Lastly, Archer and Gleason (1996) rely on modeling to teach critical organization and study skills in their highly successful Skills for School Success.

Modeling is also a central component in successful social skills programs, including The Walker Social Skills Curriculum (e.g., Walker, McConnell, Holmes, Tocis, Walker. & Golden, 1983), Learning to Get Along (Jackson, Jackson, Bennett, Bynum, & Faryna, 1991), and others. School-wide Positive Behavior Support, which has received consistent empirical validation (e.g., Horner & Carr, 1997; Bohanon et al., 2006), is a comprehensive program designed to bring about highly disciplined schools that have a positive ambience and produce successful academic achievement. The implementation of School-wide Positive Behavior Support is typically categorized in three tiers. In the first tier, which applies to the majority of students, teachers and other school personnel teach the many classroom and school-wide procedures through demonstrating the desired performance. For students who continue to display problem behavior, Tier 2 interventions are implemented, which often consist of social skills programs such as those identified above. Tier 3 is reserved for the most recalcitrant students, for whom an individualized behavior support plan is developed, which may include modeling of specific desirable behaviors.

Only those individuals whose behavior is not yet imitative are not candidates for learning through modeling, and it is recommended practice that such individuals be taught to imitate (Lovaas, 2003).

Video Modeling

Video modeling is a technique in which the learner watches a video-recorded performance of a behavior and then performs the behavior. As video equipment has become more accessible to a wider audience, in part because it is easier to use and increasingly less expensive, the use of video equipment to make videos that serve as models has become an increasingly popular instructional strategy.

The research literature on the use of video modeling as an instructional tool has been reviewed at least five times in recent years (Bellini & Akullian, 2007; Delano, 2007; Hitchcock, Dowrick & Prater, 2003; Mechling 2005; McCoy, 2007). These reviews have demonstrated what appears to be a broad application and utility of video modeling. For example, researchers have shown video modeling to be an effective instructional tool with a variety of populations, including children with autism (e.g. Charlop-Christy & Daneshavar, 2003; Taylor, Levin, & Jasper, 1999), individuals with intellectual disabilities (e.g. Embregts, 2002; Mechling, Gast, and Barthold, 2003), and individuals with moderate mental retardation (e.g. Bidwell & Rehfelt, 2004; Embregts, 2003). Video modeling has also been shown to be effective in teaching a variety of skills including play skills (e.g. D'Ateno, Mangiapanello & Taylor, 2003; Paterson & Arco, 2007), conversation skills (e.g.

Buggey, 2005; Sherer, Pierce, Paredes, Kisacky, Ingersol, & Schreibman, 2001), academics (e.g. Hitchcock, Prater, & Dowrick, 2004), and independent living skills (e.g. Goodson, Sigafoos, O'Reilly, Cannella, & Lancioni, 2007; Bidwell & Rehfelt, 2004). Video modeling has also been effective in decreasing certain types of problem behavior (e.g. Buggey, 2005; Schreibman, Whalen, & Stahmer, 2000). There are a variety of ways in which video modeling has been used as an intervention. Various types of models have been used including peer as model (e.g. Bidwell & Rehfeldt, 2004), adult as model (e.g. Alcantara, 1994), self-model (e.g. Buggey, 2005), and participant point of view (e.g. Shipley-Benamou, Lutzker, & Taubum, 2003). Sherer et al. (2001) compared the use of self as model and other as model in teaching children to answer conversation question. They found no difference in rate of task acquisition between the two model types.

Studies have also differed in how the video is used. Typically, the video model is shown in its entirety, then the learner performs the behavior. Variations include video prompting and video feedback. Video prompting is a technique in which segments of video are shown and the learner immediately performs the steps before moving on to the next segment (e.g. Sigafoos et al., 2005). Video feedback involves showing the learner their unedited performance and allows them to assess their performance (e.g. Embregts, 2002).

Advantages of Video Modeling. In addition to being a research validated instructional strategy, there appear to be several advantages to video modeling in comparison to *in vivo* modeling by the teacher. First, because of the digital video

that is currently available, videos can be played virtually an infinite number of times and each time the model will be exactly the same as every other time, providing a level of performance consistency trial to trial and student to student that is impossible to attain with *in vivo* models (see Mechling, 2005; Bidwell & Rehfelt, 2004).

Second, once a video model is created and shown to be effective, it has the potential to be used by any number of instructors; it makes no difference whether any of the instructors is a proficient model (see Mechling, 2005; Bidwell & Rehfelt, 2004). Further, a video can be used for a multiple of students at the same time (see Bidwell & Rehfelt, 2004) and, with broadcast or internet capabilities, the students do not need to be in the same location, so that the potential to maximize instructional time is enormous. A video can also be used again at another time with a different group of students, increasing instructional effectiveness and, as an added bonus, minimizing the time teachers need to plan or to train their assistants. A video model that has been shown to be effective as the sole component of the teaching package has an additional advantage in that the person delivering the video need not be an expert in other research validated teaching strategies, thereby permitting the most skilled teachers to utilize their teaching time to the greatest advantage.

Some studies suggest that video modeling may actually be more effective than teacher interventions alone. Charlop-Christy, Le, and Freeman (2000) compared video modeling and in vivo modeling to teach play skills and daily living

skills to children with autism. Four out of five children acquired tasks more quickly through video modeling than through in vivo modeling. Myrzynski and Bourret (2007) compared least-to-most prompting procedures with and without video modeling to teach daily living skills. Results show that students acquired the skill in fewer trials when video modeling and least to most prompting were used together than when least to most prompting procedures were used alone.

A third advantage to video modeling compared to *in vivo* modeling concerns the emphasis that one might want to put on certain aspects of the procedure that is modeled. Video has an array of features to provide emphasis that are either difficult to arrange in an *in vivo* model or simply cannot be done at all. For instance, the camera can be made to zoom in on a particular part of a procedure, or the product of the procedure. Still frames are possible for emphasis. Certain parts or scenes in the video can be replayed allowing for special emphasis (see Charlop-Christy et al., 2000).

A fourth advantage is that a video allows students to access places and acquire behaviors relevant to them that they may not otherwise access (see Charlop-Christy et al., 2000). Additionally, students can become familiar with these places and learn behaviors in a safe and controlled environment before performing in actual settings. For example, Schriebman et al. (2000) used video modeling to teach a young autistic boy to accompany his mother to the Target store without displaying problem behaviors in the store.

Finally, there is the issue of efficiency of instruction, that is, obtaining mastery in the shortest time or fewest number of trials possible. Several studies have demonstrated a high level of instructional efficiency for video modeling. Shipley-Benamou, et al. (2002) and Buggey (2005), for example, demonstrated an immediate effect of their video models.

Use of Video Modeling to Teach Food Preparation Skills

Six research studies have investigated the effectiveness of video models on teaching food preparation skills to individuals with disabilities (Bidwell & Rehfelt, 2004; Lasater & Brady, 1995; Murzynski & Bourret, 2007; Rehfelt, Dahman, Young, Cherry, & Davis, 2003; Sigafoos et al., 2005; Shipley-Benamou et al., 2002).

Murzynski and Bourret (2007) compared two treatment packages to teach participants daily living skills. One treatment consisted of least-to-most prompting and the other treatment combined least-to-most prompting with a video model. The study involved 2 participants with autism, ages 8 and 9, whose communication skills were limited to picture exchange and basic sign language. Using a parallel treatment design, the study involved 2 clothes folding tasks (shirt and pants) and 2 food preparation tasks (making a peanut butter and jelly sandwich and juice making). The folding tasks had 6 steps each and the food preparation tasks had 10 steps each. During baseline, each participant was instructed to perform the procedure. No prompts or reinforcement were given. During the least-to-most prompting phase, the participant was given the direction (e.g. “It’s time to make juice.”) and given 5 seconds to initiate the task. If s/he did not begin the task, the

instructor implemented least-to-most prompting. During the video plus least-to-most prompting phase, the participant watched the video first. Then the session continued as in the least-to-most prompting condition. Praise and edible reinforcers were given at the end of each session regardless of performance. Regarding the food preparation tasks, the first participant mastered making a sandwich in 13 trials given the video plus prompting task and mastered the juice making task in 30 trials with least-to-most prompting. Participant 2 mastered the juice making task in 10 trials with the video plus least-to-most prompting and mastered the sandwich making task in 22 trials given least-to-most prompting. The results of participant 2 were slightly compromised by a rising baseline in the prompting alone condition. However, despite the rising baseline in the prompting alone condition, the participant acquired the skill more quickly in the video plus least-to-most prompting condition. For each of the two participants, the acquisition of the skills taught using both video modeling and least to most prompting were acquired in fewer training sessions than those taught in the least to most prompting condition alone, suggesting that the video model was an influential independent variable. However, the study did not present a video modeling alone condition, so it is not possible to determine whether the skills could be acquired with the video model alone.

Bidwell and Rehfelt (2004) combined video modeling and specific praise to teach a coffee making and coffee service procedure to three adults with severe mental retardation. During baseline, participants were instructed to make coffee.

No other prompts or feedback was given. However, if the participant did not perform any step within 3 seconds or if she made an error that prevented the successful completion of future steps, the instructor completed the step. During the training phase, a 5-minute video of a peer making coffee, serving it to another peer, and then sitting down with that peer was shown to the participants. They were then given the direction to make coffee. If the participant performed any step correctly, a specific praise statement was delivered by the instructor. The same error correction procedure was used as in baseline. During baseline, participant 1 completed no more than 30% of the procedure correctly. She gradually improved in performance, reaching mastery after 30 trials. The second participant mastered the procedure in 18 trials, but her rising baseline precludes interpreting her results. The third participant mastered the procedure after 21 training sessions. She also had a slightly increasing baseline, making her results difficult to interpret as well. Generalization probes were conducted across settings, stimuli, and people in which all participants completed the entire procedure correctly.

Sigafoos et al. (2005) used a video prompting procedure to teach microwave popcorn making skills to 3 adult males. A video was created of each step in the procedure from the first person perspective. Participants were shown, in order, individual clips of the procedure, asked to perform the procedure, then shown the next clip. If the participant did not complete the step in 30 seconds, the instructor completed the step and then showed the participant the video clip of the next step. No other prompts or reinforcers were delivered during the training phase. None of

the participants completed over 30% of steps correctly during baseline. During video training, two participants completed 100% of the procedure. One reached criterion in nine sessions, and the other met criterion in five sessions. The third participant gradually went from completing less than 10% of steps correctly in baseline to 80% in video training, but performance subsequently deteriorated to baseline levels.

Rehfelt et al. (2003) used video modeling by a peer along with verbal reinforcement to teach 3 adults with moderate to severe disabilities to make a peanut butter and jelly sandwich. A multi-probe design across participants was used to establish that the treatment package was effective in teaching 2 of the 3 participants to perform all 17 steps necessary to make the sandwich. During baseline 2 participants completed no more than 35% of the steps. Once the treatment package was instituted, they were able to reach the 100% criterion within 13 training sessions. The third participant was able to complete as many as 15 of the 17 steps during baseline. Interpretation of her results was compromised by the substantial increase in her performance during baseline.

Shipley-Benamou et al. (2002) used video modeling from first person perspective to teach daily living skills to three preschoolers with autism. The video model began with a clip of each child's favorite cartoon and a voice over encouraging the child to watch the video. If task wasn't attempted after 60 seconds, a prompt was given. If no initiation after another 30 seconds, materials removed and all steps considered incomplete. One task for one of the children was

making orange juice. This child performed between 30 and 60% of steps correctly during baseline, reached 100% in the first video training session, and maintained this when the video was removed and during a one month follow-up. Video models of two other tasks, table setting and mailing a letter, were presented to this participant. During baseline, he performed between 0 and 20% of steps correctly and he reached the 100% criterion within three video training sessions.

Lasater and Brady (1995) studied the effects of video self-modeling on several self-help skills. The authors worked with 2 adolescent boys who performed routine self-help tasks very slowly and required continual prompting. The tasks included shaving, hanging shirts and pants, bed making, and sandwich making. Only one of the adolescents was targeted for sandwich making and his performance rose from 0 of the 14 steps necessary to prepare a peanut butter and jelly sandwich to 94% during baseline conditions. The subsequent increase to 100% during the video training phase could have merely been the result of the additional practice provided during the 12 video self-modeling sessions.

In summary, six studies attempted to teach basic food preparation skills to individuals with developmental disabilities. Although all of these studies appear to have shown favorable results, several aspects of these studies evoke questions the current study seeks to address.

Questions Raised by the Research Using Video Models to Teach Food Preparation

Treatment Package Efficiency. The treatment packages that resulted in the four participants gaining elementary food preparation skills consisted of video

models along with other components. For example, during the treatment phase, Bidwell and Rehfelt (2004) and Rehfeldt et al. (2003) provided specific praise for correct completion of steps in their sandwich-making task, they completed steps when their participants failed to begin the step within three seconds, and they gave general motivative prompts when it appeared that a participant was distracted. The study by Lasaster and Brady (1995) required intense levels of trainer involvement including questioning, discrimination training, behavioral rehearsal, and debriefing. Sigafoos et al. (2005) showed video clips one step at a time, with a direction to "watch this" before each clip and a direction "now you do it" after each clip. Researchers also completed steps for their participants when the participants hesitated too long. Shipley-Benamou et al. (2002) were the only researchers to address the issue of motivation in the video itself. They added a preferred cartoon in the video attempting to improve the likelihood the participant to attend without the involvement of the teacher. If one of the goals of video modeling as a teaching tool is efficiency of instruction, that is, instruction that can occur without a teacher, then, despite the successes of these studies, the question remains whether a video model can stand alone in the training of elementary food preparation skills.

What Accounts for the Observed Skill Acquisition. The treatment packages used by both Rehfeldt et al. (2003) and Sigafoos et al.(2005) included more than the video model as stated above. The problem in their having used multi-component treatments is that it is difficult to know how much of the observed effect was due to components other than the video model. For instance, Rehfeldt et al.

provided specific verbal praise contingent on correct completion of the steps in their sandwich-making procedure. Contingent verbal praise is a highly validated practice for strengthening behavior (Cooper et al., 2007), so it is likely that it contributed to the skill acquisition for the participants who learned to make sandwiches. Murzynski and Bourret (2007) used a treatment package involving video modeling and least to most prompting. They compared this to the use of least to most prompting alone, but not to video modeling alone. Lasaster and Brady (1995) used a treatment package with five identified components, one of which was a video model. The question remains, then, how important is the video model as a component of these multi-component treatments.

Teaching an Organization Scheme. Individuals with developmental disabilities are known to be comparatively poor at self-management and the other so-called executive functions (Raymond, 2007). However, successful meal preparation often depends on prior planning, organizing of equipment, organizing ingredients, and, possibly, preparing ingredients. Professional chefs refer to such organization, which is clearly a set of self-managing behaviors, as “mise en place” or everything in its place (Donovan, 1996). According to the Culinary Institute of America (Donovan, p. 183),

> Mise en place is a French phrase that translates as “to put in place. For the true professional, it means far more than simply assembling all the ingredients, pots and pans, plates, and serving pieces needed for a particular period…Someone who has truly grasped the concept is able to keep many

tasks in mind simultaneously, weighing and assigning each its proper value and priority."

Although this is the goal for the professional chef, the concept is nevertheless relevant to individuals with disabilities specifically because they tend not to perform the types of self-managing behavior that is involved in mise en place. By initially gathering materials and organizing the work area, the cooking procedure becomes safer, more accurate, and more efficient. If generalized, mise en place becomes a useful organizational tool that can be applied to any cooking endeavor, and, perhaps tasks that do not involve food preparation at all.

Of the three reports that included task analyses (Bidwell & Rehfelt, 2004; Rehfeldt et al. 2003; Sigafoos et al., 2005), none addressed the organization of the workspace, materials, or ingredients. The task analysis developed by Rehfeldt et al., for example, devoted as many as 10 of the 17 steps to preparation, that is, mise en place. However, Refeldt et al. did not isolate those steps for further analysis to determine whether these steps were already in the repertoires of the participants, whether these steps were particularly easy or difficult to achieve, and whether the participants performed the steps in a consistent manner when they were said to have achieved criterion performance. It remains to be seen whether individuals with developmental disabilities readily acquire the self-managing skills referred to as mise en place, and whether such skills, if acquired, tend to generalize to other settings.

Generalization. Only Bidwell & Rehfeldt (2004) and Rehfeldt et al. (2003) tested for generalization of the sandwich making skills. Rehfeldt et al. did so by

probing the skill in another kitchen from the one that was used for baseline and treatment. The refrigerators were different. One opened by a sliding glass door and the other opened by pulling the handle. However, other than that, Rehfeldt et al. provide little in the way of differences between settings. They also did not specify whether the same instructor set the occasion for the probe, nor whether the tools were the same, nor whether the peanut butter and jelly were the same. In other words, the test for generalization, as described by the researchers, was minimal by comparison to the ways one might expect generalization to occur. Bidwell & Rehfeldt, on the other hand, tested for generalization in a different setting, with different equipment, and initiated a conversation with different peers. Because only one study addressed generalization across people, settings, and stimuli, the question remains, then, as to the extent to which generalization of elementary food preparation skills acquired through a video model will occur.

In summary, the current body of research addressing video modeling to teach basic food preparation tasks, although displaying favorable results, is lacking in several important ways. There is not sufficient evidence showing that video modeling itself is effective, only that video modeling used in conjunction with other treatment components has had some success. The research does not address the effectiveness of video modeling in teaching the organizational components critical to any meal preparation procedure. Further, the research does not sufficiently address the ability of video modeling to generalize to other cooking environments,

involving other equipment, tasks, and people. The current study seeks to address these areas.

Method

Introduction

A delayed multiple probe design across participants was used to explore the following questions: (a) Is a video model alone sufficient to teach transition-aged participants with mild to moderate learning disabilities to make a grilled cheese sandwich? (b) Is the video model effective in teaching these participants proper organization of ingredients and equipment, called mise en place, prior to actually assembling and grilling the sandwich? (c) Would the participants display maintenance and generalization of the skills should they acquire them?

Participants

The participants were 5 young adult males with mild to moderate disabilities, ages 18-22. All participants attended the Urban Skills Center, a non-public school of the Institute for Effective Education, which is a California non-profit corporation that has operated K-12 schools for students with special needs since 1972. The Urban Skills Center serves 18-22 year old students with a combination of mild to moderate learning problems and mild to moderate behavior problems. Students who attend the school, including all of the participants in this study, have been referred and placed by their public school districts, which contract to have the

students' Individualized Education Plans implemented at the school because no appropriate public school program is available.

All of the participants were chosen because of their need to improve in their daily living skills, including cooking, budgeting, laundry, and so on. The independent preparation of simple meals and snacks was addressed in each participant's Individualized Education Plan or Individualized Transition Plan, or both. Table 1 presents each participant's age, handicapping condition, and standard scores from the Vineland Adaptive Behavior Scales, Teacher Rating Form (Sparrow et al., 2006). The Vineland scales are standardized with a mean of 100 and a standard deviation of 15. As can be seen in Table I for the Adaptive Behavior Composite score, which is comprised of the Communication, Daily Living Skills, and Socialization composite scores, respectively, Luke, Daniel, and James scored more than one standard deviation below the mean and Kyle and Julio scored more than two standard deviations below the mean. Three participants, James, Kyle, and Julio, have autism. Luke has a specific learning disability and Daniel has mild mental retardation.

Table 1
Participant Information Including Demographic Data and Standard Scores from the Vineland II-TRF in Each Domain Area and the Adaptive Behavior Composite

Standard Scores	Age	Federal Handicapping Condition	Communication	Daily Living	Socialization	Adaptive Behavior Composite
Luke	21	Specific Learning Disability	69	80	80	74
Daniel	20	Mild Mental Retardation	76	78	96	82
James	21	Autism	85	78	74	77
Kyle	19	Autism	60	65	64	61
Julio	21	Autism	57	70	63	61

Setting

All baseline, video training, and maintenance sessions, including viewing of the video model, were conducted in the training kitchen of the Cook Education Center, another school of the Institute for Effective Education, located next door to the Urban Skills Center. The kitchen includes a gas stovetop, refrigerator, double oven, sink, and cabinets. Approximately 2.6 square feet of counter space was available on each side of the stovetop for preparation of ingredients and organizing of equipment.

Grilled cheese sandwich generalization probes were conducted at the Cook Education Center's staff lounge, which includes a sink, microwave, tables, counter space, and a coffee service station. There was no stovetop in the room; however, an electric griddle was placed on the coffee service station, which was otherwise emptied for the probe.

The mise en place generalization probe was conducted in the Cook Education Center's training kitchen as described above.

Materials and Equipment

The equipment used to create the video model included a Canon ELURA 100 Digital Video Camcorder, an Apple MacBook computer, and Apple's iMovie software. Participants viewed the video model on a MacBook computer.

Materials used for preparing the grilled cheese sandwich included a 10-inch non-stick skillet, a plastic turner (spatula), a butter knife, a sandwich plate, a loaf of white bread that was already opened, a package of individually wrapped packaged

cheese (the package was opened but the slices were wrapped), and a tub of butter. In addition to the ingredients and equipment necessary to make the grilled cheese sandwich, which were arrayed at random on the countertop to the right of the stovetop prior to each baseline and training session, certain irrelevant ingredients and equipment were also arrayed there as foils. These included a small pot, a medium pot, a large plastic spoon, a wooden spoon, a rubber spatula, a dinner spoon, a fork, a plastic bottle of vegetable oil, a jar of peanut butter, a jar of mayonnaise, a package of string cheese, a package of English muffins, and a plastic bag of flour tortillas. A jar of strawberry jelly was added to the items during the mise en place generalization probe.

Table 2
Task Analysis

	Preparing a Grilled Cheese Sandwich
1	Wash hands
2	Gather materials (mise en place)
-	Uses appropriate ingredients and equip
3	Skillet
4	Spatula
5	Knife
6	Plate
7	Bread
8	Cheese
9	Butter
10	Set skillet on burner, handle to side
11	Get 2 slices of bread
12	Place bread on plate
13	Unwrap cheese
14	Place cheese on plate
15	Butter 2 slices of bread
16	Place back on plate, butter side up
17	Light burner
18	Turn burner to medium
19	Place 1 slice in skillet, butter side down
20	Place cheese on bread
21	Place 2nd slice on cheese, butter side up
22	Wait until cheese melts
23	Check bottom
24	Flip sandwich w/spatula when bottom is brown

25	Wait
26	Check sandwich
27	Place sandwich on plate w/spatula when bottom is brown
28	Turn burner off

Procedures

Task analysis and video creation. To create the task analysis for making a grilled cheese sandwich, three teachers were invited to make such a sandwich and the steps performed by each teacher were recorded by the researcher. Based on their efforts, a task analysis was developed that is depicted in Table 2. One important element in the task analysis pertained to the organization of the ingredients and equipment on the left side of the stovetop once they were selected from the right side of the stovetop, that is mise en place.

Table 3
Storyboard for Video Model

Shot type	Content
Title over Black	Preparing a Grilled Cheese Sandwich
Still (4.14 seconds)	Completed sandwich
3rd person	Finishing washing and drying hands
Still (4.14 seconds)	Ingredients, Materials, and Foils
3rd person	Gathering materials by moving them from one side of counter to other
Still (4.14 seconds)	Gathered materials (mise en place)
3rd person	Preparing sandwich
Still (4.14 seconds)	Prepared ingredients & materials ready begin cooking in skillet (mise en place)
Close up	Turning on the burner and turning to medium
3rd person	Assembling sandwich in the skillet
1st person	Sandwich cooking in skillet
Radial transition	Signal passage of time
1st person	Checking the sandwich and flipping
Radial transition	Signal passage of time
1st person	Checking the sandwich and placing it on the plate
Close up	Turning the burner off
1st person	Cutting the sandwich
Still (2.5 seconds)	Completed sandwich

From the task analysis, a storyboard was created to guide the video taping of the model by prescribing angles, distances, perspectives, still frames, and a

video effect that is designed to reflect the passage of time, all of which, in the opinion of the researcher, would best showcase each step in the procedure. Table 3 shows the storyboard including type of movie shot and the contents of the shot. The researcher, who is familiar to all the students as their teacher and the Coordinator of the school, modeled the procedure. Most steps were shown from a third person angle common in cooking shows and cooking classes. Completed sandwich, ingredients and foils, and mise en place were shown as stills, lasting approximately 4.0 seconds each. Cooking the sandwich, checking the sandwich for browning, flipping the sandwich to grill the other side, and moving the sandwich to the plate when done were all shown from an overhead, first person perspective. A close up shot was used to show lighting the burner, setting the temperature to medium, and turning the burner off. A radial transition was used four times to show the passage of time as the sandwich grilled. The video did not include any text or any voice over. The only sound recorded was the sound of constructing and grilling the sandwich. The model was not shown eating the sandwich.

Stove Safety Assessment. The procedure of making a grilled cheese sandwich involves using the stovetop, which incurred safety concerns. Any error involving lighting, adjusting, or turning off the stovetop required that the teacher must intervene to maintain a safe environment. In an attempt to remove the need for any teacher intervention during any phase of the study, prior to baseline, the ability of students to light the gas stovetop, adjust the temperature, and turn off the stovetop was assessed. Four of six participants were able to perform this

procedure without errors. The two participants who did not perform this procedure independently received instruction on the procedure and were brought to independence before baseline began.

Baseline. Materials were set out on the counter to the right of the stovetop prior to the start of each session. On entering the kitchen, participants were given the direction to make a grilled cheese sandwich.

The researcher provided clarification for general questions, such as "Should I use the ingredients on the counter," but otherwise provided no feedback, praise statements or other reinforcers, or specific prompts to the participant regarding correct or incorrect performance. If a participant asked what to do, the researcher gave general motivative prompts, like "Just do whatever you think you should do." If the participant stated that s/he didn't know how to do something, the observer also gave general motivative prompts, like "Just give it your best shot" or " Why don't you just give it a try." In no case did the researcher provide prompts for specific behaviors, for the use of specific ingredients, or the for use of specific equipment. Upon completion of the procedure, the participant was thanked for participating and told s/he did a "great job." If the resulting sandwich was safe, appropriate to eat, and the student wanted to eat it, the student was allowed to eat the sandwich. If the student offered the sandwich to the researcher, the researcher said "thank you" and accepted the sandwich.

Video Training Phase. For the video training phase of the study, materials were set out on the counter to the right of the stovetop prior to the start of each

session, just as in baseline. On entering the kitchen, participants were asked to sit down in front of the computer, whereupon they were informed that they were going to watch a video. The video model of the task was presented. Immediately after the video was shown, the participant was given the direction to make a grilled cheese sandwich. As in baseline, the researcher provided only general motivative prompts when the students inquired about the procedure or their performance. The researcher did not tell the participants to make the sandwich as they had been shown in the video. The criteria for evaluating performance during the video training phase were the same as they were in baseline.

Maintenance. Maintenance probes were conducted at least twice for four of the five participants. The first probe was conducted a varying amount of time, but always less than two weeks after the final training session. The second probe was conducted at least two weeks after the first probe. Maintenance probes were conducted in the same manner as described for baseline.

Generalization of the grilled cheese sandwich procedure. Probes to assess generalization of the grilled cheese sandwich procedure were conducted with all participants except Julio. For Luke, James, and Kyle, the generalization probe was initiated by another teacher who, in the role of the researcher's confederate, told the students one at a time that she was aware that they could make a grilled cheese sandwich and she really wanted one, so would they make one for her. Each, in turn, agreed and she took each one to the staff lounge of the Cook Education Center where the ingredients, equipment, and foils were arrayed on a

counter next to the lounge's sink. There was no stovetop in the room; however, an electric griddle was placed on the lounge's coffee service station, which was otherwise emptied for the probe. As such, the students were being probed for generalization across setting, heat source, teacher, and task (i.e., the researcher told them to make a grilled cheese sandwich on each baseline, video training, and maintenance trial, but the researcher's confederate asked the participants to make a sandwich for her). In Daniel's case, the generalization probe occurred as a result of his choice to make a grilled cheese sandwich for lunch when, one day, he forgot his lunch at home and was offered a choice between a standard "school lunch" and making himself a grilled cheese sandwich.

Generalization of Mise En Place. A generalization probe was conducted with each participant to determine if the organizational component of the grilled cheese sandwich procedure, mise en place, would generalize to the making of a different sandwich. The probe was conducted in the same setting that was used for the video training sessions and the researcher provided the direction to make a sandwich. The setup of ingredients, materials, and foils was also the same as used in the video training sessions, the only addition being a jar of strawberry jelly. Participants were given the direction to make a peanut butter and jelly sandwich, which was chosen because it is a sandwich all participants were familiar with, and, based on the name of the sandwich, participants were likely to use the proper ingredients.

Scoring Performance and Inter-Observer Reliability. Using a data collection form that corresponded to the task analysis (see Table 2), the researcher recorded whether steps were completed correctly or incorrectly. If the student completed the step correctly, but not in the sequence described in the task analysis, it was recorded as correct if it led to a correct final product. For instance, if the participant unwrapped the cheese after the bread was buttered, the steps were scored as correct, even though they happened out of the sequence shown in the video. If the participant made an error, but then corrected it (e.g. flipped the sandwich before it browned, but then flipped it back over to brown), the step was scored as correct.

Table 4

Number and%age of Sessions in which IOA was Conducted

Session Type	IOA Sessions	Total Sessions	Percentage IOA
Baseline	7	14	50%
Video	10	18	56%
Maintenance	3	8	38%
Total	20	42	48%

Inter-observer reliability, or inter-observer agreement (IOA), was determined for each of the participants and each of the phases of the study. To accomplish this, in addition to the researcher, two other observers were trained to view the videotaped sessions in keeping with the task analysis. The researcher viewed and scored all sessions. Altogether, the other two observers viewed and scored 48% of the sessions. One of the other observers viewed and scored 60% of these and the other observer viewed and scored 40% of them. Table 4 shows that the number and percentage of sessions in which IOA was conducted in each phase, totaling 50% of baseline sessions, 56% of video sessions, and 38% of maintenance

sessions. To evaluate inter-observer agreement, the researcher compared the step-by-step scoring by the other observer with her own scoring for each of the sessions that was scored by two observers. The number of agreements was then divided by the sum of agreements and disagreements. As Table 5 shows, the mean inter-observer agreement was 98%, with a range of 89% to 100% across the 5 participants.

Table 5

IOA by Student and Session Type

Participant	Baseline	Video	Maintenance	Total
Luke	89%	100%	100%	98%
Daniel	100%	93%		95%
James	93%	100%	100%	98%
Kyle	96%	98%	96%	97%
Julio B	100%	100%		100%
Total	97%	98%	99%	98%

Social Validity. The social validity of acquiring the sandwich making procedure is established by the fact that each of the participants had an IEP or ITP goals concerning the skill.

Results

Making a grilled cheese sandwich

Figure 1 shows the percentage of steps completed correctly by the participants in each session of all phases of the study. As is clear in the figure, none of the participants knew how to perform all the steps in the procedure before watching the video. The direction to make a grilled sandwich did, however, produce consistent results during baseline. All of the participants constructed some version of a cheese sandwich. They put cheese between two pieces of

bread. What they did with the sandwich varied considerably. Luke made a fine grilled cheese sandwich. Kyle made an approximation of a grilled cheese sandwich. He used vegetable oil instead of butter. James constructed his sandwich in a pot and then burned it, because he left it on too long and did not use butter. Daniel put cheese in a hamburger bun and cooked it in the microwave. Finally, Julio put a piece of cheese in a hamburger bun and handed it to the researcher.

After only one or two viewings of the video, all participants successfully completed the procedure. Performance was generally maintained during sessions conducted 2 weeks or more after training, and, for four of the participants who were evaluated, performance generalized across people, settings, and tasks.

Luke was consistently the highest performer of the group. During baseline, he correctly completed 71-75% of the steps in the 28-step procedure and he made an acceptable grilled cheese sandwich during each of his two baseline sessions. Luke did not wash his hands, perform anything resembling mise en place, he did not use a plate, and he did not check the sandwich to determine that it was browned. After viewing the video just one time, Luke completed 27 of the 28 steps correctly (96%), a level of performance he essentially maintained throughout the video training phase, the maintenance phase, and the generalization phase. Luke did not wash his hands during any of the sessions.

Daniel completed only 25-29% of the steps correctly during baseline. During two of the baseline sessions, he unwrapped a slice of cheese, placed it between two slices of bread, and placed the sandwich in the microwave for 15-20

sec. On the third session, he used string cheese instead of sliced cheese and, again, he put the sandwich in the microwave. During video sessions, Daniel was very attentive to the video. He verbalized the steps and he would physically rehearse the steps as he watched the video (e.g. he practiced flipping the sandwich with the spatula). After watching the video the first time, he increased to 64% of steps correctly performed and, after a second viewing of the video, he completed 82% of the steps correctly. After four video sessions, Daniel completed 25 (85%) of the steps correctly and made an acceptable sandwich. During maintenance, Daniel increased to 93% of steps correctly performed, but dropped to 78% in the second maintenance session, which was conducted three weeks after the first maintenance session. Daniel used mayonnaise instead of butter during this trial and was awarded credit for buttering the sandwich, but not for using the appropriate ingredient. He had never used mayonnaise before.

During generalization, Daniel performed 92% of steps correctly, making errors only in washing his hands and failing to turn off the grill. On this occasion, Daniel used mayonnaise on the inside of the sandwich and butter on the outside of the sandwich, getting credit for both buttering the sandwich and using the appropriate ingredient, because there was no penalty for using ingredients not modeled so long as the product was desirable. Daniel was the only participant to add an ingredient not shown in the video model.

James completed 25-36% of steps correctly during baseline. As described above, during baseline, James constructed a cheese sandwich in a pot and let the

bottom of the sandwich burn. James also began to avoid the task in that he did not report to the researcher at scheduled times. The researcher had to go get him for the baseline trials and he appeared anxious during the sessions. He also asked directly (e.g., “What sized pot do I need” and “What am I supposed to look for to see if it is done?”) or indirectly (e.g., “A grilled cheese sandwich, huh?”) for assistance 17 times during baseline sessions 2 and 3 (Baseline session 1 was not recorded due to equipment failure). Examples of James’ solicitations can be found in Appendix A.

After a single viewing of the video, James increased to 96% of steps correctly performed and he completed 100% of the procedure following the second viewing. While viewing the tape, he made comments like, “I didn’t know you were supposed to add butter to a grilled cheese sandwich,” and “you turned [the burner] to medium.” By comparison to James’s requests for assistance during baseline, he made only a single request once having seen the video. James also completed between 96 and 100% of steps during maintenance and he completed 100% of steps correctly during the generalization probe.

Kyle completed 46-57% of steps correctly during baseline sessions. He poured oil into the skillet instead of using butter, and he cooked the sandwich on high heat but did not wait for the cheese to melt and the sandwich to brown. After the first viewing session, Kyle completed 93% of the steps correctly and he completed 100% of the steps after the second viewing. During maintenance, Kyle completed between 93% and 100% of the steps.

Julio was the poorest performer of the group. He completed only 11% of the steps correctly during each baseline session. Julio would split a hamburger bun open, placed a slice of cheese between the bread slices and hand it to the researcher. He made no attempt to grill or otherwise heat the sandwich. After the first viewing of the video, Julio successfully completed 39% of the steps correctly and, after the second and third viewing session, he completed 93% of the steps correctly. The only errors Julio made after viewing the video model were not washing his hands and not turning the handle of

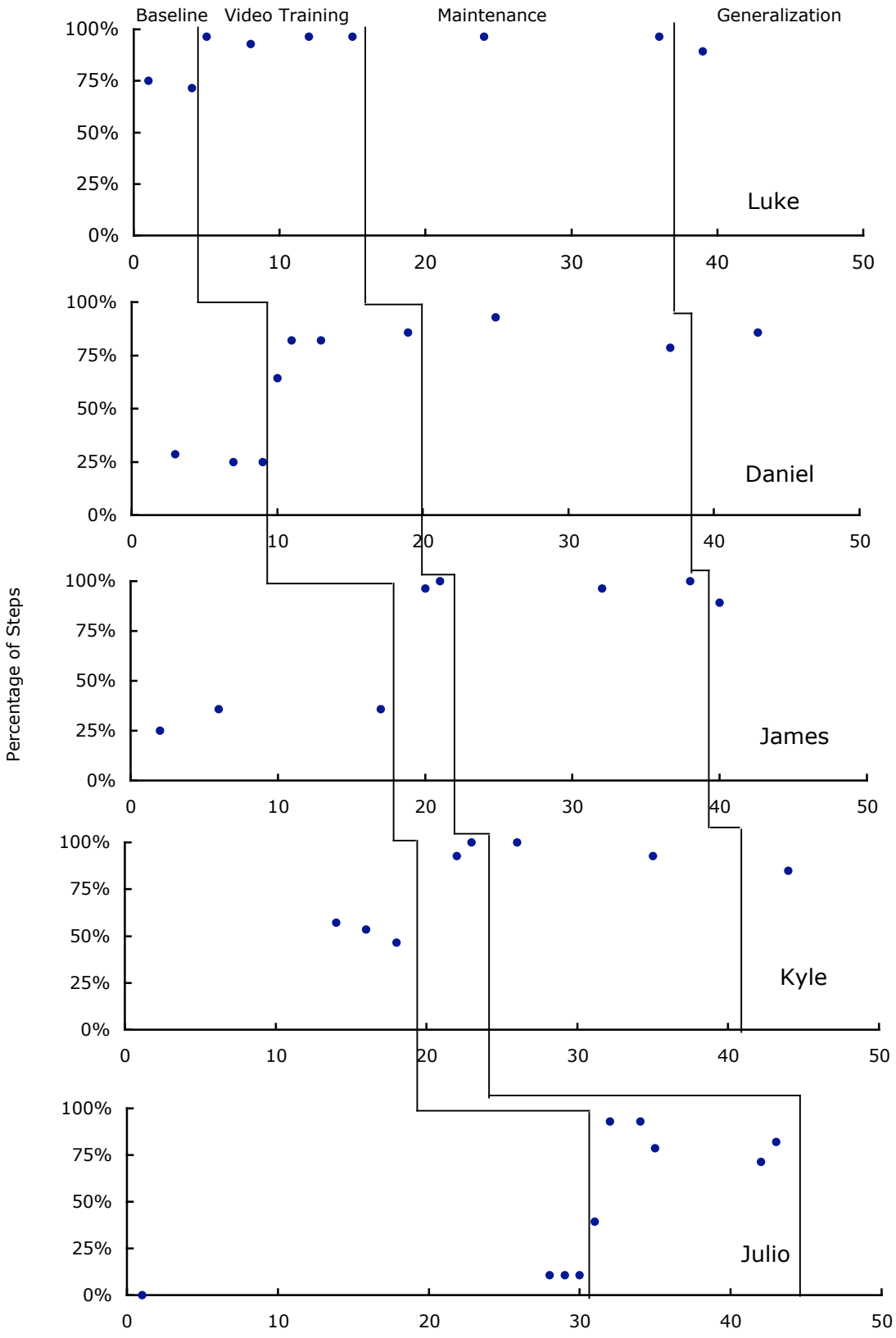

Figure 1a . Percentage of steps completed correctly in baseline, video training, maintenance, and generalization for Luke, Daniel, James, Kyle, and Julio.

the skillet to the side. During the fourth viewing session, Julio was unlike any of the other participants in that his performance dropped to 78% of steps correctly performed. On the fifth session, he dropped even further to 71%. Because Julio had never expressed interest in eating the sandwich, the researcher suspected that the motivation for making the sandwich was low or nonexistent for Julio. In the attempt to increase his motivation, a teacher who was preferred by Julio acted as the researcher's confederate and told Julio that she heard he knew how to make a grilled cheese and would he please make her one because she really wanted to have one. After this interaction, Julio completed 82% of steps correctly, suggesting that the generalized social reinforcement in the form of social attention from a preferred teacher was a motivator for Julio to complete the procedure more correctly.

Mise En Place

Table 6 displays how often mise en place was performed by each student during each phase of the study. During baseline, none of the participants organized the materials and/or ingredients in any way that would be considered mise en place. None of the participants moved the necessary ingredients and materials from the right side of the stovetop, where they were located along with all of the foils leaving little room for efficient sandwich preparation. Nor did they move any of the foils away from the area in order to provide the necessary room. For example, Luke assembled the sandwich in a bowl. Daniel and Kyle assembled the sandwich on the countertop next to the location of all other materials and ingredients. James

assembled it in the pot, and Julio held the sandwich in his hand when putting it together. By comparison with baseline, four of the five participants completed mise en place just as it was demonstrated in the video after the first viewing session and all participants completed it as modeled within the first two sessions. In addition, all of the participants continued to perform mise en place according to the video model throughout all video training, maintenance, and generalization sessions.

A generalization of mise en place probe was conducted in which participants were asked to make a peanut butter and jelly sandwich under conditions that otherwise were the same as those that applied for making the grilled cheese sandwich. The probe was conducted in the same kitchen, with the same setup of ingredients, materials, and foils with the only addition being a jar of strawberry jelly. All 5 of the students successfully made a peanut butter and jelly sandwich and all 5 completed mise en place correctly by moving all the necessary materials (i.e. peanut butter jar, jelly jar, bread, plate, knife) from the right side of the stovetop to the left side before beginning the procedure.

Table 6

Percentage of Sessions in which Mise En Place was Completed

	Baseline	Video	Maintenance	Generalization
Luke	0%	100%	100%	100%
Daniel	0%	100%	100%	100%
James	0%	100%	100%	100%
Kyle	0%	100%	100%	100%
Julio	0%	67%		
Total	0%	89%	100%	100%

Discussion

The results of the present study are exceptionally clear in that all of the participants very quickly acquired the grilled cheese sandwich making procedure and all of them made acceptable grilled cheese sandwiches once they saw the video model. In addition, four of the five participants replicated the procedure and made acceptable sandwiches several weeks after seeing the video model for the last time. Their performance maintained over this period without any further observation of the video model even though Luke and Daniel saw the video model only four times and James and Kyle saw the video model only two times.

Following the first video model, there were no instances in which the participants scored below their own baselines, that is, all treatment phase data points exceed all baseline phase data points for all 5 participants. The Percentage of Nonoverlapping Data (PND) is 100%, which Scruggs and Mastropieri (1998) argue is evidence of a highly effective intervention in single-subject research.

Of the participants, three have autism. All three increased significantly in the number of steps completed correctly during the video training phase. Of the two who were assessed for maintenance and generalization, both successfully completed mise en place and made an appropriate sandwich. PND for those with autism was also 100%, indicating the intervention was highly successful with this subgroup.

Review of the Problems Addressed in the Present Study

This study was undertaken to answer several questions that arose from a review of existing research concerning the teaching of independent living skills to

transition-aged youth with disabilities using video models. The study was motivated by several factors. First, there is the observation that such individuals tend not to have acquired more than a rudimentary level of independent living skills by the time they leave high school and transition to adult life (Wagner et al., 2005; 2006). Second, there is a requirement under law to implement research-validated instructional practices with individuals with disabilities, including transition-aged youth (IDEIA, 2004; NCLB, 2002). Third, video modeling has a track record of success in teaching a variety of skills to individuals with disabilities (e.g. Bellini & Akullian, 2007; Delano, 2007; Hitchcock et al., 2003; Mechling, 2005; McCoy, 2007), although there have been few attempts to use the method with transition-aged youth with disabilities. Further motivation for the study derived from the fact that the researcher is the Coordinator of a school program serving transition-aged youth with disabilities and the problems of efficient and effective teaching of independent living skills is a daily concern.

The review of the literature concerning the use of video modeling to teach independent living skills to individuals with disabilities revealed that, overall, the method has proved quite successful. However, a number of questions remained. All of the studies in which video modeling was used to teach food preparation skills employed video modeling as merely one component of a multi-component treatment package, rendering it impossible to determine the size of the contribution of the video model as an independent variable. Nor is it possible to determine whether the video model would be an effective instructional tool on its own.

Although mise en place, the organization of materials and equipment prior to cooking, facilitates accurate and efficient cooking (Donovan, 1996), and such organization is a self-management skill that transition-aged youth with disabilities often lack (Raymond, 2000), none of the studies that attempted to teach food preparation using video modeling attempted to teach mise en place. Another problem is that, when tests of generalization were conducted (Bidwell & Rehfeldt, 2003; Rehfeldt et al., 2004), they were modest at best because the probes were conducted in situations very similar to the training situation. Finally, no studies on the use of video modeling to teach food preparation skills have had transition-aged youth as participants. The present study was designed to contribute to the knowledge base concerning each of these questions.

Video Modeling as the Sole Instructional Component

This study sought to determine whether a video model alone would be effective in teaching such skills. Although previous studies involved video modeling as a component of the treatment package, the procedure used in the present study was carefully designed to include no instructional activities other than the video model itself. No prompting, feedback, or reinforcement was given at any time during the procedure. To ensure that the researcher did not influence and thereby instruct the participants, the researcher had minimal interaction with the participants. The researcher gave only one initial direction to “Watch this video” and only one subsequent direction to “Make a grilled cheese sandwich.” General motivative prompts, like “Just do whatever you think is best” or “Just give it a shot,”

were given in a neutral, non-directive manner, and were given only when students asked a question or solicited help. Such prompts were rarely needed once the video-modeling phase was begun. The researcher was also careful to provide only a single general praise statement at the end of the session, like "Thanks for your help," which is unlikely to have much of a strengthening effect on any of the components of the procedure.

Not only did the present results show that a video model is an effective instructional tool to teach food preparation skills to transition-aged youth with disabilities, it also showed that, for such individuals, video modeling can be highly efficient. The participants acquired the skill within one or two sessions, that is, virtually immediately upon seeing the video model, and no teacher was required to provide any instruction in addition to the instruction provided by the video model itself. These results differ dramatically from those previously reported (Bidwell & Rehfelt, 2004; Lasater & Brady, 1995; Murzynski & Bourret, 2007; Rehfelt, et al., 2003; Sigafoos et al., 2005; Shipley-Benamou et al., 2002) because previous researchers required more sessions to achieve criterion and the number of steps in the tasks studied were fewer than the 28 steps the participants mastered in the present study.

Mise en Place as Self-managing Behavior

As is characteristic of transition-aged youth with disabilities (Raymond, 2000), the participants in the present study displayed far less than quality organization of materials and ingredients prior to making the grilled cheese

sandwich. During baseline, none of the participants moved ingredients or equipment from where they were placed among a considerable number of foils to the other side of the stovetop, which was a completely empty counter just a step or two away. Nor did any of the participants push the foils out of reach or move them to another counter so that more space for constructing the sandwich would be available. Luke constructed his sandwich in a bowl that he moved to the front of the counter pushing away some of the other items. Daniel and Julio made their sandwiches in their hand. James constructed his in a pot that he had placed on the burner. Kyle constructed his sandwich in the frying pan that he had placed on the burner. In a way, all of the participants recognized the need to have space to construct the sandwich, but their solutions were less than desirable.

Once the participants saw the video model, all of them performed mise en place by gathering the necessary ingredients and equipment, and organizing their workspace. As a result, they made the cooking procedure safer and more efficient, and they were more accurate in following the procedure. This is the first demonstration that transition-aged youth with disabilities can ~~easily~~ acquire self-managing organization skills, such as mise en place, quite easily with a video model. Although mise en place might well have been studied by Rehfeldt et al. (2003), whose participants made a peanut butter and jelly sandwich, the researchers did not report on it and their discussion gave no hint that organization of materials and equipment prior to making the sandwich was an issue for them.

Generalization of Skills Acquired by the Video Model

Four of the five participants whose skill at making a grilled cheese sandwich was maintained for several weeks, were subsequently probed for generalization. Of the previous researchers who used video models to train food preparation skills, only two tested for generalization. Rehfeldt et al. (2003) changed the location of the probe and changed very little else. Bidwell and Rehfeldt (2004) attempted generalization probes varying a sizable number of stimuli, as was conducted in the present study. Bidwell and Rehfeldt obtained generalization; however, due to the rising baselines of their participants, it is not possible to determine whether the generalization was a result of the treatment or of some other variable. By contrast, the treatment used in the current study was clearly responsible for the effects, including generalization. All of the participants, who were tested for generalization, displayed generalization. They performed the procedure and they made acceptable sandwiches. In fact, during the generalization probe, Kyle made the best sandwich that he had made during the entire study.

Not only did the participants display generalization, they did so under conditions quite substantially different from the training conditions. The location was changed from a training kitchen to a staff lounge. The materials and equipment were arrayed on a counter that was much smaller than the training counter and it contained a microwave oven, a crock of utensils, an electric teapot, and a roll of paper towels in addition to the items for the probe. The heat source for grilling the sandwich was no longer next to the supplies themselves, but, rather,

was approximately 10 feet away and set on a coffee service station. The heat source was no longer a gas stovetop, but rather it was an electric griddle, which required no skillet. The area for completing mise en place was no longer on the opposite side of the stovetop but, rather, was on the coffee service cart next to the electric griddle. Finally, for two of the participants, Luke and James, the generalization probe was initiated by a confederate of the researcher, who asked them to make a grilled cheese sandwich for her. Daniel's generalization probe occurred when, one day, he forgot his lunch and was offered the choice between a typical school lunch and making a grilled cheese sandwich for himself. He chose the grilled cheese sandwich. Only Kyle's generalization probe was initiated by the researcher. These results show that, for transition-aged youth with disabilities who display maintenance of a food preparation skill acquired through video modeling, the skill can generalize to conditions that are substantially different from those in which the skill is trained. This finding is given additional importance because the probe was conducted several weeks after the last time the participants saw the video model.

It is also noteworthy the two ways in which mise en place generalized. First, all four participants, who were tested for generalization of the grilled cheese procedure, generalized mise en place. Luke, Daniel, and Kyle performed mise en place on the coffee service station, constructed their sandwiches, and grilled them on the griddle, which they had set to medium. James moved items on the counter, where they had been placed, in order to provide himself more room. He then proceeded

to sort out the desired ingredients and equipment and, then, to construct his sandwich on a plate, which he carried to the coffee service station for grilling.

Second, all five of the participants displayed generalization of mise en place in making a peanut butter and jelly sandwich. This probe was conducted in the training kitchen and all items along with foils were arrayed as they were during training. The only exception was the addition of a jar of strawberry jelly. All participants moved peanut butter, jelly, bread, a plate, and a knife from where they were arrayed to the empty counter on the other side of the stovetop. They did not move the butter, the cheese, or the spatula, which they had included in successfully completing mise en place for making the grilled cheese sandwich. Not only did they perform mise en place, but they did so in a discriminated manner. Taken together, these results indicate that video modeling alone can be a powerful instructional tool to teach generalized self-managing organizational skills to transition-aged youth with disabilities.

Limitations of the Study and Suggestions for Future Research

For a video model to be useful, the teacher needs to know with whom to use it. Julio was the poorest performer of the group of participants trained in the present study and Luke was the best, and Kyle and James were a close second. It is possible that a general measure of competence, like that provided by the Vineland, predicts who will benefit from a video model. However, that is not what happened. Luke was not the highest scorer on the Vineland; Daniel was. Julio was not the poorest scorer on the Vineland; Kyle was. Perhaps, if more participants

were studied, a correlation would emerge, but the present data do not support this possibility. One possibility for future research, then, is to determine whether levels of general competence will predict successful learning with a video model.

Along similar lines, it is possible that more specific skills, ones more in line with the skills being taught by the video model, will predict that the video model will be a effective and efficient instructional tool. All of the participants in the present study except James had at least some instruction in food preparation as part of their curriculum. The problem is that an assessment tool is lacking and the only such assessment conducted as part of the present study involved turning on the stove as a safety measure. Future research into the development of a curriculum-based assessment tool and the extent to which such a tool predicts successful learning with a video model is desirable.

The present study makes clear that transition-aged youth with disabilities can learn to make a grilled cheese sandwich by viewing a video model. The procedure involved 28 steps. Future researchers need to determine how many steps is the limit for an effective and efficient video model of food preparation. Stacking sandwiches, like a BLT, can involve many more steps, as can grilled meat sandwiches, like a cheeseburger. Other fairly simple recipes, like making marinara sauce from scratch, involve even more steps. Surely, there must be a point at which learners with or without disabilities cannot learn effectively and efficiently. Although it is important for researchers to determine the number of steps that make for a successful video model, video models having more steps may still prove

valuable if the learner can control the viewing so that only what can be learned in one viewing is observed.

The researcher of the present study elected to evaluate maintenance and generalization after at least two weeks in part because it was felt that the participants would not want a grilled cheese sandwich more often that that. The results clearly showed maintenance of the skill, but left unanswered is just how long one might wait before a maintenance probe and still obtain faithful reproduction of the procedure taught by the video model.

James is a young adult with autism, who, as a student, frequently asks for and obtains help from teachers. As noted in the Results, during baseline sessions, James frequently solicited help from the researcher, either directly or indirectly. However, after the first video training session, James' solicitations decreased substantially. It's not that he stopped talking during the sessions. He just stopped soliciting help. Instead, he made statements about what happened in the video. These findings were not common to all of the participants. The others seldom made such solicitations during baseline, and none of the participants made a solicitation for assistance once they saw the video model. Nevertheless, the problem of prompt dependency is common among individuals with disabilities in general, so it seems that further investigation of the ability of video modeling to reduce prompt dependency and increase independence of learners with disabilities is warranted.

The researcher took care to make a video model that showed each step of the procedure as clearly as possible. A storyboard was created after discussing and experimenting with different angles, perspectives, and shot types. Video footage was edited to best showcase the procedure. Despite these efforts, certain errors tended to occur again and again. For instance, Luke never washed his hands, Daniel tended not to wait during the grilling, and Julio put the top piece of bread butter side toward the cheese. It is possible that these persistent errors could have been precluded with an improved video. No researchers have reported on an iterative process whereby an attempt is made to improve the effectiveness and/or efficiency of a video model based on an analysis of errors made by participants. Further investigation regarding the critical features of a video model in teaching skills is warranted.

It was noted that Luke and Daniel made grilled cheese sandwiches when they wanted one. Luke made his at his home and discussed it in great detail that appears in Appendix B. Daniel made his as a result of being offered a choice between a grilled cheese sandwich and a typical school lunch on a day that he forgot to bring his lunch from home. The initiating stimulus for making the sandwich during all phases of the study was the researcher or her confederate instructing the participants to make a grilled cheese sandwich. This is consistent with how other researchers have initiated trials. For example, Rehfeldt et al. (2003) said, “Make a sandwich,” and Sigafoos et al. (2005) said, “Make popcorn.” Neither of the researchers provided evidence to suggest that their participants ever made

popcorn or the peanut butter and jelly sandwich when they wanted the product. Nor did they report that their participants ever asked to have the product. In retrospect, this seems a substantial inadequacy of the previous research and the present study as well. After all, it does little good for the independent living capacity of the participants if they have learned how to make some item of food but, then, never choose to do so. The ultimate goal of teaching a cooking procedure is to get the learner to perform it when s/he desires to eat the product. The present study was not organized to provide a test of this transfer of goal from "please the teacher" to "I want to eat a grilled cheese sandwich." For instance, the researcher conducted sessions at virtually any time during the school day, depending more on whether the training kitchen was available than on whether the participants might be hungry. Future research will need to address this issue or the value of using video modeling to teach food preparation skills will always be in question.

Finally, five young adults with developmental disabilities cannot be said to be a reasonable sample of transition-aged youth with disabilities, so, despite the consistent success of the video modeling procedure with the participants in this study, future research must involve systematic replication of the procedure with other participants to determine whether the effects can be obtained as effectively and efficiently as demonstrated here.

Conclusion

This study set out to determine whether transition-aged youth with disabilities could be taught a fairly simple food preparation skill with a video model as the sole

instructional tool. The consistent improvement of performance once the video model was shown within the context of the multi-probe design established clearly that the video model was a highly effective and efficient instructional tool. The study also sought to determine whether transition-aged youth with disabilities could be taught a self-managing organization strategy, mise en place, that would permit more accurate and efficient making of the product. Again, the results, taken within the context of the multi-probe design, are unequivocal. Finally, it was asked whether the skills, if acquired, would be maintained and would generalize across substantial variation in stimulus conditions. Once more, the results, taken within the context of the multi-probe design, clearly show that maintenance and generalization are the result of the video model used in the study. There were no instances in which performance following the first viewing of the video model fell below the highest performance during baseline for any of the 5 participants, indicating that the video model was a highly effective intervention for these young adults with disabilities, including autism.

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Appendix A
Examples of James' Solicitations for Help

Solicitations
What sized pot do I need?
Am I supposed to turn the stove on yet?
Is this the bun end of the bread?
What is the camera there for?
What setting should it be?
How long does it need to cook?
What are you keeping track of?
I've never made a grilled cheese sandwich before; it's hard to tell if it's done.
What am I supposedto look for to see if it is done?
Now what?
Where's the ingredients?
A grilled cheese sandwich, huh?
The shredded cheddar cheese or the sliced cheddar cheese?
How long are we here for?
What am I being graded on?
What's the camera doing?
How did I do?

Appendix B

Transfer of Function Demonstrated by Luke

Speaker	Comment
Luke	"You should have seen the grilled cheese I made back at home a couple of days ago. It was a sandwich about as long as my forearm."
Researcher	"When did you make it?"
Luke	"I think it was Saturday."
Luke	"It was about, it was like, about as wide as this plate but as long as my arm."
Researcher	"Really, sounds good."
Luke	"Yeah, I topped it off by spreading mustard on top of it. It tasted really good."
Researcher	"Sounds great"
Luke	"I'm really good at mixing foods together."
Researcher	"mmhm"
Luke	"Make a hot dog and ham sandwich. I call it a dog sandwich."
Researcher	"Sounds good."
Researcher	Luke, do you cook grilled cheese often at home?"
Luke	"Ever since that first time I made it here, yes."
Researcher	"Really"
Luke	"Yes"
Luke	"I don't use the-ah-like thin layers, like these at cheese
Researcher	"What kind."
Luke	"The, um, I use, I just cut it from like a normal block of cheese."
Researcher	"Cool. That sounds really good. What kind of cheese is it?"
Luke	"Um, cheddar, sometimes I use Swiss."
Luke	"I just love cheese so much. I know every kind of cheese. Personal favorite is pepper jack."